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January 20, 2020
Project No. 8128.02.19

Mr. Hunter Young
U.S. Environmental Protection Agency
Region 10—Oregon Operations Office
805 SW Broadway, Suite 500
Portland, Oregon 97205

Re: Results of Siltronic 2019 Sediment Sampling: Willamette River Mile 6.55 to 6.9 West

Dear Hunter:

Maul Foster & Alongi, Inc. (MFA) has prepared this sediment sampling results data package on behalf of its client, Siltronic Corporation (Siltronic). Siltronic performed sediment sampling activities to obtain data in support of future remedial design activities and to demonstrate their leadership role in the Portland Harbor Superfund Site. Siltronic is requesting U.S. Environmental Protection Agency (USEPA) review of the data for approval.

This cover letter serves to itemize the attached analytical data, data validation, and field documentation. Sediment sampling activities were performed by MFA on behalf of Siltronic on the west side of the Willamette River in Portland, Oregon, between approximately 6.55 and 6.9 miles upstream of the confluence with the Columbia River (Willamette river mile [RM] 6.55 to 6.9 west), referred to as the Area of Interest (AOI). The AOI, which extends from the shoreline to the navigation channel, includes the in-water area adjacent to the Siltronic property located at 7200 NW Front Avenue in Portland, Oregon, and is part of the USEPA-identified sediment decision unit RM 7 west (see Figure 1).

Between October 7 and October 10, 2019, sediment from the AOI was retrieved, processed, and analyzed consistent with the Siltronic Work Plan/Quality Assurance Project Plan/Health and Safety Plan provided in Attachment A. Sampling activities were conducted as authorized by the U.S. Army Corps of Engineers (COE) permit number NWP-2019-369 and an Oregon Department of State Lands General Authorization for Certain Minimal Disturbance Activities within Essential Salmonid Habitat. Sample locations are shown in the attached Figures 2 and 3 and sample summaries are provided in the attached Tables 1 and 2. Samples were collected by MFA from aboard the vessel *Carolyn Dow*, operated by Research Support Services Incorporated of Bainbridge Island, Washington, under MFA subcontract.

Surface sediment samples were collected using a pneumatically operated Van-Veen-type sampler deployed from the *Carolyn Dow*. A three-point composite was collected at each surface sample location. Surface sediments were processed and sampled by MFA staff onboard the support vessel. Subsurface samples were collected from the *Carolyn Dow*, using a Vibracore sampler with dedicated acetate core tube liners. Subsurface sediment cores were transferred to an indoor area at the Siltronic facility for processing and sampling by MFA staff. All sediment sampling was conducted within 24 hours of sediment collection. Surface and subsurface sediment sampling intervals, dates, times, containers, and other supporting information are summarized in the attached documentation.

Sediment sample analysis was overseen by Apex Laboratories LLC (Apex) of Tigard, Oregon. Samples were transferred to Apex on ice and under chain-of-custody procedures. A summary of the resulting data is provided as Table 3. Laboratory analytical reports are provided in Attachment B. Analytical data validation was performed by AlterEcho of Chantilly, Virginia; data validation memoranda are provided in Attachment C. All data are acceptable for use with the appropriate qualifiers assigned. A flat-file (.csv format) providing all validated data and sample attributes is provided as Attachment D.

Field activities, which were thoroughly documented, included the following:

- Field sampling forms (Attachment E)
- Sediment descriptions and boring logs completed by a geologist registered in Oregon (Attachment F)
- Photographs of sample-collection activities (Attachment G), surface samples retrieved (Attachment H), and complete sediment cores retrieved (Attachment I)

Consistent with the requirements of the COE permit, investigation-derived waste (IDW) was containerized either aboard the *Carolyn Dow* or at the sediment core processing area located on Siltronic property, depending on waste type. IDW was characterized and disposed of appropriately by a licensed waste hauler.

Sincerely,

Maul Foster & Alongi, Inc.

Phil Wiescher, PhD
Senior Environmental Scientist

Michael R. Murray, RG
Senior Hydrogeologist

Attachments: Limitations
Tables
Figures
Attachment A—Work Plan/QAPP/HASP

Attachment B—Laboratory Analytical Reports
Attachment C—Data Validation Memoranda
Attachment D—Data File
Attachment E—Field Sample Forms
Attachment F—Boring Logs
Attachment G—Sample Collection Photolog
Attachment H—Surface Sediment Photolog
Attachment I—Subsurface Sediment Photolog

cc: Sean Sheldrake, USEPA
Myron Burr, Siltronic Corporation
David Rabbino, Jordan Ramis

LIMITATIONS

The services undertaken in completing this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

TABLES

Table 1
Surface Sediment Sample Summary
Siltronic Corporation
Portland, Oregon

Sample Location	Date	Attempt	Radius (feet)	Water Depth (feet)	Sample Depth (cm bml)	Sample Name	Observations
SED-01	10/09/2019	1	1.9	10.8	0 - 21	SED-01-SS-1.0	Silt with sand (ML); gray; 90% fines; 10% sand, fine; trace rootlets, very soft; no odor or sheen.
		5	48.5	29.7	0 - 30		
		6	46.7	24.5	0 - 28		
SED-02	10/09/2019	1	1.7	3.4	0 - 23	SED-02-SS-1.0	Sandy silt (ML); gray; 85% fines; 15% sand, fine- to medium-grained; trace organic debris and rootlets; slight odor and no sheen.
		3	8.6	5.8	0 - 30		
		4	14.3	11.6	0 - 27		
SED-03	10/09/2019	1	6.93	13.5	0 - 23	SED-03-SS-1.0	Silty sand (SM); gray to brown; 30% fines; 70% sand; loose; no odor or sheen.
		2	6.05	6.3	0 - 25		
		3	6.05	6.4	0 - 23		
SED-04	10/09/2019	1	8.58	15.1	0 - 27	SED-04-SS-1.0 SED-04-SS-1.0-DUP	Sandy silt (ML); gray; 70% fines; 30% sand; soft; trace rootlets; sheen and odor.
		2	6.97	16.3	0 - 25		
		3	0.99	18.7	0 - 21		
SED-05	10/10/2019	1	9.4	4.7	0 - 20.5	SED-05-SS-1.0	Sand (SP); gray; 100% sand, fine- to coarse-grained; trace gravel and cobbles; loose to medium dense; slight odor and no sheen.
		2	0.5	6.4	0 - 25		
		3	11.8	8.7	0 - 25		
SED-06	10/10/2019	1	1.2	8.1	0 - 24.5	SED-06-SS-1.0	Sand with silt (SW-SM); gray; 10% fines; 90% sand, fine- to medium-grained; trace gravel; loose; slight odor and no sheen.
		2	5.8	15.2	0 - 25		
		3	7.3	9.8	0 - 22		
SED-07	10/10/2019	2	2.1	13.4	0 - 23	SED-07-SS-1.0 SED-07-SS-1.0-DUP	Sandy silt (ML); gray; 70% fines; 30% sand, fine; soft to firm; rootlets; hydrocarbon-like odor and slight sheen.
		3	6.4	15.6	0 - 20.5		
		5	10.9	14.3	0 - 23		
SED-08	10/10/2019	1	21.11	17.8	0 - 21	SED-08-SS-1.0	Sand with silt (SW-SM); gray; 10% fines; 90% sand, fine- to coarse-grained; trace gravel, fine size; loose; wood fragments; no odor or sheen.
		2	7.91	15.3	0 - 22		
		3	22.3	4.5	0 - 23		
SED-09	10/10/2019	2	10.64	18.6	0 - 25	SED-09-SS-1.0	Silty sand (SM); gray; 20% fines; 80% sand; very soft; slight hydrocarbon-like odor and sheen.
		3	5.91	17.8	0 - 26		
		4	13.01	21.6	0 - 27		

Table 1
Surface Sediment Sample Summary
Siltronic Corporation
Portland, Oregon

Sample Location	Date	Attempt	Radius (feet)	Water Depth (feet)	Sample Depth (cm bml)	Sample Name	Observations
SED-10	10/10/2019	1	7.2	14.6	0 - 27	SED-10-SS-1.0	Silt with sand (ML); gray; 75% fines; 25% sand, fine; very soft; hydrocarbon-like odor and slight sheen.
		2	12.55	27.8	0 - 29		
		3	21.86	32.8	0 - 27		

NOTES:
bml = below mudline.
cm = centimeter.

Table 2
Subsurface Sediment Sample Summary
Siltronic Corporation
Portland, Oregon

Sample Location	Date Collected	Date Processed	Sample Interval	Sample Name	Submitted for Analyses?
SED-01	10/08/2019	10/09/2019	0 - 2.0	SED-01-SB-2.0	X
			2.0 - 3.5	SED-01-SB-3.5	--
			3.5 - 5.5	SED-01-SB-5.5	X
			5.5 - 6.65	SED-01-SB-6.65	--
			6.65 - 8.65	SED-01-SB-8.65	X
SED-02	10/08/2019	10/09/2019	0 - 2.0	SED-02-SB-2.0	X
			2.0 - 3.0	SED-02-SB-3.0	--
			3.0 - 5.0	SED-02-SB-5.0	X
			5.0 - 6.25	SED-02-SB-6.25	--
			6.25 - 8.25	SED-02-SB-8.25	X
SED-03	10/08/2019	10/09/2019	0 - 2.0	SED-03-SB-2.0	X
			2.0 - 3.0	SED-03-SB-3.0	--
			3.0 - 5.0	SED-03-SB-5.0	X
			5.0 - 6.45	SED-03-SB-6.45	--
			6.45 - 8.45	SED-03-SB-8.45	X
SED-04	10/07/2019	10/08/2019	0 - 2.0	SED-04-SB-2.0	X
			2.0 - 2.75	SED-04-SB-2.75	--
			2.75 - 4.75	SED-04-SB-4.75	X
			4.75 - 5.75	SED-04-SB-5.75	--
			5.75 - 7.75	SED-04-SB-7.75	X
SED-05	10/07/2019	10/07/2019	0 - 2.0	SED05-SB-2	X
			2.0 - 3.0	SED05-SB-3	--
			3.0 - 5.0	SED05-SB-5	X
			5.0 - 7.0	SED05-SB-7	X
SED-06	10/07/2019	10/08/2019	0 - 2.0	SED-06-SB-2.0	X
			2.0 - 3.5	SED-06-SB-3.5	--
			3.5 - 5.5	SED-06-SB-5.5	X
			5.5 - 6.5	SED-06-SB-6.5	--
			6.5 - 8.5	SED-06-SB-8.5	X
SED-07	10/07/2019	10/08/2019	0 - 2.0	SED-07-SB-2.0	X
			2.0 - 4.35	SED-07-SB-4.35	X
			4.35 - 6.35	SED-07-SB-6.35	X
SED-08	10/08/2019	10/09/2019	0 - 2.0	SED-08-SB-2.0	X
			2.0 - 3.25	SED-08-SB-3.25	X
SED-09	10/08/2019	10/09/2019	0 - 2.0	SED-09-SB-2.0	X
			2.0 - 2.85	SED-09-SB-2.85	--
			2.85 - 4.85	SED-09-SB-4.85	X
			4.85 - 6.85	SED-09-SB-6.85	X
SED-10	10/08/2019	10/09/2019	0 - 2.0	SED-10-SB-2.0	X
			2.0 - 3.0	SED-10-SB-3.0	--
			3.0 - 5.2	SED-10-SB-5.2	X
			5.2 - 7.2	SED-10-SB-7.2	X

Table 2
Subsurface Sediment Sample Summary
Siltronic Corporation
Portland, Oregon

NOTES:
X = yes.
-- = no.

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-01				SED-02				SED-03			
Sample Name	SED-01-SS-1.0	SED-01-SB-2.0	SED-01-SB-5.5	SED-01-SB-8.65	SED-02-SS-1.0	SED-02-SB-2.0	SED-02-SB-5.0	SED-02-SB-8.25	SED-03-SS-1.0	SED-03-SB-2.0	SED-03-SB-5.0	SED-03-SB-8.45
Collection Date	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	2	5.5	8.65	1	2	5	8.25	1	2	5	8.45
Cyanide (mg/kg)												
Total Cyanide	1.47 J-	5.5	12.6	1.14	1.05 J-	1.44	1.01	3.16	0.381 J-	2.62 J-	2.33 J-	0.925 J-
TPH (mg/kg)												
Diesel-Range Hydrocarbons	18.4 U	18.6 U	17.7 U	16.3 U	16.6 U	16.4 U	15.6 U	15.9 U	13.1 U	14.8 U	14.2 U	84.8 U
Heavy-Oil (Residual) Range Hydrocarb	298	732	582	918	217	259	246	893	76.6	273	282 J	3080
Total Metals (mg/kg)												
Arsenic	2.84	4.52	4.54	4.41	3.19	3.02	4.57	4.78	2.52	2.99	4.11	4.69
Barium	93.8 J+	168	168	195	118 J+	143	163	215	62.2 J+	180	157	150
Cadmium	0.141 J	0.292	0.426	0.457	0.191	0.177	0.338	0.415	0.0639 U	0.209	0.354	0.449
Chromium	16.5 J+	25.3	25.7	25	18.4 J+	16.5	24.3	30.8	7.54 J+	19.4	22.8	28.3
Copper	24.7 J+	41.1	46.9	45.6	26.2 J+	27.8	41.2	46.7	11.4 J+	32	33	40.6
Lead	11.5	23.5	32.8	31.8	14.7	14.5	30.6	46.1	4.77	19.9	49.6	31.6
Mercury	0.0784	0.31	0.565	0.27	0.0531 J	0.0448 J	0.401	0.165	0.0256 U	0.0543 J	0.144	0.255
Selenium	0.461 U	0.843 J	0.881 J	0.766 J	0.426 U	0.584 J	0.786 J	0.763 J	0.32 U	0.778 J	0.608 J	0.792 J
Silver	0.0923 U	0.371	0.717	0.781	0.111 J	0.149 J	0.462	0.367	0.0639 U	0.171	0.258	0.71
Zinc	79.2 J+	145	131	124	86.3 J+	103	147	259	47.3 J+	118	177	141
Organotins (ug/kg)												
Tri-n-butyltin	2.6 J	3 U	2.7 U	2.7 U	3.4 J	2.3 U	2.7 U	2.4 U	2.3 U	2.3 U	2.8 U	2.1 U
SVOCs (ug/kg)												
1,2,4-Trichlorobenzene	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	42.6 U	221 U	211 U	5590 U
1,2-Dichlorobenzene	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	42.6 U	221 U	211 U	5590 U
1,2-Dinitrobenzene	6,070 U	2,490 U	2,330 U	2,340 U	2,210 U	2,210 U	2,180 U	2,140 U	426 U	2,210 U	2,110 U	55,900 U
1,3-Dichlorobenzene	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
1,3-Dinitrobenzene	6,070 U	2,490 U	2,330 U	2,340 U	2,210 U	2,210 U	2,180 U	2,140 U	426 U	2,210 U	2,110 U	55,900 U
1,4-Dichlorobenzene	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
1,4-Dinitrobenzene	6,070 U	2,490 U	2,330 U	2,340 U	2,210 U	2,210 U	2,180 U	2,140 U	426 U	2,210 U	2,110 U	55,900 U
1-Methylnaphthalene	487 U	905	1,130	12,600	177 U	177 U	175 U	736	34 U	178 U	169 U	4,480 U
2,2'-oxybis(1-chloropropane)	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
2,3,4,6-Tetrachlorophenol	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
2,3,5,6-Tetrachlorophenol	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
2,4,5-Trichlorophenol	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
2,4,6-Trichlorophenol	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
2,4-Dichlorophenol	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
2,4-Dimethylphenol	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
2,4-Dinitrophenol	6,070 U	2,490 U	2,330 U	2,340 U	2,210 U	2,210 U	2,180 U	2,140 U	426 U	2,210 U	2,110 U	55,900 U
2,4-Dinitrotoluene	2,420 U	994 U	932 U	1,870 U	881 U	883 U	870 U	856 U	170 U	885 U	843 U	22,300 U
2,6-Dinitrotoluene	2,420 U	994 U	932 U	934 U	881 U	883 U	870 U	856 U	170 U	885 U	843 U	22,300 U
2-Chloronaphthalene	242 U	99 U	93 U	93 U	88 U	88 U	87 U	86 U	17 U	89 U	84 U	2,230 U
2-Chlorophenol	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
2-Methylnaphthalene	487 U	290 J	754	19,100	177 U	270 J	175 U	173 J	34 U	178 U	290 J	4,480 U
2-Methylphenol	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
2-Nitroaniline	4,870 U	2,000 U	1,870 U	1,870 U	1,770 U	1,770 U	1,750 U	1,720 U	341 U	1,780 U	1,690 U	44,800 U
2-Nitrophenol	2,420 U	994 U	932 U	934 U	881 U	883 U	870 U	856 U	170 U	885 U	843 U	22,300 U
3- & 4-Methylphenol (m,p-Cresol)	607 U	407 J	405 J	434 J	221 U	221 U	921	214 U	43 U	221 U	271 J	5,590 U
3,3-Dichlorobenzidine	4,870 U	2,000 U	1,870 U	1,870 U	1,770 U	1,770 U	1,750 U	1,720 U	341 U	1,780 U	1,690 U	44,800 U
3-Nitroaniline	4,870 U	2,000 U	1,870 U	1,870 U	1,770 U	1,770 U	1,750 U	1,720 U	341 U	1,780 U	1,690 U	44,800 U
4,6-Dinitro-2-methylphenol	6,070 U	2,490 U	2,330 U	2,340 U	2,210 U	2,210 U	2,180 U	2,140 U	426 U	2,210 U	2,110 U	55,900 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-01				SED-02				SED-03			
Sample Name	SED-01-SS-1.0	SED-01-SB-2.0	SED-01-SB-5.5	SED-01-SB-8.65	SED-02-SS-1.0	SED-02-SB-2.0	SED-02-SB-5.0	SED-02-SB-8.25	SED-03-SS-1.0	SED-03-SB-2.0	SED-03-SB-5.0	SED-03-SB-8.45
Collection Date	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	2	5.5	8.65	1	2	5	8.25	1	2	5	8.45
4-Bromophenylphenyl ether	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
4-Chloro-3-methylphenol	2,420 U	994 U	932 U	934 U	881 U	883 U	870 U	856 U	170 U	885 U	843 U	22,300 U
4-Chloroaniline	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
4-Chlorophenylphenyl ether	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
4-Nitroaniline	4,870 U	2,000 U	1,870 U	1,870 U	1,770 U	1,770 U	1,750 U	1,720 U	341 U	1,780 U	1,690 U	44,800 U
4-Nitrophenol	2,420 U	2,000 U	1,870 U	2,810 U	881 U	883 U	870 U	1,720 U	170 U	885 U	843 U	22,300 U
Acenaphthene	557 J	1,810	2,080	24,400	1,310	6,980	594	1,470	33 J	5,300	3,610	6,540
Acenaphthylene	242 U	204	223	881 U	143 J	177 U	87 U	310	73	89 U	292	2,230 U
Aniline	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
Anthracene	381 J	2,230	2,410	18,500	400	3,380	183	1,280	33 J	2,140	1,280	8,280
Azobenzene	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
Benzo(a)anthracene	1,150 J	2,110	2,190	17,600	903	1,520	773	2,030	208	992	2,590	20,300
Benzo(a)pyrene	1,690 J	2,070	2,490	19,500	978	1,010	1,050	2,550	455	549	2,750	28,700
Benzo(b)fluoranthene	1,560 J	1,930	2,370	17,400	1,000	1,120	985	2,250	420	649	2,590	26,600
Benzo(ghi)perylene	1,130 J	1,380	2,040	13,700	740	580	742	1,940	407	231	2,200	20,900
Benzo(k)fluoranthene	858 J	734 J	882 J	6,190 J	360 J	509 J	419 J	878 J	161 J	316 J	1,020 J	12,900 J
Benzoic acid	30,400 U	12,500 U	11,700 U	11,700 U	11,100 U	11,100 U	10,900 U	10,800 U	2,130 U	11,100 U	10,600 U	280,000 U
Benzyl alcohol	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,700 J
Bis(2-chloroethoxy)methane	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
Bis(2-chloroethyl)ether	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
Bis(2-ethylhexyl)phthalate	3,640 U	1,490 U	1,400 U	1,400 U	1,320 U	1,330 U	1,310 U	1,290 U	256 U	1,330 U	1,270 U	33,600 U
Butylbenzylphthalate	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
Carbazole	364 U	149 U	217 J+	1,680 J+	132 U	133 U	131 U	176 J+	26 U	133 U	127 U	3,360 U
Chrysene	1,380 J	2,500	2,890	18,900	1,020	1,760	891	2,600	269	1,130	3,200	25,000
Di(2-ethylhexyl)adipate	6,070 U	2,490 U	2,330 U	2,340 U	2,210 U	2,210 U	2,180 U	2,140 U	426 U	2,210 U	2,110 U	55,900 U
Dibenzo(a,h)anthracene	242 U	186 J	231	1,620	121 J	92 J	87 U	227	47	89 U	289	2,350 J
Dibenzofuran	242 U	180 J	324	2,320	256	526	87 U	301	17 U	221	1,180	2,230 U
Diethyl phthalate	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
Dimethyl phthalate	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
Di-n-butyl phthalate	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
Di-n-octyl phthalate	1,950 U	800 U	750 U	751 U	709 U	710 U	700 U	689 U	137 U	712 U	678 U	18,000 U
Fluoranthene	2,520 J	7,170	8,000	57,300	2,990	7,640	2,030	5,490	243	6,020	8,150	68,200
Fluorene	346 J	1,370	1,710	17,600	983	5,080	363	1,130	20 J	3,730	2,530	5,950
Hexachlorobenzene	242 U	99 U	93 U	93 U	88 U	88 U	87 U	86 U	17 U	89 U	84 U	2,230 U
Hexachlorobutadiene	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
Hexachlorocyclopentadiene	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
Hexachloroethane	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
Indeno(1,2,3-cd)pyrene	1,060 J	1,180	1,590	11,300	693	551	666	1,590	341	233	1,650	19,000
Isophorone	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
Naphthalene	487 U	599	891	3,160	498	538	236 J	460	42 J	223 J	750	4,730 J
Nitrobenzene	2,420 U	994 U	932 U	934 U	881 U	883 U	870 U	856 U	170 U	885 U	843 U	22,300 U
N-Nitrosodimethylamine	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
N-Nitrosodiphenylamine	607 U	498 U	467 U	1,450 U	221 U	221 U	218 U	214 U	43 U	221 U	423 U	5,590 U
N-Nitrosodipropylamine	607 U	249 U	233 U	234 U	221 U	221 U	218 U	214 U	43 U	221 U	211 U	5,590 U
Pentachlorophenol	2,420 U	994 U	932 U	934 U	881 U	883 U	870 U	856 U	170 U	885 U	843 U	22,300 U
Phenanthrene	2,130 J	10,900	11,100	143,000	4,040	13,200	1,650	7,040	68	11,500	10,200	68,800
Phenol	487 U	200 U	187 U	187 U	177 U	177 U	175 U	172 U	34 U	178 U	169 U	4,480 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-01				SED-02				SED-03			
Sample Name	SED-01-SS-1.0	SED-01-SB-2.0	SED-01-SB-5.5	SED-01-SB-8.65	SED-02-SS-1.0	SED-02-SB-2.0	SED-02-SB-5.0	SED-02-SB-8.25	SED-03-SS-1.0	SED-03-SB-2.0	SED-03-SB-5.0	SED-03-SB-8.45
Collection Date	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	2	5.5	8.65	1	2	5	8.25	1	2	5	8.45
Pyrene	2,940 J	8,940	9,820	66,600	2,820	6,480	2,220	6,850	356	4,880	8,650	81,600
Pyridine	1,220 U	498 U	467 U	468 U	442 U	443 U	436 U	429 U	85 U	444 U	423 U	11,200 U
PAH Homologs (ug/kg)												
C1-Chrysenes/Benz(a)anthracenes	1,130	3,550	1,060	5,900	2,090	673	484	3,990	150	994	1,580	6,310
C1-Fluoranthenes/Pyrenes	1,610	6,560	2,370	13,800	4,630	1,840	850	6,490	207	3,110	3,270	14,900
C1-Fluorenes	366 U	1,910	917	5,760	511	678	321 U	1,440	100 U	1,430	795	3,030
C1-Phenanthrenes/Anthracenes	1,780	15,100	5,190	29,800	3,950	3,130	1,050	12,200	100 U	5,660	5,480	20,900
C2-Chrysenes/Benz(a)anthracenes	665	2,010	568	3,140	881	317 U	321 U	2,720	111	413	964	3,210
C2-Fluorenes	366 U	2,470	959	4,760	536	317 U	321 U	1,830	100 U	457	861	3,550
C2-Naphthalenes	477	7,290	5,110	44,400	500	2,150	465	5,210	100 U	2,800	2,100	8,850
C2-Phenanthrenes/Anthracenes	1,720	10,800	3,190	15,400	2,360	1,390	1,020	10,200	100 U	2,270	4,280	11,900
C3-Chrysenes/Benz(a)anthracenes	470	1,270	345 U	2,020	527	317 U	321 U	1,530	100 U	333 U	648	2,170
C3-Fluorenes	366 U	1,130	542	2,930	376	317 U	321 U	1,090	100 U	370	568	2,400
C3-Naphthalenes	565	8,320	4,290	30,300	791	1,120	520	5,300	100 U	1,820	2,510	11,300
C3-Phenanthrenes/Anthracenes	1,070	4,730	1,370	5,760	900	589	611	5,480	100 U	844	2,090	5,130
C4-Chrysenes/Benz(a)anthracenes	732 U	866	691 U	3,560 U	764	634 U	642 U	978	201 U	665 U	647 U	3,420 U
C4-Naphthalenes	449	4,330	2,280	13,200	719	388	345	2,860	100 U	779	1,730	6,110
C4-Phenanthrenes/Anthracenes	732 U	2,470	976	5,030	658 U	634 U	642 U	2,350	201 U	1,040	1,110	9,340
Chlorinated Herbicides (mg/kg)												
2,4,5-T	0.034 U	0.042 U	0.037 U	0.035 U	0.032 U	0.033 U	0.034 U	0.035 U	0.028 U	0.033 U	0.033 U	0.034 U
2,4-D	0.042 U	0.051 U	0.046 U	0.043 U	0.039 U	0.041 U	0.042 U	0.043 U	0.035 U	0.041 U	0.04 U	0.042 U
2,4-DB	0.1 U	0.13 U	0.11 U	0.11 U	0.096 U	0.1 U	0.1 U	0.11 U	0.085 U	0.1 U	0.099 U	0.1 U
Dalapon	0.11 U	0.14 U	0.13 U	0.12 U	0.11 U	0.11 U	0.11 U	0.12 U	0.095 U	0.11 U	0.11 U	0.12 U
Dicamba	0.054 U	0.067 U	0.06 U	0.056 U	0.051 U	0.053 U	0.054 U	0.056 U	0.045 U	0.054 U	0.052 U	0.055 U
Dichlorprop	0.043 UJ	0.053 U	0.047 U	0.045 U	0.04 U	0.042 U	0.043 U	0.044 U	0.036 U	0.042 U	0.041 U	0.043 U
Dinoseb	0.023 U	0.028 U	0.025 U	0.024 U	0.021 U	0.022 U	0.023 U	0.024 U	0.019 U	0.023 U	0.022 U	0.023 U
MCPA	4.8 U	5.9 U	5.2 U	5 U	4.4 U	4.7 U	4.8 U	4.9 U	3.9 U	4.7 U	4.6 U	4.8 U
MCPP (Mecoprop)	4.1 U	5.1 U	4.5 U	4.3 U	3.8 U	4 U	4.1 U	4.2 U	3.4 U	4.1 U	4 U	4.2 U
Pentachlorophenol	0.038 U	0.047 U	0.042 U	0.04 U	0.036 U	0.037 U	0.038 U	0.039 U	0.032 U	0.038 U	0.037 U	0.039 U
Picloram	0.043 U	0.053 U	0.048 U	0.045 U	0.041 U	0.042 U	0.043 U	0.045 U	0.036 U	0.043 U	0.042 U	0.044 U
Silvex	0.043 U	0.053 U	0.048 U	0.045 U	0.041 U	0.042 U	0.043 U	0.045 U	0.036 U	0.043 U	0.042 U	0.044 U
Organochlorine Pesticides (ng/g)												
2,4'-DDD	13.9 J-	18.6	219	193 J+	6.66 J-	11	16.6	45.7	4.96 J-	2.89 J-	45.3 J-	7.47 J-
2,4'-DDE	1.7 UJK	13.1	67.5	39.2	1.7 UJK	2.9 UJK	1.6 UJK	11 UJK	0.62 UJK	2.8 UJK	7.47 J-	1.1 UJK
2,4'-DDT	1.55 J-	3.42	5.23	3.29 J+	0.67 J-	194	0.47 J	2.54 J	4.63 J-	0.11 J-	1.23 J-	0.34 J-
4,4'-DDD	34 J-	77.9	599	393 J+	21.1 J-	57.9	45.3	179	7.16 J-	12 J-	135 J-	22.8 J-
4,4'-DDE	7.87 J-	48.4	142	70.4	11.7 J-	16.1	10	63.7	3.93 J-	13.7 J-	29.3 J-	2.1 J-
4,4'-DDT	2.33 J-	243 J	962	153 J+	2.2 J-	1390 J	27.3	16.3	20.8 J-	0.424 J-	191 J-	9.2 J-
Aldrin	2 UJK	4 UJK	3.2 UJK	1.6 UJK	2 UJK	7.4 UJK	5.8 UJK	53 UJK	0.19 UJK	6.6 UJK	11 UJK	0.48 UJK
alpha-BHC	0.066 UJ	0.36 U	0.065 U	0.32 U	0.064 UJ	0.059 U	0.063 U	0.058 U	0.047 UJ	0.062 UJ	0.11 UJ	0.12 UJ
alpha-Chlordane	0.14 UJK	0.35 J	0.49 UJK	0.22 U	0.118 J-	0.18 UJK	0.25 UJK	0.49 UJK	0.035 J-	0.106 J-	0.27 UJK	0.084 UJ
beta-BHC	0.15 UJ	0.8 U	0.15 U	0.75 U	0.15 UJ	0.14 U	0.15 U	0.14 U	0.11 UJ	0.14 UJ	0.26 UJ	0.29 UJ
beta-Chlordane	0.25 J-	0.91 J	0.81 J	0.27 UJK	0.2 UJK	0.308 J	0.493 J	1.45	0.038 UJ	0.27 UJK	0.876 J-	0.1 UJ
cis-Nonachlor	0.13 UJ	0.14 U	0.14 UJK	0.64 U	0.13 UJ	0.12 U	0.12 U	0.15 UJK	0.092 UJ	0.12 UJ	0.22 UJ	0.24 UJ
delta-BHC	0.11 UJ	0.6 U	0.11 U	0.53 U	0.1 UJ	0.096 U	0.1 U	0.095 U	0.076 UJ	0.1 UJ	0.18 UJ	0.2 UJ
Dieldrin	0.13 UJ	0.14 U	0.13 U	0.65 U	0.13 UJ	0.12 U	0.13 U	0.89 UJK	0.093 UJ	0.12 UJ	0.22 UJ	0.25 UJ
Endosulfan I	0.29 UJ	0.31 U	0.29 U	1.4 U	0.28 UJ	0.26 U	0.28 U	0.25 U	0.2 UJ	0.27 UJ	0.49 UJ	0.54 UJ

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-01				SED-02				SED-03			
Sample Name	SED-01-SS-1.0	SED-01-SB-2.0	SED-01-SB-5.5	SED-01-SB-8.65	SED-02-SS-1.0	SED-02-SB-2.0	SED-02-SB-5.0	SED-02-SB-8.25	SED-03-SS-1.0	SED-03-SB-2.0	SED-03-SB-5.0	SED-03-SB-8.45
Collection Date	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	2	5.5	8.65	1	2	5	8.25	1	2	5	8.45
Endosulfan II (beta)	0.2 UJ	0.22 UJ	0.2 UJ	1 UJ	0.25 UJK	0.18 UJ	0.2 UJ	0.18 UJ	0.35 UJK	0.19 UJ	0.35 UJ	0.38 UJ
Endosulfan sulfate	0.26 UJ	0.28 UJ	0.26 UJ	1.3 UJ	0.25 UJ	0.23 UJ	0.25 UJ	0.23 UJ	0.18 UJ	0.24 UJ	0.44 UJ	0.49 UJ
Endrin	0.45 UJK	2.3 UJK	3.1 UJK	0.55 U	0.11 UJ	0.1 U	0.81 UJK	0.1 U	0.08 UJ	0.11 UJ	0.19 UJ	0.21 UJ
Endrin aldehyde	0.26 UJ	0.28 U	0.25 U	1.3 U	0.25 UJ	0.48 UJK	0.25 U	0.23 U	0.18 UJ	0.24 UJ	0.43 UJ	0.48 UJ
Endrin ketone	0.16 UJ	0.17 U	0.16 U	0.79 U	0.16 UJ	0.14 U	0.15 U	0.14 U	0.11 UJ	0.15 UJ	0.27 UJ	0.3 UJ
Heptachlor	0.14 UJ	0.15 U	0.13 U	0.67 U	0.13 UJ	0.12 U	0.13 U	0.12 U	0.096 UJ	0.13 UJ	0.23 UJ	0.25 UJ
Heptachlor epoxide	0.087 UJ	0.093 U	0.086 U	0.43 U	0.084 UJ	0.078 U	0.083 U	0.077 U	0.061 UJ	0.081 UJ	0.15 UJ	0.16 UJ
Hexachlorobenzene	1.57 J-	1.1 U	1.39 J+	0.94 UJ	0.76 J-	0.66 J+	1.46 J+	4.36 J+	0.52 J-	0.92 J	2.12 J-	0.36 UJ
Lindane	0.071 UJ	0.38 U	0.07 U	0.35 U	0.069 UJ	0.064 U	0.068 U	0.063 U	0.05 UJ	0.067 UJ	0.12 UJ	0.13 UJ
Methoxychlor	0.13 UJ	0.7 U	0.13 UJ	0.62 UJ	0.12 UJ	0.14 UJK	0.12 U	0.55 U	0.09 UJ	0.12 UJ	0.21 UJ	0.24 UJ
Mirex	0.094 UJ	0.1 U	0.093 U	0.46 U	0.091 UJ	0.084 U	0.089 U	0.083 U	0.066 UJ	0.088 UJ	0.16 UJ	0.18 UJ
Oxychlordane	0.21 UJ	0.23 U	0.21 U	1.1 U	0.21 UJ	0.19 U	0.21 U	0.19 U	0.15 UJ	0.2 UJ	0.36 UJ	0.4 UJ
trans-Nonachlor	0.1 UJK	0.086 U	0.12 UJK	0.39 U	0.077 UJ	0.071 U	0.076 U	0.24 UJK	0.056 UJ	0.075 UJ	0.14 UJ	0.15 UJ
Dioxins/Furans (pg/g)												
1,2,3,4,6,7,8-HpCDD	73.9 J	210	123	348	10.6	125	311	111	24.5	151	90.2	151
1,2,3,4,6,7,8-HpCDF	87.9 J	178	114	56.9	6.68	74.9	209	248	4.75 J	104	120	84.3
1,2,3,4,7,8,9-HpCDF	31.9	58.5	32.2	11.1 J	2.71 J	28.7	47.7	95.5	1.28 J	36.9	39	2.72 J
1,2,3,4,7,8-HxCDD	0.952 UJK	1.15 J	0.669 UJK	1.78 U	0.227 U	1.09 J	2.23 J	0.974 J	0.282 U	1.33 UJK	1.16 U	1.66 U
1,2,3,4,7,8-HxCDF	175 J	360	323	56.5	5.9	175	207	554	7.32	180	210	5.27 J
1,2,3,6,7,8-HxCDD	3.1 J	6.65	4.1 J	5.7 UJK	0.544 J	6.83	14.1	5	0.922 J	6.49	3.74 J	4.54 J
1,2,3,6,7,8-HxCDF	43.5 J	99.3	101	15.6 J	1.58 J	38.8	68.1	152	1.79 UJK	49	59.3	3.68 UJK
1,2,3,7,8,9-HxCDD	1.55 UJK	3.02 J	1.86 J	2.4 UJK	0.311 J	3.47 J	5.91	2.47 J	0.285 U	3.07 J	1.9 J	1.84 J
1,2,3,7,8,9-HxCDF	15.8 J	44.2 J-	40.1 J-	7.97 UJK	0.91 J	15.1 J-	21.5 J-	58.3 J-	0.741 J	20.5 J	20.6 J	3.43 UJ
1,2,3,7,8-PeCDD	0.867 UJK	0.887 J	0.753 J	1.36 U	0.149 U	1.3 J	3.31 J	2 J	0.167 U	1.41 J	1.61 J	1.87 J
1,2,3,7,8-PeCDF	93.4 J	188	179	35.3 J	2.97 J	63.7	113	249	3.8 J	93.3	114	2.36 J
2,3,4,6,7,8-HxCDF	8.09	24.6	23.1	5.67 J	0.645 J	8.46	18.2	31.1	0.478 J	12	11.8	4.14 J
2,3,4,7,8-PeCDF	41.5 J	106	73	19 J	1.65 J	25.6	54.6	118	2.09 J	43.6	55.9	5.02 J
2,3,7,8-TCDD	0.472 J	0.458 J	0.676 J	1.44 U	0.0866 U	0.654 J	2 J	1.6 UK	0.102 U	0.592 J	1.02 UK	1.06 U
2,3,7,8-TCDF	72.4 J	151	54.3	26.7	4.09	43.1	93	155	9.52	60.2	102	1.84 UJK
OCDD	920	3,990 J	1,690	3,350	118	1,520	5,380 J	1,640	211	1,910	1,250	1,960
OCDF	139	302	139	152	16	135	424	368	9.46 J	227	201	64.9 J
Total HpCDDs	161	525	293	775	31.7	281	782	249	62.1	300	199	350
Total HpCDFs	172 JK	442 J	243 JK	177 J	15.2 JK	175 J	561 J	485 J	12 J	255 J	238 J	173 J
Total HxCDDs	23.9 JK	63.4 JK	37.3 JK	67.4 JK	4.58 J	55.6 J	116 J	37.4 J	6.38 JK	49.9 JK	28 J	38.8 JK
Total HxCDFs	289 J	666 JK	587 J-	143 JK	12.7 JK	297 JK	502 JK	929 J-	15.4 JK	341 JK	366 JK	90.2 JK
Total PeCDDs	5.07 JK	6.76 JK	6.95 JK	7.25 JK	0.474 JK	8.16 JK	18 JK	8.54 JK	0.587 JK	8.74 JK	6.67 JK	8.8 JK
Total PeCDFs	217 JK	457 JK	405 JK	119 JK	9.18 JK	130 JK	266 JK	556 JK	10.8 JK	205 JK	287 JK	74.2 JK
Total TCDDs	9.89 JK	8.51 JK	8.3 JK	3.75 JK	0.717 JK	6.9 JK	23 JK	8.52 JK	2.03 J	4.65 JK	5.48 JK	1.06 U
Total TCDFs	170 JK	363 JK	119 JK	68.4 JK	10.3 J	98.4 JK	233 JK	404 JK	18 JK	152 JK	267 JK	29.5 JK
PCB Congeners (pg/g)												
2-MonoCB-(1)	25.9 UJK	105 J	15.5 U	53.6 UJK	14.7 J	52.3 J	22 J	138 J	3.24 U	55.3 J	112	28.8 U
3-MonoCB-(2)	16.9 J	21.4 J	20.6 UJK	32.2 J	9.2 J	8.39 J	5 J	22.6 J	2.92 U	6.95 J	12.5 J	27.4 UJK
4-MonoCB-(3)	27.1 UJK	81.7 J	25.5 UJK	53.6 UJK	16.8 J	35.6 J	13 J	114 UJK	2.76 U	28.9 J	69.1 J	38.5 J
2,2'-DiCB-(4)	94.8 J	80.6 J	55.6 U	68.1 U	62.5 J	339	116 J	404	12.6 U	306	421	139 U
2,3-DiCB-(5)	13.4 U	7.67 U	40.2 U	66.6 U	10.7 U	17.8 U	13 U	42.4 U	8.04 U	19.9 U	14.8 U	113 U
2,3'-DiCB-(6)	62.1 J	39.3 J	34.8 U	57.7 U	46.3 UJK	151	48 J	497	6.77 U	177	202	102 U
2,4-DiCB-(7)	11.5 U	13.2 J	33.8 U	56 U	9.15 U	28.8 J	11 U	41.6 J	6.89 U	34.5 J	42.3 J	101 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-01				SED-02				SED-03			
Sample Name	SED-01-SS-1.0	SED-01-SB-2.0	SED-01-SB-5.5	SED-01-SB-8.65	SED-02-SS-1.0	SED-02-SB-2.0	SED-02-SB-5.0	SED-02-SB-8.25	SED-03-SS-1.0	SED-03-SB-2.0	SED-03-SB-5.0	SED-03-SB-8.45
Collection Date	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	2	5.5	8.65	1	2	5	8.25	1	2	5	8.45
2,4'-DiCB-(8)	243	129 J	85.9 UJK	53.6 UJ	149	598	214 J	877 J	13.7 UJK	724	858	95.4 U
2,5-DiCB-(9)	12.2 U	15.3 J	38.2 U	63.4 U	9.73 U	43.1 J	12 U	40.4 U	7.33 U	50.9 UJK	52.7 J	110 U
2,6-DiCB-(10)	10.8 U	3.47 U	28.8 U	47.5 U	8.29 U	18.1 UJK	10 U	22.9 U	7.19 U	8.26 U	13.1 U	90.9 U
3,3'-DiCB-(11)	50.7 J	29.8 J	204	69.9 UJK	35.6 J	16.7 U	24 UJK	154 UJK	37.2 J	31.6 J	59.1 J	108 U
PCBs 12 + 13	38.2 CJ	30 CJ	36.4 CU	60.3 CU	31.8 CJ	60.7 CJ	31 CUJK	223 CJ	7.01 CU	68.5 CJ	94.9 CJ	103 CU
3,5-DiCB-(14)	11.8 U	6.45 U	36.2 U	60 U	9.44 U	16.3 U	12 U	38.9 U	7.11 U	17.9 U	13.1 U	105 U
4,4'-DiCB-(15)	173 J	148	113 UJK	83.3 U	130	403	167	992	13.1 UJK	377	544	116 U
2,2',3-TriCB-(16)	211	177	113 UJK	22.9 U	131	545	254	2,050	7.46 UJK	690	853	36.1 U
2,2',4-TriCB-(17)	287	272	121 J	21.1 U	225	673	293	2,640	9.56 UJK	787	1,080	33.3 U
PCBs 18 + 30	576 C	485 C	267 CJ	71 CJ	373 C	1,270 C	634 C	5,980 C	16.5 CJ	1,570 C	2,410 C	43.6 CUJK
2,2',6-TriCB-(19)	72.1 UJK	46.4 J	35.2 U	32.1 U	48 J	161	58 J	468	5.19 J	150	167	38.5 U
PCBs 20 + 28	1,130 C	998 C	772 C	164 CJ	887 C	2,270 C	1,110 C	11,200 C	47.1 CJ	2,680 C	4,220 C	108 CUJK
PCBs 21 + 33	504 C	452 C	296 CJ	62.5 CJ	352 C	1,040 C	524 C	4,160 C	19.3 CJ	1,350 C	2,010 C	42.8 CJ
2,3,4'-TriCB-(22)	312	260	193	40.5 J	218	661	334	3,350	14.1 UJK	833	1,230	36.4 UJK
2,3,5-TriCB-(23)	5 U	2.55 U	17.1 U	14.9 U	3.6 U	4 U	4 U	15 U	2.69 U	5 U	5 U	23.3 U
2,3,6-TriCB-(24)	5 U	2.82 U	18.5 U	16.2 U	3.98 U	4 U	4 U	16 U	2.97 U	5 U	5 U	24.5 U
2,3',4-TriCB-(25)	125 J	81.5 J	33.4 J	13.9 U	74 J	253	85 J	1,910	4.4 UJK	231	301	21.4 U
PCBs 26 + 29	215 CJ	153 CJ	71.5 CUJK	20.5 CUJK	115 CJ	448 C	175 CJ	2,960 C	7.42 CUJK	419 C	633 C	23.1 CU
2,3',6-TriCB-(27)	42 J	23.6 J	17.9 U	15.6 U	30.4 J	98 UJK	43 J	16 U	2.89 U	105 J	139	24.8 U
2,4',5-TriCB-(31)	924	900	654	169	681	1,860	1,030	12,400	35.6 J	2,250	3,960	104 J
2,4',6-TriCB-(32)	175	11.4 J	31.3 UJK	14.4 U	134	172 J	169	675 J	8.25 UJK	378	515	22.8 U
2,3',5'-TriCB-(34)	16 J	15 UJK	18.1 U	15.8 U	11 J	26 J	14 J	178	2.87 U	30 J	55 J	24.6 U
3,3',4,-TriCB-(35)	26 J	24.4 J	23.9 U	25.8 U	10.8 UJK	36 UJK	18 UJK	267	3.46 U	46 J	77 J	30.4 U
3,3',5-TriCB-(36)	6 U	4.44 U	21.3 U	23 U	5.95 U	5 U	6 U	30 U	3.21 U	6 U	8 U	30.3 U
3,4,4'-TriCB-(37)	307	224	179	38.3 J	222	616	309	2,950	17.7 J	664	1,070	35.8 U
3,4,5-TriCB-(38)	7 U	4.43 U	22.1 U	23.8 U	6.41 U	5 U	6 U	30 U	3.47 U	6 U	8 U	31.5 U
3,4',5-TriCB-(39)	6 U	4.06 U	20.5 U	22.1 U	6.09 U	5 U	6 U	28 U	3.3 U	6 U	8 U	28.4 U
PCBs 40 + 71	574 C	557 C	405 C	95.1 CJ	435 C	948 C	698 C	7,020 CJ+	34.1 CJ	1,120 C	2,690 C	66.2 CJ
2,2',3,4-TetraCB-(41)	94 J	95.8 J	89.7 UJK	36.7 U	53 UJK	152	122	1,070 J+	6.11 U	179	540 UK	33.8 U
2,2',3,4'-TetraCB-(42)	356	403	283	72.9 UJK	301	698	456	4,710 J+	20.1 J	716	1,690	32.1 J
2,2',3,5-TetraCB-(43)	71 J	58.8 J	26.8 UJK	31.4 U	12.6 U	105 J	89 J	710 J+	5.2 U	138	9 U	32.2 U
PCBs 44/47/65	1,430 C	1,900 C	1,330 C	469 CJ	1,070 C	2,390 C	1,780 C	16,700 CJ+	79 CJ	2,620 C	6,310 C	197 CJ
PCBs 45 + 51	239 CJ	256 CJ	124 CJ	30.1 CJ	189 CJ	141 CJ	302 C	2,180 CJ+	16.4 CJ	517 C	1,150 C	27.4 CJ
2,2',3,6'-TetraCB-(46)	74 J	74 J	37 UJK	10.8 U	62 J	6 U	93 J	805 J+	5.01 UJK	166	378	21.1 U
2,2',4,5-TetraCB-(48)	262	272	189	32 J	182	461	330	2,860 J+	10.8 J	516	1,290	26.6 U
PCBs 49 + 69	1,030 C	1,030 C	751 C	237 CJ	801 C	1,670 C	1,210 C	7,120 CJ+	48.7 CJ	1,700 C	4,040 C	136 CJ
PCBs 50 + 53	181 CJ	178 CJ	98 CJ	29.7 CJ	143 CJ	354 C	222 CJ	1,620 CJ+	12.5 CUJK	362 C	842 C	26.5 CJ
2,2',5,5'-TetraCB-(52)	1,890	2,650	2,040	1,030	1,220	2,890	2,400	17,700 J+	84.3 J	2,930	7,530	350 J
2,2',6,6'-TetraCB-(54)	7 UJK	4 UJ	20 UJ	27 U	4 UJK	8 J	5 UJK	33 CJ+	1.78 UJK	7 J	10 UJK	20.1 UJ
2,3,3',4-TetraCB-(55)	10 U	1,510	1,370	28 U	6 U	12 UJK	16 J	50 J+	3.83 U	2,440	39 J	22.9 U
2,3,3',4'-Tetra CB-(56)	742	700	606	103 J	576	1,080	770	8,670 J+	43 J	1,190	3,110	97.4 J
2,3,3',5-TetraCB-(57)	11 U	5 U	19 U	28 U	6 U	13 J	8 U	99 J+	3.95 U	13 U	16 U	22.9 U
2,3,3',5'-TetraCB-(58)	11 U	5 U	19 U	28 U	9 UJK	13 J	8 U	68 UJK	3.94 U	14 U	16 U	23.1 U
PCBs 59/62/75	114 CJ	124 CJ	72 CJ	22 CU	91 CJ	10 CU	138 CJ	1,230 CJ+	5.54 CUJK	232 CJ	523 C	20.7 CU
2,3,4,4'-TetraCB --(60)	273	167	244	46 J	128	286	320	2,740 J+	20.3 J	396	1,260	33 UJK
PCBs 61/70/74/76	2,790 C	2,680 C	2,790 C	1,030 C	2,140 C	3,650 C	2,880 C	26,900 CJ+	117 CJ	4,450 C	11,300 C	442 CJ
2,3,4',5-TetraCB-(63)	77 J	63 J	35 UJK	27 U	36 J	85 J	71 J	749 J+	3.82 U	109 J	301	22.4 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-01				SED-02				SED-03			
Sample Name	SED-01-SS-1.0	SED-01-SB-2.0	SED-01-SB-5.5	SED-01-SB-8.65	SED-02-SS-1.0	SED-02-SB-2.0	SED-02-SB-5.0	SED-02-SB-8.25	SED-03-SS-1.0	SED-03-SB-2.0	SED-03-SB-5.0	SED-03-SB-8.45
Collection Date	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	2	5.5	8.65	1	2	5	8.25	1	2	5	8.45
2,3,4',6-TetraCB-(64)	653	647	536	157 J	486	1,040	783	7,210 J+	38.2 J	1,230	3,040	78.3 UJK
2,3',4,4'-TetraCB-(66)	1,500	5 U	19 U	223 J	1,330	2,110	1,460	16,300 J+	84.9 J	14 U	6,270	177 J
2,3',4,5-TetraCB-(67)	54 J	38 J	17 U	24 U	27 J	87 J	40 J	530 J+	3.42 U	81 J	189	19.9 U
2,3',4,5'-TetraCB-(68)	14 J	40 J	30 J	25 U	15 J	22 J	22 J	122 J+	3.57 U	16 J	48 J	21 U
2,3',5,5'-TetraCB-(72)	27 UJK	60 J	39 UJK	27 U	25 J	42 J	37 J	207 J+	3.87 U	36 J	92 J	22.3 U
2,3',5',6-TetraCB-(73)	4 U	3 U	16 U	22 U	9 U	23 J	22 J	3 UJ	3.85 U	8 U	7 U	20.7 U
3,3',4,4'-TetraCB-(77)	150	128 J	125 J	28 UJK	115 J	227	145	1,570 J+	11 UJK	227	533	26.8 UJK
3,3',4,5-TetraCB-(78)	10 U	5 U	20 U	29 U	6 U	9 U	8 U	20 UJ	3.75 U	13 U	15 U	22.9 U
3,3',4,5'-TetraCB-(79)	9 U	58 UJK	34 J	26 U	28 J	46 J	45 J	17 UJ	3.34 U	44 J	117	25.5 J
3,3',5,5'-TetraCB-(80)	9 U	5 U	17 U	25 U	5 U	8 U	7 U	17 UJ	3.34 U	12 U	14 U	19.9 U
3,4,4',5-TetraCB-(81)	11 U	4 U	16 U	19 U	6 U	8 U	8 U	45 J+	4.16 U	9 U	17 J	22 U
2,2',3,3',4-PentaCB-(82)	284	376	350	187	148	342	351	2,160	23.5 J	395	972	71.1 J
2,2',3,3',5-PentaCB-(83)	148	230	178	115 J	69 J	183	186	788	7.92 UJK	176	409 UK	42.8 J
2,2',3,3',6-PentaCB-(84)	587	835	650	78 UJK	318	712	677	2,940	32.3 J	755	1,720	151 J
PCBs 85/116/117	390 C	576 C	544 C	268 CJ	223 CJ	494 C	491 C	2,850 C	27.4 CJ	551 C	1,290 C	111 CJ
PCBs 86/87/97/109/119/125	1,500 C	2,360 C	2,200 C	1,290 C	749 C	1,830 C	1,950 C	8,570 C	86.2 CJ	1,900 C	4,380 C	461 CJ
PCBs 88 + 91	334 C	485 C	421 C	55 CUJK	222 CJ	447 C	412 C	1,770 C	22.6 CJ	437 C	987 C	83.3 CJ
2,2',3,4,6'-PentaCB-(89)	33 J	19 UJK	30 U	23 U	20 J	19 J	27 J	141 J	5.82 U	50 J	83 J	25.6 U
PCBs 90 + 101	2,410 C	4,990 C	3,460 C	2,270 C	1,200 C	3,040 C	3,490 C	10,000 C	127 CJ	2,800 C	6,660 C	1,030 CJ
2,2',3,5,5'-PentaCB-(92)	592	1,010	978	480	236	655	815	2,330	27.3 J	576	1,590	186 J
PCBs 93 + 100	32 CUJK	55 CUJK	52 CJ	21 CU	22 CJ	39 CJ	42 CJ	111 CJ	5.35 CU	27 CUJK	98 CUJK	24 CU
2,2',3,5,6'-PentaCB-(94)	10 U	16 UJK	30 U	23 U	11 UJK	11 U	15 J	93 J	5.63 U	20 J	44 J	25 U
2,2',3,5',6-PentaCB-(95)	1,880	3,000	2,580	1,360	892	2,180	2,340	5,970	104	2,100	4,790	649 J
2,2',3,6,6'-PentaCB-(96)	18 J	26 J	15 UJK	5 U	14 J	28 J	28 J	174	2.48 U	31 J	72 J	13 U
PCBs 98 + 102	88 CUJK	95 CJ	58 CJ	23 CU	58 CJ	114 CJ	102 CJ	597 C	5.62 CU	119 CJ	296 C	25 CU
2,2',4,4',5-PentaCB-(99)	998	2,030	1,890	1,140	652	1,350	1,440	5,860	60.2 J	1,300	3,010	322 J
2,2',4,5',6-PentaCB-(103)	41 J	96 J	92 J	69 UJK	27 J	50 J	57 J	121 J	5.1 U	42 J	93 J	22 U
2,2',4,6,6'-PentaCB-(104)	2 U	2 U	8 U	6 U	3 U	3 U	3 U	6 U	2.27 U	1 U	3 U	12 U
2,3,3',4,4'-PentaCB-(105)	744	6 U	1,210	639	404	833	931	4,580	72.4 J	836	2,120	270 J
2,3,3',4,5-PentaCB-(106)	8 U	5 U	10 U	12 U	6 U	9 U	12 U	16 U	3.3 U	8 U	10 U	20 U
2,3,3',4',5-PentaCB-(107)	157	255	263	160 J	90 J	174	215	885	8.57 UJK	189	429	62 J
PCBs 108 + 124	72 CJ	95 CJ	111 CJ	61 CJ	34 CJ	77 CJ	77 CJ	325 CJ	5.26 CJ	83 CJ	161 CJ	32 CUJK
PCBs 110 + 115	2,590 C	4,420 C	4,160 C	2,310 C	1,390 C	3,310 C	3,450 C	13,200 C	164 CJ	3,170 C	6,950 C	903 CJ
2,3,3',5,5'-PentaCB-(111)	7 U	11 J	21 U	16 U	4 U	7 U	7 UJK	21 UJ	3.89 U	5 U	10 UJK	17 U
2,3,3',5,6-PentaCB-(112)	6 U	3 U	20 U	15 U	4 U	7 U	6 U	21 U	3.84 U	5 U	6 U	17 U
2,3,4,4',5-PentaCB-(114)	48 J	62 J	74 J	33 UJK	25 J	58 J	57 J	319	4.04 U	57 J	144	23 U
2,3',4,4',5-PentaCB-(118)	1,880	3,160	3,530	1,920	1,090	2,340	2,470	10,500	136	2,130	4,990	740 J
2,3',4,5,5'-PentaCB-(120)	17 J	42 J	44 J	16 U	11 J	19 J	28 J	62 J	3.85 U	16 UJK	46 J	17 U
2,3',4,5',6-PentaCB-(121)	7 U	3 U	21 U	16 U	4 U	8 U	7 U	22 U	3.99 U	5 U	6 U	18 U
2,3,3',4',5'-PentaCB-(122)	26 UJK	31 J	33 J	15 J	16 UJK	28 J	32 J	140 J	3.62 U	35 J	63 J	22 U
2,3',4,4',5'-PentaCB-(123)	27 UJK	31 J	41 UJK	14 U	18 J	34 J	34 J	147 J	3.87 U	34 J	53 UJK	22 U
3,3',4,4',5-PentaCB-(126)	11 U	21 J	32 UJK	15 UJ	6 UJ	11 U	16 U	94 J	3.89 U	14 UJK	9 UJ	23 U
3,3',4,5,5'-PentaCB-(127)	8 U	5 U	10 U	12 U	6 U	9 U	12 U	15 U	3.21 U	8 U	10 U	19 U
PCBs 128 + 166	405 C	697 C	777 C	442 C	173 CJ	411 C	464 C	1,270 C	30.6 CJ	404 C	846 C	215 CJ
PCBs129/138/163	3,640 C	7,790 C	8,360 C	4,730 C	1,460 C	4,690 C	5,260 C	12,500 C	239 CJ	3,400 C	8,160 C	2,120 CJ
2,2',3,3',4,5'-HexaCB-(130)	249	430	432	268	95 J	256	362	824	15.3 J	210	524	120 J
2,2',3,3',4,6-HexaCB-(131)	41 J	81 J	67 J	46 J	15 J	46 J	54 J	150 J	6.64 U	41 J	94 J	34 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-01				SED-02				SED-03			
Sample Name	SED-01-SS-1.0	SED-01-SB-2.0	SED-01-SB-5.5	SED-01-SB-8.65	SED-02-SS-1.0	SED-02-SB-2.0	SED-02-SB-5.0	SED-02-SB-8.25	SED-03-SS-1.0	SED-03-SB-2.0	SED-03-SB-5.0	SED-03-SB-8.45
Collection Date	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	2	5.5	8.65	1	2	5	8.25	1	2	5	8.45
2,2',3,3',4,6'-HexaCB-(132)	1,140	2,590	2,220	1,370	427	1,400	1,650	3,840	64.8 J	1,000	2,490	587 J
2,2',3,3',5,5'-HexaCB-(133)	82 J	195	185	105 J	34 J	91 J	133	296	5.89 UJK	61 J	226	53 J
2,2',3,3',5,6-HexaCB-(134)	213	451	16 U	230	80 J	234	283	710	10.9 UJK	188	459	96 J
PCBs 135 + 151	1,320 C	4,240 C	3,730 C	2,230 C	486 C	1,930 C	2,340 C	5,050 C	70.3 CJ	1,260 C	3,430 C	854 CJ
2,2',3,3',6,6'-HexaCB-(136)	451	1,450	1,160	722	173	678	801	1,450	24.4 J	458	1,090	292 J
2,2',3,4,4',5-HexaCB-(137)	104 J	175	789	99 J	50 J	116	132	453	7.79 J	120	209	47 J
PCBs 139 + 140	63 CJ	155 CJ	119 CJ	81 CJ	26 CJ	61 CJ	85 CJ	292 CJ	5.4 CU	59 CJ	159 CJ	29 CUJK
2,2',3,4,5,5'-HexaCB-(141)	637	1,530	1,500	796	186	910	928	2,100	40.6 J	585	1,470	446 J
2,2',3,4,5,6-HexaCB-(142)	14 U	22 J	15 U	26 U	12 U	13 U	14 U	73 J	6.18 U	8 J	24 UJK	33 U
2,2',3,4,5,6'-HexaCB-(143)	12 U	7 U	14 U	25 U	11 U	13 U	13 U	28 J	5.6 U	7 U	21 U	31 U
2,2',3,4,5',6-HexaCB-(144)	165	5 UJK	280 UK	6 U	57 J	256 J	282	8 UJK	10.3 J	159	410	120 J
2,2',3,4,6,6'-HexaCB-(145)	4 U	5 J	6 U	5 U	4 U	4 U	5 U	13 J	4.6 U	3 J	5 UJK	15 U
2,2',3,4',5,5'-HexaCB-(146)	644	8 UJK	1,510	921	274	761	1,100	2,290	35.7 J	543	1,630	347 J
PCBs 147 + 149	2,920 C	7,170 C	289 CJ	3,440 C	1,140 C	3,850 C	4,550 C	9,130 C	162 CJ	2,500 C	6,700 C	1,680 CJ
2,2',3,4',5,6'-HexaCB-(148)	11 UJK	47 J	50 J	30 J	6 J	18 UJK	30 J	55 J	6.21 U	10 UJK	51 J	19 U
2,2',3,4',6,6'-HexaCB-(150)	6 UJK	29 J	24 J	15 J	6 J	12 J	17 J	22 UJK	4.37 U	6 J	15 UJK	15 U
2,2',3,5,6,6'-HexaCB-(152)	4 U	6 J	6 U	5 U	4 U	4 U	4 U	15 UJK	4.46 U	3 J	7 J	15 U
PCBs 153 + 168	3,090 C	8,180 C	7,880 C	4,430 C	1,280 C	4,120 C	4,910 C	10,500 C	183 CJ	2,880 C	7,320 C	2,060 CJ
2,2',4,4',5,6'-HexaCB-(154)	62 J	221	190	130 J	35.5 UJK	81 J	131	237	5.06 U	55 J	187	33 J
2,2',4,4',6,6'-HexaCB-(155)	3 U	2 UJK	6 U	4 U	3.69 U	4 U	4 U	5 U	4.38 U	2 U	3 U	12 U
PCBs 156 + 157	349 C	701 C	757 C	392 C	146 CJ	447 C	443 C	1,210 C	33.3 CJ	314 C	712 C	233 CJ
2,3,3',4,4',6-HexaCB-(158)	290	4 U	583	17 U	107 J	355	362	954	21.1 J	233	634	157 J
2,3,3',4,5,5'-HexaCB-(159)	11 U	7 U	12 U	14 U	5.02 U	8 U	10 U	19 U	3.37 U	9 U	13 U	20 U
2,3,3',4,5,6-HexaCB-(160)	10 U	603	10 U	392	8.03 U	9 U	10 U	17 U	4.3 U	6 U	16 U	22 U
2,3,3',4,5',6-HexaCB-(161)	9 U	1,330	10 U	18 U	7.92 U	9 U	9 U	16 U	4.25 U	6 U	16 U	22 U
2,3,3',4',5,5'-HexaCB-(162)	10 U	7 U	11 U	14 U	4.8 U	7 U	9 U	18 U	3.22 U	9 U	13 U	20 U
2,3,3',4',5',6-HexaCB-(164)	254	491	10 U	309	99.1 J	299	343	756	14.8 J	218	543	134 J
2,3,3',5,5',6-HexaCB-(165)	10 U	22 UJK	11 U	19 U	8.43 U	9 U	10 U	17 U	4.52 U	6 U	17 U	24 U
2,3',4,4',5,5'-HexaCB-(167)	119 J	242	262	124 UJK	53 J	156	152	388	9.54 UJK	106 J	229	83 J
3,3',4,4',5,5'-HexaCB-(169)	12 U	18 UJK	13 U	14 U	5.13 U	12 UJK	11 U	19 U	3.48 U	8 U	15 U	23 UJK
2,2',3,3',4,4',5-HeptaCB-(170)	911	2,230	2,800	1,150	376	1,430	1,500	3,180	69.9 J	952	2,120	639 J
PCBs 171 + 173	314 C	822 C	898 C	370 C	124 CJ	487 C	517 C	1,200 C	23.4 CUJK	309 C	724 C	232 CJ
2,2',3,3',4,5,5'-HeptaCB-(172)	177	426	451	204	73.1 J	249	287	563	13 J	181	415	140 J
2,2',3,3',4,5,6'-HeptaCB-(174)	1,010	2,690	2,900	1,200	406	1,530	1,710	3,590	66.3 J	1,020	2,410	795 J
2,2',3,3',4,5',6-HeptaCB-(175)	54 J	125 J	153	69 J	18.4 J	73 J	78 J	182	4.11 UJK	49 J	130	42 J
2,2',3,3',4,6,6'-HeptaCB-(176)	149	466	431	210	57.5 J	237	263	575	10.1 UJK	153	389	110 J
2,2',3,3',4,5',6'-HeptaCB-(177)	618	1,690	1,830	781	256	948	1,070	2,380	39.8 J	609	1,530	436 J
2,2',3,3',5,5',6-HeptaCB-(178)	242	664	719	329	104 J	341	410	876	14.2 J	237	638	192 J
2,2',3,3',5,6,6'-HeptaCB-(179)	464	1,510	1,440	713	181	741	857	1,810	27.6 J	468	1,220	384 J
PCBs 180 + 193	2,070 C	5,470 C	6,480 C	2,700 C	863 C	3,230 C	3,600 C	7,550 C	159 CJ	2,270 C	4,950 C	1,670 CJ
2,2',3,4,4',5,6-HeptaCB-(181)	68 J	260	141 J	30 J	18.2 J	30 J	41 J	779	5.38 U	73 J	186	20 U
2,2',3,4,4',5,6'-HeptaCB-(182)	7 UJK	5 U	18 UJK	7 U	3.95 U	9 UJK	12 J	21 J	3.28 U	8 J	22 J	17 U
PCBs 183 + 185	738 C	1,960 C	2,040 C	807 C	292 C	1,120 C	1,310 C	2,800 C	47.4 CJ	729 C	1,760 C	583 CJ
2,2',3,4,4',6,6'-HeptaCB-(184)	4 U	11 UJK	4 U	5 U	3.12 U	3 U	3 U	11 UJK	2.59 U	3 U	5 U	13 U
2,2',3,4,5,6,6'-HeptaCB-(186)	4 U	12 J	4 U	5 U	3.3 U	4 U	4 U	33 UJK	2.74 U	3 J	10 J	14 U
2,2',3,4',5,5',6-HeptaCB-(187)	1,300	3,220	3,720	1,580	527	1,710	2,030	3,880	82.8 J	1,320	3,280	1,040 J
2,2',3,4',5,6,6'-HeptaCB-(188)	3.94 U	8 UJK	7 UJK	5 U	3.7 U	4.06 UJK	5 UJK	15 J	3.02 U	2.51 U	6 UJK	14 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-01				SED-02				SED-03			
Sample Name	SED-01-SS-1.0	SED-01-SB-2.0	SED-01-SB-5.5	SED-01-SB-8.65	SED-02-SS-1.0	SED-02-SB-2.0	SED-02-SB-5.0	SED-02-SB-8.25	SED-03-SS-1.0	SED-03-SB-2.0	SED-03-SB-5.0	SED-03-SB-8.45
Collection Date	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	2	5.5	8.65	1	2	5	8.25	1	2	5	8.45
2,3,3',4,4',5,5'-HeptaCB-(189)	43.6 J	110 J	114 J	52 J	17.5 UJK	71.7 J	69 J	160 J	4.56 UJK	41.1 J	103 J	41 J
2,3,3',4,4',5,6-HeptaCB-(190)	210	452	579	244	84.6 J	318	308	763	16.7 J	212	479	145 J
2,3,3',4,4',5',6-HeptaCB-(191)	43.5 J	86 J	115 J	48 J	16.7 J	59.8 J	61 J	147 J	4.2 U	39.2 J	97 J	31 UJK
2,3,3',4,5,5',6-HeptaCB-(192)	8.34 U	4 U	9 U	12 U	4.88 U	9.03 U	7 U	13 U	4.39 U	6.34 U	11 U	17 U
2,2',3,3',4,4',5,5'-OctaCB-(194)	508	1,080	1,610	707	206	721	865	1,860	40.2 J	527	1,160	449 J
2,2',3,3',4,4',5,6-OctaCB-(195)	226	489	635	287	86.3 J	319	360	1,080	18.7 J	239	525	160 J
2,2',3,3',4,4',5,6'-OctaCB-(196)	271	683	1,020	501	107 J	390	522	1,120	19.5 J	296	647	305 J
PCBs 197 + 200	104 CJ	260 CJ	299 CJ	149 CJ	40.4 CJ	150 CJ	179 CJ	486 C	4.63 CJ	113 CJ	240 C	109 CJ
PCBs 198 + 199	593 C	1,480 C	2,740 C	1,120 C	250 C	848 C	1,080 C	2,110 C	43.4 CJ	643 C	1,370 C	846 CJ
2,2',3,3',4,5',6,6'-OctaCB-(201)	79.7 J	238	265	151 J	30.7 J	111	144	373	6.08 UJK	83.5 J	188	102 J
2,2',3,3',5,5',6,6'-OctaCB-(202)	139	306	439	276	57.9 J	170	243	559	10.7 J	128	321	242 J
2,2',3,4,4',5,5',6-OctaCB-(203)	358	836	1,230	644	145	507	656	1,460	27.2 J	407	812	449 J
2,2',3,4,4',5,6,6'-OctaCB-(204)	5.59 U	13 J	5 U	15.6 U	2.97 U	5.01 U	5.15 U	44 J	4.19 U	5.42 U	12 J	14 U
2,3,3',4,4',5,5',6-OctaCB-(205)	39.1 UJK	77 J	93 J	35.4 J	12.1 J	43.1 J	51 J	163 J	3.14 U	30.9 J	72 J	38 J
2,2',3,3',4,4',5,5',6-NonaCB-(206)	368 J	2,290	6,870	974	132	458	601	1,820	25.2 UJK	333	1,200	1,760
2,2',3,3',4,4',5,6,6'-NonaCB-(207)	68.8 J	141	175	119 J	22.4 J	47.7 J	83.4 J	451	6.8 U	71.9 J	151	187 J
2,2',3,3',4,5,5',6,6'-NonaCB-(208)	111 J	473	1,060	403	43.3 J	118	206	595	6.77 U	99.6 J	275	817 J
DecaCB-(209)	747 J	9,300	14,000	1,470	179	419	994	2,690	25.3 J	617	3,940	3,490
Conventionals												
TOC (mg/kg)	16,000	31,000 J	31,000 J	37,000 J	14,000	14,000 J	26,000 J	25,000 J	4,500	12,000	16,000	39,000
Total solids (%)	54	51.3	55.8	55.9	59.1	58.6	59.7	60.7	75.5	57.9	61.3	57.9
Grain Size (%)												
Gravel	1.07	0.5	0.13	0.95	0.09	0.2	0.55	0.31	1.58	0.03	0.14	0.89
Sand	53.9	11.1	12	16.1	59.2	46.3	28.7	14.6	88.2	40.3	37.7	34.2
Silt	33.7	61.1	60.8	55.4	30.6	41.1	51	63.1	7.4	45.6	46.6	47.1
Clay	11.3	27.4	27	27.6	10.1	12.4	19.7	22	2.8	14.1	15.6	17.8
Percent retained 63-micron sieve (#230	4.74	2.42	2.48	2.98	6.1	5.38	3.2	2.85	1.46	4.8	5.88	4.39
Percent retained 75-micron sieve (#200	11.3	3.52	4.2	4.98	13.1	11.5	5.34	3.86	2.64	9.24	11.5	9.51
Percent retained 106-micron sieve (#14	12.5	2.04	2.23	3.35	11.4	8.41	3.84	2.74	2.68	9.09	9.92	9.06
Percent retained 150-micron sieve (#10	16.8	1.6	1.71	2.36	15.5	10.8	5.67	2.43	4.58	11	7.81	7.74
Percent retained 250-micron sieve (#60	6.24	0.81	0.8	1.35	10.4	7.93	5.96	1.59	29.2	4.91	1.96	2.08
Percent retained 425-micron sieve (#40	1.71	0.52	0.47	0.84	2.37	1.92	4.2	0.88	42.7	1.02	0.47	1.01
Percent retained 850-micron sieve (#20	0.6	0.17	0.07	0.25	0.25	0.27	0.51	0.24	4.94	0.19	0.16	0.47
Percent retained 2000-micron sieve (#1	0.67	0.18	0.07	0.23	0.09	0.07	0.32	0.17	1.11	0.03	0.06	0.23
Percent retained 4750-micron sieve (#4	0.4	0.32	0.06	0.71	0.01 U	0.13	0.23	0.15	0.47	0.01 U	0.08	0.66

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-04					SED-05				SED-06			
Sample Name	SED-04-SS-1.0	SED-04-SS-1.0-DUP	SED-04-SB-2.0	SED-04-SB-4.75	SED-04-SB-7.75	SED-05-SS-1.0	SED05-SB-2	SED05-SB-5	SED05-SB-7	SED-06-SS-1.0	SED-06-SB-2.0	SED-06-SB-5.5	SED-06-SB-8.5
Collection Date	10/09/2019	10/09/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/07/2019	10/07/2019	10/07/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019
Collection Depth (ft bml)	1	1	2	4.75	7.75	1	2	5	7	1	2	5.5	8.5
Cyanide (mg/kg)													
Total Cyanide	0.688 J-	0.881 J-	0.792	0.254	0.0675 U	0.244 J-	1.89	0.431	0.619	0.351 J-	1.29	2.28	0.349
TPH (mg/kg)													
Diesel-Range Hydrocarbons	1120 J	630 J	13.1 U	14.3 U	13.1 U	12.4 U	14.5 U	12.9 U	12.5 U	13.8 U	14.2 U	11.6 U	11.8 U
Heavy-Oil (Residual) Range Hydrocarbo	311	228	234	139	26.2 U	57.3	289	176	172	151	485	116	147
Total Metals (mg/kg)													
Arsenic	3.09	2.7	1.75	2.63	2.2	2.27	2.71	3.23	3.14	2.91	2.02	2.64	3.05
Barium	144 J+	119 J+	156	144	102	65.4	128	121	110	80	153	145	119
Cadmium	0.202	0.208	0.18	0.177	0.127 J	0.0626 U	0.234	0.238	0.275	0.0702 U	0.135 J	0.28	0.256
Chromium	20 J+	17.1 J+	11.3	16.2	7.79	8.24	12.7	16.7	16	11.1	12.2	21.8	16.5
Copper	33.5 J+	29.5 J+	21.7	25.1	13.6	10.3	23.1	34.6	29.8	14.3	21.9	22	28.3
Lead	20.8	18.9	14.3	23.4	5.17	6.35	21.5	21.3	33.4	7.59	13.5	30.3	28.5
Mercury	0.0611 J	0.0547 J	0.0396 J	0.108	0.0273 U	0.0262 J	0.0957	0.127	0.1	0.0281 U	0.0318 J	0.0699	0.197
Selenium	0.415 U	0.431 U	0.649 J	0.508 J	0.519 J	0.388 J	0.37 U	0.361 U	0.338 U	0.555 J	0.612 J	0.536 J	0.569 J
Silver	0.165 J	0.159 J	0.0874 J	0.17	0.0681 U	0.0626 U	0.18	0.224	0.201	0.0702 U	0.0936 J	0.18	0.398
Zinc	137 J+	118 J+	90.5	101	37.1	38.9	97.8	281	146	55.8	90.2	118	98.2
Organotins (ug/kg)													
Tri-n-butyltin	2.5 J	2.7 J	2.1 U	2.1 U	2.1 U	2 U	2 U	2 U	2 U	2.1 U	2.2 U	2.1 U	2 U
SVOCs (ug/kg)													
1,2,4-Trichlorobenzene	219 U	525 U	195 U	192 U	4.39 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45.2 U
1,2-Dichlorobenzene	219 U	525 U	195 U	1500	27.7	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45.2 U
1,2-Dinitrobenzene	2,190 U	5,250 U	1,950 U	1,920 U	44 U	4,210 U	1,970 U	1,810 U	1,740 U	4,610 U	1,970 U	1,670 U	452 U
1,3-Dichlorobenzene	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
1,3-Dinitrobenzene	2,190 U	5,250 U	1,950 U	1,920 U	44 U	4,210 U	1,970 U	1,810 U	1,740 U	4,610 U	1,970 U	1,670 U	452 U
1,4-Dichlorobenzene	219 U	525 U	195 U	871	14	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
1,4-Dinitrobenzene	2,190 U	5,250 U	1,950 U	1,920 U	44 U	4,210 U	1,970 U	1,810 U	1,740 U	4,610 U	1,970 U	1,670 U	452 U
1-Methylnaphthalene	2,810	3,310	156 U	154 U	4 U	337 U	158 U	145 U	139 U	370 U	211 J	134 U	36 U
2,2'-oxybis(1-chloropropane)	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
2,3,4,6-Tetrachlorophenol	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 U	394 U	335 U	91 U
2,3,5,6-Tetrachlorophenol	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 U	394 U	335 U	91 U
2,4,5-Trichlorophenol	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 U	394 U	335 U	91 U
2,4,6-Trichlorophenol	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 U	394 U	335 U	91 U
2,4-Dichlorophenol	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 UJ	394 U	335 U	91 U
2,4-Dimethylphenol	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 U	394 U	335 U	91 U
2,4-Dinitrophenol	2,190 U	5,250 U	1,950 U	1,920 U	44 U	4,210 UJ	1,970 U	1,810 U	1,740 U	4,610 U	1,970 U	1,670 U	452 U
2,4-Dinitrotoluene	1,750 U	4,210 U	778 U	765 U	18 U	1,680 U	788 U	723 U	694 U	1,840 U	1,580 U	668 U	181 U
2,6-Dinitrotoluene	874 U	2,100 U	778 U	765 U	18 U	1,680 U	788 U	723 U	694 U	1,840 U	786 U	668 U	181 U
2-Chloronaphthalene	87 U	210 U	78 U	77 U	2 U	168 U	79 U	72 U	69 U	184 U	79 U	67 U	18 U
2-Chlorophenol	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 U	394 U	335 U	91 U
2-Methylnaphthalene	7,970	9,190	156 U	162 J	4 U	337 U	158 U	145 U	139 U	370 U	184 J	134 U	39 J
2-Methylphenol	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
2-Nitroaniline	1,750 U	4,210 U	1,560 U	1,540 U	35 U	3,370 U	1,580 U	1,450 U	1,390 U	3,700 U	1,580 U	1,340 U	363 U
2-Nitrophenol	874 U	2,100 U	778 U	765 U	18 U	1,680 UJ	788 U	723 U	694 U	1,840 U	786 U	668 U	181 U
3- & 4-Methylphenol (m,p-Cresol)	219 U	525 U	195 U	352 J	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	107
3,3-Dichlorobenzidine	1,750 U	4,210 U	1,560 U	1,540 U	35 U	3,370 UJ	1,580 U	1,450 U	1,390 U	3,700 U	1,580 U	1,340 U	363 U
3-Nitroaniline	1,750 U	4,210 U	1,560 U	1,540 U	35 U	3,370 U	1,580 U	1,450 U	1,390 U	3,700 U	1,580 U	1,340 U	363 U
4,6-Dinitro-2-methylphenol	2,190 U	5,250 U	1,950 U	1,920 U	44 U	4,210 UJ	1,970 U	1,810 U	1,740 U	4,610 U	1,970 U	1,670 U	452 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-04					SED-05				SED-06			
Sample Name	SED-04-SS-1.0	SED-04-SS-1.0-DUP	SED-04-SB-2.0	SED-04-SB-4.75	SED-04-SB-7.75	SED-05-SS-1.0	SED05-SB-2	SED05-SB-5	SED05-SB-7	SED-06-SS-1.0	SED-06-SB-2.0	SED-06-SB-5.5	SED-06-SB-8.5
Collection Date	10/09/2019	10/09/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/07/2019	10/07/2019	10/07/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019
Collection Depth (ft bml)	1	1	2	4.75	7.75	1	2	5	7	1	2	5.5	8.5
4-Bromophenylphenyl ether	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
4-Chloro-3-methylphenol	874 U	2,100 U	778 U	765 U	18 U	1,680 U	788 U	723 U	694 U	1,840 U	786 U	668 U	181 U
4-Chloroaniline	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
4-Chlorophenylphenyl ether	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
4-Nitroaniline	3,500 U	4,210 U	1,560 U	1,540 U	35 U	3,370 U	1,580 U	1,450 U	1,390 U	3,700 U	1,580 U	1,340 U	363 U
4-Nitrophenol	1,750 U	2,100 U	778 U	765 U	18 U	1,680 U	788 U	723 U	694 U	1,840 U	1,580 U	668 U	181 U
Acenaphthene	25,100	33,200	1,420	252	2 U	253 J	177	96 J	216	200 J	21,500	375	59
Acenaphthylene	263 U	421 U	78 U	92 J	2 U	320 J	79 U	72 U	69 U	239 J	328	67 U	18 U
Aniline	438 U	1,050 U	390 U	384 U	9 U	843 UJ	395 U	362 U	348 U	924 U	394 U	335 U	91 U
Anthracene	35,300	47,300	1,350	197	2 U	168 U	79 U	141 J	69 U	184 U	14,500	162	22 J
Azobenzene	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
Benzo(a)anthracene	7,480	8,340	1,070	1,400	2 J	545	301	231	170	520	5,360	347	48
Benzo(a)pyrene	2,880	3,250	751	2,010	4 J	1,670	331	254	239	1,450	3,170	451	73
Benzo(b)fluoranthene	3,900	4,410	887	1,730	4 J	1,520	345	246	230	1,500	3,410	390	74
Benzo(ghi)perylene	1,110	1,310	499	1,690	2 J	1,770	244	126 J	166	1,330	1,900	342	35 J
Benzo(k)fluoranthene	1,870 J	2,090 J	368 J	708 J	3 J	524 J	170 J	123 J	117 J	576 J	1,590 J	181 J	40 J
Benzoic acid	11,000 U	26,400 U	9,770 U	9,610 U	220 U	21,100 UJ	9,890 U	9,070 U	8,710 U	23,100 U	9,870 U	8,380 U	2,270 U
Benzyl alcohol	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 U	394 U	335 U	91 U
Bis(2-chloroethoxy)methane	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
Bis(2-chloroethyl)ether	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
Bis(2-ethylhexyl)phthalate	1,310 U	3,160 U	1,170 U	1,150 U	26 U	2,530 U	1,180 U	1,090 U	1,040 U	2,770 U	1,180 U	1,000 U	272 U
Butylbenzylphthalate	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 U	394 U	335 U	91 U
Carbazole	10,200	11,700	117 U	115 U	3 U	253 U	118 U	109 U	104 U	277 U	872 J+	100 U	27 U
Chrysene	7,320	8,540	1,260	1,640	2 J	894	348	237	221	852	5,580	415	51
Di(2-ethylhexyl)adipate	2,190 U	5,250 U	1,950 U	1,920 U	70 J	4,210 U	1,970 U	1,810 U	1,740 U	4,610 U	1,970 U	1,670 U	452 U
Dibenzo(a,h)anthracene	237	248 J	78 U	145 J	2 U	201 J	79 U	72 U	69 U	184 U	242	67 U	18 U
Dibenzofuran	16,100	20,300	461	77 U	2 U	168 U	79 U	72 U	69 U	184 U	6,200	67 U	18 U
Diethyl phthalate	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 U	394 U	335 U	91 U
Dimethyl phthalate	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 U	394 U	335 U	91 U
Di-n-butyl phthalate	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 U	394 U	335 U	91 U
Di-n-octyl phthalate	703 U	1,690 U	626 U	616 U	14 U	1,350 U	634 U	581 U	558 U	1,480 UJ	632 U	537 U	145 U
Fluoranthene	33,300	42,700	5,090	2,710	4	488	985	479	507	830	34,200	1,310	110
Fluorene	28,800	37,600	1,930	182	2 U	168 U	79 U	77 J	69 U	184 U	20,700	272	28 J
Hexachlorobenzene	87 U	210 U	78 U	77 U	2 U	168 U	79 U	72 U	69 U	184 U	79 U	67 U	18 U
Hexachlorobutadiene	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
Hexachlorocyclopentadiene	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 UJ	394 U	335 U	91 U
Hexachloroethane	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
Indeno(1,2,3-cd)pyrene	1,110	1,390	411	1,300	2 J	1,530	200	119 J	139 J	1,210	1,650	285	31 J
Isophorone	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
Naphthalene	461	649 J	156 U	425	15	337 U	158 U	145 U	154 J	370 U	259 J	134 U	103
Nitrobenzene	874 U	2,100 U	778 U	765 U	18 U	1,680 U	788 U	723 U	694 U	1,840 U	786 U	668 U	181 U
N-Nitrosodimethylamine	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
N-Nitrosodiphenylamine	438 U	1,050 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	394 U	167 U	45 U
N-Nitrosodipropylamine	219 U	525 U	195 U	192 U	4 U	421 U	197 U	181 U	174 U	461 U	197 U	167 U	45 U
Pentachlorophenol	874 U	2,100 U	778 U	765 U	18 U	1,680 U	788 U	723 U	694 U	1,840 U	786 U	668 U	181 U
Phenanthrene	62,800	89,000	9,450	1,060	4	210 J	920	514	586	886	56,200	1,900	158
Phenol	175 U	421 U	156 U	154 U	9	337 U	158 U	145 U	139 U	370 U	158 U	134 U	36 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-04					SED-05				SED-06			
Sample Name	SED-04-SS-1.0	SED-04-SS-1.0-DUP	SED-04-SB-2.0	SED-04-SB-4.75	SED-04-SB-7.75	SED-05-SS-1.0	SED05-SB-2	SED05-SB-5	SED05-SB-7	SED-06-SS-1.0	SED-06-SB-2.0	SED-06-SB-5.5	SED-06-SB-8.5
Collection Date	10/09/2019	10/09/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/07/2019	10/07/2019	10/07/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019
Collection Depth (ft bml)	1	1	2	4.75	7.75	1	2	5	7	1	2	5.5	8.5
Pyrene	28,400	36,200	5,020	5,860	7	901	1,210	572	674	1,110	27,700	1,500	155
Pyridine	438 U	1,050 U	390 U	384 U	9 U	843 U	395 U	362 U	348 U	924 U	394 U	335 U	91 U
PAH Homologs (ug/kg)													
C1-Chrysenes/Benz(a)anthracenes	4,140	--	737	1,090	27 U	414	292	265	257	2,090	1,430	395	108 U
C1-Fluoranthenes/Pyrenes	15,500	--	2,070	2,430	27 U	365	506	265	257	2,860	3,660	748	136
C1-Fluorenes	7,450	--	964	1,070 U	27 U	102 U	288	265	257	276 U	2,010	254 U	108 U
C1-Phenanthrenes/Anthracenes	32,600	--	3,520	1,070 U	27 U	140	698	423	428	2,500	5,680	993	299
C2-Chrysenes/Benz(a)anthracenes	1,310 U	--	346	1,070 U	27 U	305	288	265	257	1,410	1,130 U	254 U	108 U
C2-Fluorenes	1,520	--	346	1,070 U	27 U	102 U	288	265	257	453	1,130 U	254 U	108 U
C2-Naphthalenes	21,200	--	1,370	1,070 U	27 U	102 U	288	265	257	392	3,450	437	272
C2-Phenanthrenes/Anthracenes	8,790	--	1,340	1,280	27 U	233	587	340	391	2,600	2,300	699	303
C3-Chrysenes/Benz(a)anthracenes	1,310 U	--	291 U	1,130	27 U	213	288	265	257	832	1,130 U	254 U	108 U
C3-Fluorenes	1,310 U	--	291 U	1,070 U	27 U	102 U	288	265	257	355	1,130 U	254 U	108 U
C3-Naphthalenes	9,210	--	1,650	1,070 U	27 U	102 U	348	338	318	511	2,490	514	303
C3-Phenanthrenes/Anthracenes	2,220	--	600	1,280	27 U	263	398	265	310	1,710	1,130 U	481	191
C4-Chrysenes/Benz(a)anthracenes	2,610 U	--	581 U	2,140 U	53 U	205 U	577	530	513	696	2,270 U	508 U	217 U
C4-Naphthalenes	2,470	--	684	1,300	27 U	102 U	309	292	309	365	1,130 U	327	289
C4-Phenanthrenes/Anthracenes	2,610 U	--	581 U	2,140 U	53 U	205 U	577	530	513	749	3,340	508 U	217 U
Chlorinated Herbicides (mg/kg)													
2,4,5-T	0.032 U	0.031 U	0.028 U	0.029 U	0.029 U	0.027 U	0.029 U	0.028 U	0.026 U	0.025 U	0.028 U	0.028 U	0.029 U
2,4-D	0.039 U	0.038 U	0.034 U	0.035 U	0.036 U	0.034 U	0.036 U	0.035 U	0.032 U	0.031 U	0.034 U	0.034 U	0.035 U
2,4-DB	0.097 U	0.095 U	0.084 U	0.087 U	0.088 U	0.083 U	0.089 U	0.086 U	0.079 U	0.075 U	0.085 U	0.085 U	0.087 U
Dalapon	0.11 U	0.11 U	0.094 U	0.097 U	0.099 U	0.092 U	0.099 U	0.096 U	0.088 U	0.084 U	0.095 U	0.094 U	0.097 U
Dicamba	0.051 U	0.05 U	0.045 U	0.046 U	0.047 U	0.044 U	0.047 U	0.046 U	0.042 U	0.04 U	0.045 U	0.045 U	0.046 U
Dichlorprop	0.041 U	0.04 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.033 U	0.031 U	0.035 U	0.035 U	0.036 U
Dinoseb	0.022 U	0.021 U	0.019 U	0.019 U	0.02 U	0.018 U	0.02 U	0.019 U	0.018 U	0.017 U	0.019 U	0.019 U	0.019 U
MCPA	4.5 U	4.4 U	3.9 U	4 U	4.1 U	3.8 U	4.1 U	4 U	3.6 U	3.5 U	3.9 U	3.9 U	4 U
MCPP (Mecoprop)	3.9 U	3.8 U	3.4 U	3.5 U	3.5 U	3.3 U	3.6 U	3.5 U	3.1 U	3 U	3.4 U	3.4 U	3.5 U
Pentachlorophenol	0.036 U	0.035 U	0.031 U	0.032 U	0.033 U	0.031 U	0.033 U	0.032 U	0.029 U	0.028 U	0.031 U	0.031 U	0.032 U
Picloram	0.041 U	0.04 U	0.036 U	0.037 U	0.037 U	0.035 U	0.038 U	0.037 U	0.033 U	0.032 U	0.036 U	0.036 U	0.037 U
Silvex	0.041 U	0.04 U	0.036 U	0.037 U	0.037 U	0.035 U	0.038 U	0.037 U	0.033 U	0.032 U	0.036 U	0.036 U	0.037 U
Organochlorine Pesticides (ng/g)													
2,4'-DDD	9.08 J-	2.4 J-	2.42	15.4	0.0223 J	2.85 J-	6.42	1.52	8.51	15.6 J-	0.088 U	4.66	2.17
2,4'-DDE	3.7 UJK	1.9 UJK	1.1 UJK	1.32	0.0067 U	0.28 UJK	1.3 UJK	0.34 UJK	0.75 UJK	0.65 UJK	1.1 UJK	0.47 UJK	0.41 UJK
2,4'-DDT	0.5 J-	0.21 UJ	0.275 J	0.247 J	0.0077 U	0.79 J-	3.17 J	0.081 U	0.086 U	1.83 J-	0.091 U	0.088 U	0.079 U
4,4'-DDD	18.1 J-	10.4 J-	11.2	47.5	0.039 J	7.47 J-	20.9	4.98	18.7	43 J-	30.8	13.2	5.28
4,4'-DDE	12.4 J-	10 J-	6.63	6.45	0.0078 J	2.49 J-	8.23	3.97	5.8	7.91 J-	9.09	3.31	3.71
4,4'-DDT	2.51 J-	0.7 J-	17.5	6.47	0.0066 U	1.31 J-	334 J	1.04	0.52 J	4.61 J-	1.35	1.4	0.129 J
Aldrin	7.1 UJK	5.9 UJK	5.1 UJK	3.4 UJK	0.016 U	0.37 UJK	6 UJK	4.6 UJK	3.9 UJK	0.41 UJK	6.5 UJK	3.4 UJK	3.7 UJK
alpha-BHC	0.12 UJ	0.13 UJ	0.055 U	0.051 U	0.0047 U	0.049 UJ	0.056 U	0.05 U	0.052 U	0.049 UJ	0.28 U	0.054 U	0.049 U
alpha-Chlordane	0.219 J-	0.281 J-	0.059 UJK	0.068 UJK	0.0032 U	0.06 UJK	0.11 UJK	0.084 UJK	0.11 UJK	0.087 UJK	0.34 UJK	0.142 J	0.13 UJK
beta-BHC	0.28 UJ	0.29 UJ	0.13 U	0.12 U	0.011 U	0.11 UJ	0.13 U	0.12 U	0.12 U	0.11 UJ	0.65 U	0.12 U	0.11 U
beta-Chlordane	0.38 J-	0.31 UJK	0.16 J	0.239 J	0.0038 U	0.051 UJK	0.295 J	0.252 J	0.338 J	0.09 UJK	0.23 U	0.266 J	0.282 J
cis-Nonachlor	0.24 UJ	0.25 UJ	0.11 U	0.1 U	0.0093 U	0.097 UJ	0.11 U	0.099 U	0.1 U	0.096 UJ	0.11 U	0.11 U	0.096 U
delta-BHC	0.2 UJ	0.21 UJ	0.09 U	0.083 U	0.0077 U	0.08 UJ	0.091 U	0.081 U	0.086 U	0.079 UJ	0.46 U	0.088 U	0.079 U
Dieldrin	0.24 UJ	0.56 UJK	0.11 U	0.1 U	0.0094 U	0.099 UJ	0.11 U	0.27 UJK	0.1 U	0.19 UJK	0.11 U	0.11 U	0.097 U
Endosulfan I	0.52 UJ	0.55 UJ	0.24 U	0.22 U	0.021 U	0.22 UJ	0.24 U	0.22 U	0.23 U	0.21 UJ	0.24 U	0.23 U	0.21 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-04					SED-05				SED-06			
Sample Name	SED-04-SS-1.0	SED-04-SS-1.0-DUP	SED-04-SB-2.0	SED-04-SB-4.75	SED-04-SB-7.75	SED-05-SS-1.0	SED05-SB-2	SED05-SB-5	SED05-SB-7	SED-06-SS-1.0	SED-06-SB-2.0	SED-06-SB-5.5	SED-06-SB-8.5
Collection Date	10/09/2019	10/09/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/07/2019	10/07/2019	10/07/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019
Collection Depth (ft bml)	1	1	2	4.75	7.75	1	2	5	7	1	2	5.5	8.5
Endosulfan II (beta)	0.37 UJ	0.39 UJ	0.17 UJ	0.16 UJ	0.015 UJ	0.15 UJ	0.22 UJK	0.16 UJ	0.16 UJ	0.15 UJ	0.17 UJ	0.17 UJ	0.15 UJ
Endosulfan sulfate	0.47 UJ	0.5 UJ	0.22 UJ	0.2 UJ	0.019 UJ	0.19 UJ	0.32 UJK	0.2 UJ	0.21 UJ	0.19 UJ	1.1 UJ	0.21 UJ	0.19 UJ
Endrin	0.2 UJ	1 UJK	0.36 UJK	0.72 UJK	0.011 UJK	0.084 UJ	0.095 U	0.82 UJK	0.22 UJK	0.083 UJ	0.096 U	0.096 J	0.57 UJK
Endrin aldehyde	0.47 UJ	0.49 UJ	0.21 U	0.2 U	0.018 U	0.19 UJ	0.22 U	0.19 U	0.2 U	0.19 UJ	1.1 U	0.21 U	0.19 U
Endrin ketone	0.29 UJ	0.31 UJ	0.13 U	0.12 U	0.012 U	0.12 UJ	0.14 U	0.12 U	0.13 U	0.12 UJ	0.7 U	0.13 U	0.12 U
Heptachlor	0.25 UJ	0.26 UJ	0.11 U	0.1 U	0.0097 U	0.1 UJ	0.11 U	0.1 U	0.11 U	0.1 UJ	0.11 U	0.11 U	0.1 U
Heptachlor epoxide	0.16 UJ	0.17 UJ	0.072 U	0.067 U	0.0062 U	0.065 UJ	0.073 U	0.066 U	0.069 U	0.064 UJ	0.074 U	0.071 U	0.064 U
Hexachlorobenzene	2.23 J	3.13 J	1.99 J+	0.23 J+	0.014 U	0.18 J-	0.77	0.14 U	0.15 U	0.26 J-	0.8 U	0.59 J	0.14 UJ
Lindane	0.13 UJ	0.14 UJ	0.059 U	0.055 U	0.0051 U	0.053 UJ	0.06 U	0.054 U	0.057 U	0.052 UJ	0.3 U	0.058 U	0.052 U
Methoxychlor	0.23 UJ	0.24 UJ	0.11 U	0.109 J	0.009 U	0.095 UJ	0.11 U	0.096 U	0.1 U	0.093 UJ	0.55 U	0.1 U	0.093 U
Mirex	0.17 UJ	0.18 UJ	0.078 U	0.072 U	0.0067 U	0.07 UJ	0.079 U	0.071 U	0.075 U	0.069 UJ	0.4 U	0.076 U	0.069 U
Oxychlordane	0.39 UJ	0.41 UJ	0.18 U	0.17 U	0.015 U	0.16 UJ	0.18 U	0.16 U	0.17 U	0.16 UJ	0.18 U	0.18 U	0.16 U
trans-Nonachlor	0.15 UJ	0.15 UJ	0.066 U	0.061 U	0.0057 U	0.06 UJ	0.067 U	0.06 U	0.064 U	0.074 UJK	0.34 U	0.065 U	0.059 U
Dioxins/Furans (pg/g)													
1,2,3,4,6,7,8-HpCDD	18.4	28.9	17.7	7.91	1.73 J	20.9	220	319	258	199 J	33.6 J	106	205
1,2,3,4,6,7,8-HpCDF	16.5	19.7	32.1	8.2	0.187 UJ	4.84 J	219	77.1	73	26.7 J	24.4 J	137	69.8
1,2,3,4,7,8,9-HpCDF	6.36	7.21	13.4	0.979 J	0.151 U	1.39 UJ	74.1	7.85	7.51	4.48 J	7.06	38.1	5.52
1,2,3,4,7,8-HxCDD	0.294 U	0.247 J	0.2 UJ	0.194 U	0.113 U	0.411 U	1.85 UJ	2.3 UJ	2.22 UJ	1.59 U	0.242 UJ	0.6 J	1.4 J
1,2,3,4,7,8-HxCDF	26.9	29.2	96.2	2.89 J	0.108 UJ	9.67	377	16.4	20	29.9 J	33.6 J	173	8.19
1,2,3,6,7,8-HxCDD	0.869 J	1.25 J	0.898 J	0.394 J	0.113 U	0.687 UJ	7.9	12	9.19	3.94 J	1.35 J	3.41 J	7.9
1,2,3,6,7,8-HxCDF	7.21	8	23.2	1.81 J	0.081 U	2.66 J	109	7.44	8.46	8.13 J	10.5	54.8	6.81
1,2,3,7,8,9-HxCDD	0.379 UJK	0.597 J	0.357 UJK	0.196 U	0.195 J	0.389 U	4.32 J	5.8	4.06 J	1.54 UJ	0.689 UJK	1.42 UJK	3.52 J
1,2,3,7,8,9-HxCDF	2.77 J	3.47 J	8.32 J	0.344 UJ	0.111 U	1.43 UJ	37.2	2.93 UJ	3.13 J	4.82 J-	3.51 J-	11.4 J	1.61 J
1,2,3,7,8-PeCDD	0.207 UJK	0.308 UJK	0.24 J	0.156 U	0.1 U	0.221 U	1.23 UJ	1.47 UJ	1.49 UJ	0.805 U	0.256 J	0.51 UJK	1.07 UJK
1,2,3,7,8-PeCDF	14.5	18.6	39.8	1.18 J	0.0919 UJ	4.24 J	191	3.3 J	8.87	18.3 J	17.7 J	62.8	2.35 J
2,3,4,6,7,8-HxCDF	1.86 J	2.22 J	4.47 J	0.441 J	0.079 U	0.746 UJ	21.3	5.69	4.24 J	2.49 J	2.31 J	8.71	4.23 J
2,3,4,7,8-PeCDF	7.16	9.87	14.8	0.606 UJK	0.0753 U	1.81 UJ	79.1	5.12	6.07	8.52 J	8.38 J	28	3.77 J
2,3,7,8-TCDD	0.15 U	0.265 UJK	0.136 UJK	0.0943 U	0.0717 U	0.149 U	0.885 J	0.865 J	0.897 J	0.684 U	0.232 J	0.444 UJK	0.942 J
2,3,7,8-TCDF	11.6	13.4	18.1	0.84 J	0.261 UJ	3.67	95.4	3.16	5.68	12.2 J	14.4 J	44.8	1.91
OCDD	237	355	237	116	13	190	3,680	4,620 J	4,010 J	1,560	381 J	1,180	3,390
OCDF	39.3	46	50.8	7.81 J	0.171 J	9.03 J	429	203	216	66.8 J	42.4 J	226	179
Total HpCDDs	40.7	62.5	40.6	18.7	3.94 J	50.2	499	707	583	499	76.1	215	520
Total HpCDFs	34.2	43.8 J	64.2 J	16 J	0.187 UJ	13 J	475 J	271 J	248 J	92.6 J	50.6 J	308 J	241 J
Total HxCDDs	6.25 JK	10.1 JK	7.28 JK	2.92 JK	1.69 J	6.06 UJ	70.7 J	95.3 J	78.7 JK	40.3 J	10.9 JK	28.5 JK	71.3 J
Total HxCDFs	48.3 JK	55.6 J	150 JK	10.3 JK	0.232 UJ	20.2 JK	663 J	139 JK	117 J	90.6 JK	64.2 J-	319 J	105 JK
Total PeCDDs	1.23 JK	1.64 JK	1.72 JK	0.624 J	0.29 JK	0.596 UJ	13.6 JK	16.7 JK	12.9 J	0.805 UJ	1.56 JK	5.78 JK	13.7 JK
Total PeCDFs	32.5 JK	44.4 JK	86.9 JK	6.14 JK	0.217 UJ	12.4 J	447 JK	63.8 JK	65.3 JK	41.4 JK	39.4 JK	154 JK	56.6 J
Total TCDDs	1.69 JK	1.05 JK	1.21 JK	0.456 JK	0.314 JK	3.06 J	8.15 JK	8.13 JK	5.38 JK	7.36 J	2.33 JK	2.64 JK	8.28 JK
Total TCDFs	28 JK	35.3 JK	41.9 JK	3.65 JK	0.726 UJ	9.54 JK	264 JK	29.7 JK	35 JK	27 JK	33 JK	103 JK	22.1 JK
PCB Congeners (pg/g)													
2-MonoCB-(1)	57.9 UJK	73.8 J	13.8 J	24.6 UJK	3.93 U	1.25 UJK	24.9 UJK	36.1 J	23 J	7.02 UJK	36.1 J	46.3 J	30.6 J
3-MonoCB-(2)	48.3 J	65.4 UJK	7.66 U	10.3 U	3.56 U	1.71 J	2.89 U	7.4 J	5.13 J	2.6 U	18 J	8.19 UJK	3.98 J
4-MonoCB-(3)	56.3 J	73.8 J	10.6 J	25.1 J	3.27 U	0.987 J	22.1 J	29.1 J	18 J	3.95 UJK	26.6 J	28.2 J	18.4 J
2,2'-DiCB-(4)	188 UJK	291 J	98.3 UJK	41.5 U	18.1 U	5.43 J	96 J	63.4 J	57.5 J	26.1 J	320	193 UJK	113 J
2,3-DiCB-(5)	86.3 U	105 U	14.7 U	20 U	10.7 U	1.14 U	4.67 U	3.72 U	3.98 U	4.33 U	8.99 U	18 U	6.68 U
2,3'-DiCB-(6)	147 UJK	186 UJK	55 UJK	44.1 UJK	9.28 U	2.14 J	76.2 J	46 J	55.2 J	7.62 UJK	161	95.5 J	68.1 J
2,4-DiCB-(7)	77.2 U	93.8 U	12.4 U	16.8 U	9.03 U	1.04 U	14.8 J	11.1 J	10.5 J	3.75 U	27 J	15.1 U	11.8 J

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-04					SED-05				SED-06			
Sample Name	SED-04-SS-1.0	SED-04-SS-1.0-DUP	SED-04-SB-2.0	SED-04-SB-4.75	SED-04-SB-7.75	SED-05-SS-1.0	SED05-SB-2	SED05-SB-5	SED05-SB-7	SED-06-SS-1.0	SED-06-SB-2.0	SED-06-SB-5.5	SED-06-SB-8.5
Collection Date	10/09/2019	10/09/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/07/2019	10/07/2019	10/07/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019
Collection Depth (ft bml)	1	1	2	4.75	7.75	1	2	5	7	1	2	5.5	8.5
2,4'-DiCB-(8)	624 UJK	906 UJK	240	162 UK	8.64 U	8.64 UJK	303	161	175	29.9 J	594	367	232
2,5-DiCB-(9)	84.3 U	102 U	14 U	19 U	10.2 U	1.12 U	20 J	13.3 J	13.7 J	4.15 U	48.7 J	17.1 U	16.6 J
2,6-DiCB-(10)	83.8 U	94.9 U	11.4 U	16.9 U	8.73 U	0.836 U	3.59 UJK	2.29 U	2.5 U	4.74 U	5.21 U	14 U	5.47 U
3,3'-DiCB-(11)	82.8 U	101 U	49.7 UJK	18.4 U	9.85 U	20.7	18.5 J	7.53 J	12.2 J	19.2 UJK	26.7 J	16.5 U	6.14 U
PCBs 12 + 13	78.9 CU	95.7 CU	35.8 CUJK	36.6 CJ	9.71 CU	1 CU	34.1 CJ	21.2 CJ	25.3 CJ	3.87 CU	55.4 CJ	16.3 CU	20.6 CJ
3,5-DiCB-(14)	80.1 U	97.3 U	13.3 U	18 U	9.64 U	1.01 U	4.1 U	3.27 U	3.49 U	3.89 U	7.02 U	16.2 U	6.06 U
4,4'-DiCB-(15)	388 J	525 J	178	93.4 UJK	10.9 U	8.7 J	164	86.3 J	94.8 J	30.9 UJK	422	250	84.8 J
2,2',3-TriCB-(16)	573 J	744 J	284	149	4.59 U	6.89 UJK	262	132	160	24.2 J	590	282	189
2,2',4-TriCB-(17)	605 J	830 J	303	195	4.23 U	7.65 J	344	204	243	25.5 J	608	315	247
PCBs 18 + 30	1,320 CJ	1,750 CJ	662 C	369 C	4.8 CUJK	15.7 CJ	650 C	351 C	418 C	51.7 CJ	1,310 C	669 C	431 C
2,2',6-TriCB-(19)	137 J	202 J	75.9 J	41.3 J	5.16 U	5.27 J	61.1 J	37.9 J	38.1 J	15.2 J	179 J	111 J	51 J
PCBs 20 + 28	2,190 CJ	2,970 C	1,320 C	740 C	7.06 CUJ	39.9 C	1,240 C	661 C	836 C	103 CJ	2,020 C	1,230 C	700 C
PCBs 21 + 33	1,150 CJ	1,570 CJ	668 C	367 C	4.84 CUJ	13.2 CJ	610 C	346 C	386 C	41.7 CJ	1,090 C	602 C	374 C
2,3,4'-TriCB-(22)	701 J	982 J	426	211	3.11 U	10.1	355	160	194	30.3 J	676	366	186
2,3,5-TriCB-(23)	17 U	19 U	4 U	6.71 U	2.99 U	0.319 U	2 J	1.78 U	1.47 U	2.52 U	3 UJK	4 U	2.07 U
2,3,6-TriCB-(24)	18 U	20 U	5 U	7.3 U	3.24 U	0.348 U	2 U	2.03 U	1.67 U	2.65 U	3 U	4 U	2.26 U
2,3',4-TriCB-(25)	187 J	248 J	108 J	111 J	2.79 U	3.06 J	110	78.9 J	452	8.33 J	168	131 UK	108
PCBs 26 + 29	355 CJ	485 CJ	215 CJ	185 CJ	2.99 CU	5.23 CJ	193 CJ	164 CJ	867 C	16.5 CJ	345 C	272 C	204 C
2,3',6-TriCB-(27)	86 J	126 UJK	46 J	27.9 J	3.13 U	2.21 J	47 J	26.7 J	29.5 J	5.14 J	95 J	55 J	36.9 J
2,4',5-TriCB-(31)	1,970	2,690	1,160	598	5.96 UJ	28.2	1,050	538	710	74.3 J	1,710	1,060	566
2,4',6-TriCB-(32)	308 J	378 J	191	116 J	2.9 U	6.7 J	204	118	135	22.5 J	61 UJK	208	136
2,3',5'-TriCB-(34)	26 UJK	30 J	12 J	11.2 UJK	3.15 U	0.342 U	16 J	9.91 J	13.4 J	2.68 U	15 J	11 J	9.72 J
3,3',4,-TriCB-(35)	35 UJK	42 J	20 J	11.2 UJK	3.04 U	1.02 J	19 UJK	12.4 UJK	13.8 J	2.71 U	32 J	21 UJK	12.1 UJK
3,3',5-TriCB-(36)	21 U	23 U	7 U	8.36 U	2.72 U	0.52 U	3 U	2.6 U	4.83 J	2.63 U	2 U	9 U	2.99 U
3,4,4'-TriCB-(37)	640 J	860 J	361	138	3.59 U	14.1	314	157	182	41.3 J	615	351	132
3,4,5-TriCB-(38)	21 U	24 U	7 U	8.66 U	2.81 U	0.532 U	3 U	2.62 U	2.85 U	2.73 U	2 U	9 U	3.22 U
3,4',5-TriCB-(39)	19 U	22 U	7 U	8.07 U	2.61 U	0.484 U	3 U	2.46 U	2.68 U	2.59 U	2 U	8 U	2.96 U
PCBs 40 + 71	969 CJ	1,280 CJ	632 C	396 C	3.66 CU	31.6 C	660 C	405 C	507 C	69.3 CJ	803 C	569 C	362 C
2,2',3,4-TetraCB-(41)	225 J	304 J	158	38 J	5.26 U	3.1 J	83 J	44.9 J	38.8 J	9.3 J	198	111 UJK	24.9 UJK
2,2',3,4'-TetraCB-(42)	615 J	777 J	402	293	4.39 U	18.9	431	363	393	41.4 J	522	379	288
2,2',3,5-TetraCB-(43)	118 J	158 J	8 U	41.2 J	4.5 U	2.45 J	79 J	47.3 J	57.4 J	4.91 U	3 U	4 U	45.9 J
PCBs 44/47/65	2,240 CJ	2,950 CJ	1,460 C	1,130 C	3.82 CU	71.5 C	1,640 C	1,460 C	1,670 C	154 CJ	1,800 C	1,670 C	1,200 C
PCBs 45 + 51	459 CJ	577 CJ	281 CJ	160 CJ	3.27 CU	14.9 CJ	248 C	150 CJ	174 CJ	35.4 CJ	390 C	288 C	143 CJ
2,2',3,6'-TetraCB-(46)	155 J	200 J	100 J	57 J	3.54 U	4.85 J	80 J	50 J	59 J	11.7 J	127	95 J	48 J
2,2',4,5-TetraCB-(48)	482 J	619 J	309	173	7.15 UJK	9.87	298	162	198	21.7 J	409	257	140
PCBs 49 + 69	1,420 CJ	1,830 CJ	887 C	921 C	4.55 CUJK	43 C	1,230 C	1,380 C	1,650 C	102 CJ	1,150 C	1,120 C	1,230 C
PCBs 50 + 53	327 CJ	426 CJ	198 CJ	118 CJ	3.13 CU	12.5 CJ	181 CJ	128 CJ	139 CJ	27.8 CJ	276 C	205 CJ	111 CJ
2,2',5,5'-TetraCB-(52)	2,520	3,290	1,660	1,560	10.6 UJ	84.6	2,100	2,070	2,550	177	2,120	2,850	1,930
2,2',6,6'-TetraCB-(54)	19 UJ	22 UJ	4 J	4 U	2.33 U	0.922 J	3 UJK	4 J	2 J	2.24 UJK	5 J	4 J	2 J
2,3,3',4-TetraCB-(55)	28 J	24 U	13 UJK	6 U	2.15 U	0.501 UJK	4 U	4 U	6 U	2.61 U	1,760	17 UJK	3 U
2,3,3',4'-Tetra CB-(56)	1,160 J	1,560	683	398	2.54 UJK	31.9	724	448	512	71.9 J	918	584	343
2,3,3',5-TetraCB-(57)	24 U	24 U	7 U	8 UJK	2.15 U	0.421 U	10 J	4 U	23 UJK	2.6 U	7 UJK	9 UJK	11 UJK
2,3,3',5'-TetraCB-(58)	24 U	24 U	7 U	9 UJK	2.17 U	0.43 U	12 J	21 J	21 J	2.59 U	5 U	51 UJK	20 J
PCBs 59/62/75	203 CJ	259 CJ	127 CJ	81 CJ	3.08 CU	6.83 CJ	133 CJ	97 CJ	114 CJ	14.8 CJ	174 CJ	120 CJ	78 CJ
2,3,4,4'-TetraCB --(60)	512 J	685 J	300	80 J	2.17 U	14.1	216	73 UJK	98 J	35.1 J	426	240	63 J
PCBs 61/70/74/76	4,080 CJ	5,380 CJ	2,330 C	1,560 C	8.07 CUJ	96.3 C	2,960 C	2,320 C	2,210 C	210 CJ	3,070 C	2,280 CUK	1,600 C
2,3,4',5-TetraCB-(63)	103 J	132 J	60 J	38 J	2.13 U	2.5 J	79 J	56 J	59 J	6.19 UJK	79 J	61 J	38 J

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-04					SED-05				SED-06			
Sample Name	SED-04-SS-1.0	SED-04-SS-1.0-DUP	SED-04-SB-2.0	SED-04-SB-4.75	SED-04-SB-7.75	SED-05-SS-1.0	SED05-SB-2	SED05-SB-5	SED05-SB-7	SED-06-SS-1.0	SED-06-SB-2.0	SED-06-SB-5.5	SED-06-SB-8.5
Collection Date	10/09/2019	10/09/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/07/2019	10/07/2019	10/07/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019
Collection Depth (ft bml)	1	1	2	4.75	7.75	1	2	5	7	1	2	5.5	8.5
2,3,4',6-TetraCB-(64)	1,050 J	1,400 J	710	414	3.13 U	35.2	702	481	518	75.3 J	841	674	365
2,3',4,4'-TetraCB-(66)	2,220 J	2,880 J	1,270	846	3.98 UJ	67.6	1,590	1,410	1,200	153 J	5 U	1,220	871
2,3',4,5-TetraCB-(67)	75 J	94 J	45 J	34 J	1.87 U	1.35 J	56 J	24 J	41 J	5.1 UJK	60 J	52 J	23 J
2,3',4,5'-TetraCB-(68)	22 U	22 U	10 J	23 J	1.94 U	0.591 J	30 J	60 J	53 J	2.32 U	10 J	12 UJK	59 J
2,3',5,5'-TetraCB-(72)	28 J	33 J	17 J	45 J	2.06 U	0.843 J	49 J	80 J	86 J	2.55 U	21 J	27 J	95 J
2,3',5',6-TetraCB-(73)	23 U	19 U	49 J	6 U	3.22 U	0.191 U	2 U	7 U	4 U	3.49 U	59 J	46 J	4 U
3,3',4,4'-TetraCB-(77)	223 J	311 J	141 J	70 J	2.9 U	8.14 J	125	68 J	84 J	19.5 J	186	132	54 J
3,3',4,5-TetraCB-(78)	24 U	24 U	7 U	6 U	2.26 U	0.413 U	4 U	4 U	6 U	2.59 U	5 U	6 U	3 U
3,3',4,5'-TetraCB-(79)	45 J	21 U	12 UJK	24 J	1.99 U	1 J	27 J	48 UJK	53 J	2.29 U	18 J	23 J	51 J
3,3',5,5'-TetraCB-(80)	21 U	21 U	6 U	5 U	1.92 U	0.363 U	3 U	3 U	5 U	2.29 U	4 U	5 U	3 U
3,4,4',5-TetraCB-(81)	23 U	20 U	8 U	7 U	2.74 U	0.413 U	4 U	4 U	6 U	2.88 U	8 UJK	7 U	3 U
2,2',3,3',4-PentaCB-(82)	342 J	486 J	227	180	4.25 U	14.7	265	184	196	33.6 J	241	394	156
2,2',3,3',5-PentaCB-(83)	149 J	214 J	95 J	130 J	4.5 U	6.8 J	145	140	156	17.5 J	109	214	151
2,2',3,3',6-PentaCB-(84)	654 J	825 J	405	454	4.02 U	30.6	564	571	567	64.3 J	466	906	500
PCBs 85/116/117	468 CJ	600 CJ	297 CJ	262 CJ	3.02 CU	20.7 CJ	371 C	287 CJ	293 CJ	48 CJ	312 C	524 C	254 CJ
PCBs 86/87/97/109/119/125	1,640 CJ	2,160 CJ	1,050 C	1,190 C	10.1 CUJ	67.4 C	1,580 C	1,330 C	1,310 C	157 CJ	1,170 C	2,390 C	1,270 C
PCBs 88 + 91	368 CJ	468 CJ	232 CJ	308 C	3.7 CU	20.2 C	446 C	455 C	386 C	42.1 CJ	266 C	445 C	460 C
2,2',3,4,6'-PentaCB-(89)	41 J	46 J	17 J	17 J	3.86 U	0.769 J	28 J	18 J	19 J	7.55 U	16 J	33 UJK	16 J
PCBs 90 + 101	2,310 CJ	3,070 CJ	1,490 C	2,470 C	10.2 CUJ	108 C	3,080 C	2,720 C	2,780 C	230 CJ	1,740 C	4,580 C	3,170 C
2,2',3,5,5'-PentaCB-(92)	499 J	633 J	323	682	3.77 U	22.2	820	661	776	49.5 J	385	1,110	929
PCBs 93 + 100	18 CU	36 CUJK	22 CUJK	28 CUJK	3.61 CU	1.92 CJ	80 CJ	41 CJ	37 CJ	7.01 CU	18 CJ	34 CJ	57 CJ
2,2',3,5,6'-PentaCB-(94)	19 U	21 U	9 J	10 J	3.86 U	0.973 J	14 J	11 J	10 J	7.35 U	12 J	17 UJK	13 J
2,2',3,5',6-PentaCB-(95)	1,820	2,360	1,090	1,740	7.54 UJ	101	1,990	1,980	2,020	200	1,410	3,500	2,290
2,2',3,6,6'-PentaCB-(96)	26 UJK	36 UJK	19 J	13 J	2.49 U	1.38 J	17 UJK	16 J	16 J	2.93 J	18 J	27 J	12 J
PCBs 98 + 102	100 CUJK	132 CUJK	66 CJ	66 CJ	3.86 CU	5.09 CJ	87 CJ	80 CJ	79 CJ	13.6 CJ	72 CJ	101 CJ	80 CJ
2,2',4,4',5-PentaCB-(99)	1,110 J	1,480	681	1,080	4.43 UJK	47.6	1,410	1,460	1,230	121	784	1,650	1,550
2,2',4,5',6-PentaCB-(103)	33 UJK	40 UJK	19 UJK	70 J	3.43 U	2 J	82 J	89 J	78 J	6.46 U	29 J	76 J	128
2,2',4,6,6'-PentaCB-(104)	11 U	11 U	3 U	4 U	2.22 U	0.168 J	1 U	2 U	1 U	1.76 U	1 U	3 U	1 U
2,3,3',4,4'-PentaCB-(105)	948 J	1,210 J	568	431	6.79 UJ	43.2	662	505	471	95.2	623 J	1,270	438
2,3,3',4,5-PentaCB-(106)	19 U	21 U	6 U	8 U	2.4 U	0.381 U	4 U	5 U	4 U	3.12 U	3 U	9 U	4 U
2,3,3',4',5-PentaCB-(107)	160 J	202 J	100 J	149	2.15 U	6.52 J	200	212	184	15.7 J	106	234	180
PCBs 108 + 124	83 CUJK	109 CJ	48 CJ	45 CJ	2.47 CU	3.63 CJ	64 CJ	50 CJ	56 CJ	8.31 CJ	55 CJ	113 CJ	44 CJ
PCBs 110 + 115	2,640 CJ	3,510 C	1,690 C	2,350 C	12.9 CUJ	145 C	2,810 C	2,880 C	2,810 C	308 C	1,900 C	4,280 C	2,650 C
2,3,3',5,5'-PentaCB-(111)	13 U	15 U	5 U	6 U	2.7 U	0.295 U	8 J	6 J	7 J	5.34 U	2 U	10 J	13 J
2,3,3',5,6-PentaCB-(112)	13 U	14 U	5 U	5 U	2.61 U	0.291 U	2 U	3 U	3 U	5.02 U	2 U	5 U	4 U
2,3,4,4',5-PentaCB-(114)	69 J	83 J	38 J	27 J	2.92 U	2.43 J	40 J	29 J	31 J	5.24 J	44 J	73 J	26 UJK
2,3',4,4',5-PentaCB-(118)	2,110	2,780	1,290	1,570	14.7 UJ	91.2	1,990	1,790	1,780	203 J	1,450 J	3,250	1,560
2,3',4,5,5'-PentaCB-(120)	13 U	18 J	10 J	31 J	2.65 U	0.681 UJK	27 J	35 J	31 J	5.17 U	9 J	31 J	46 J
2,3',4,5',6-PentaCB-(121)	14 U	15 U	5 U	6 U	2.7 U	0.304 U	9 J	3 UJK	4 UJK	5.19 U	2 U	5 U	6 J
2,3,3',4',5'-PentaCB-(122)	42 J	49 J	19 J	13 UJK	2.58 U	1.42 J	23 J	17 J	18 J	3.48 J	22 J	30 UJK	14 UJK
2,3',4,4',5'-PentaCB-(123)	40 UJK	46 UJK	23 J	12 UJK	2.9 U	2.42 J	26 J	14 UJK	18 J	4.59 J	26 J	48 J	19 J
3,3',4,4',5-PentaCB-(126)	22 U	23 U	14 J	9 UJ	2.99 U	0.736 J	5 UJK	5 U	5 U	3.85 U	6 J	11 U	4 U
3,3',4,5,5'-PentaCB-(127)	18 U	20 U	6 U	8 U	2.42 U	0.371 U	4 U	5 U	4 U	3.13 U	3 U	9 U	3 U
PCBs 128 + 166	379 CJ	462 CJ	214 CJ	336 C	4.46 CU	27.8 C	396 C	374 C	390 C	49 CJ	239 C	658 C	371 C
PCBs129/138/163	2,940 CJ	3,750 CJ	1,800 C	3,590 C	16.4 CUJ	242 C	3,820 C	3,410 C	3,950 C	404 C	2,140 C	6,660 C	4,470 C
2,2',3,3',4,5'-HexaCB-(130)	181 J	232 J	110 J	230	5.42 U	13.1	247	222	241	24.9 J	130	432	261
2,2',3,3',4,6-HexaCB-(131)	37 UJK	50 J	21 J	30 J	5.58 U	2.26 J	36 J	29 J	34 J	12 U	26 J	61 J	37 J

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-04					SED-05				SED-06			
Sample Name	SED-04-SS-1.0	SED-04-SS-1.0-DUP	SED-04-SB-2.0	SED-04-SB-4.75	SED-04-SB-7.75	SED-05-SS-1.0	SED05-SB-2	SED05-SB-5	SED05-SB-7	SED-06-SS-1.0	SED-06-SB-2.0	SED-06-SB-5.5	SED-06-SB-8.5
Collection Date	10/09/2019	10/09/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/07/2019	10/07/2019	10/07/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019
Collection Depth (ft bml)	1	1	2	4.75	7.75	1	2	5	7	1	2	5.5	8.5
2,2',3,3',4,6'-HexaCB-(132)	927 J	1,160 J	532	1,110	5.12 U	72.7	1,100	1,040	1,180	122	691	1,950	1,480
2,2',3,3',5,5'-HexaCB-(133)	61 UJK	69 J	35 J	102 J	5.05 U	4.28 J	116	125	112	10.5 U	40 J	165	162
2,2',3,3',5,6-HexaCB-(134)	173 J	200 UJK	89 J	186	5.96 U	12.1	193	161	178	19.5 J	129	349	256
PCBs 135 + 151	1,050 CJ	1,330 CJ	775 C	1,930 C	4.16 CUJK	95.5 CJ	1,700 C	1,390 C	1,680 C	155 CJ	889 C	3,230 C	2,420 C
2,2',3,3',6,6'-HexaCB-(136)	377 J	481 J	263	630	2.49 U	30.7	537	528	590	51.3 J	310	1,080	838
2,2',3,4,4',5-HexaCB-(137)	103 J	141 J	59 J	78 J	5.07 U	5.84 J	91 J	87 J	88 J	12.6 UJK	202	147	74 J
PCBs 139 + 140	59 CJ	63 CJ	35 CJ	61 CJ	4.59 CU	3.01 CJ	65 CJ	58 CJ	59 CJ	9.7 CU	35 CJ	100 CJ	96 CJ
2,2',3,4,5,5'-HexaCB-(141)	510 J	687 J	316	594	4.66 U	41.6	633	536	686	72.9 J	402	1,150	846
2,2',3,4,5,6-HexaCB-(142)	30 U	29 U	7 U	10 U	5.42 U	0.457 U	5 J	5 U	5 U	11.2 U	5 J	13 U	6 U
2,2',3,4,5,6'-HexaCB-(143)	28 U	28 U	7 U	9 U	5.07 U	0.432 U	3 U	4 U	5 U	10.4 U	3 U	12 U	6 U
2,2',3,4,5',6-HexaCB-(144)	143 J	188 J	107 J	188	3.24 U	9.84 J	166	146	179	20 J	117	375	203
2,2',3,4,6,6'-HexaCB-(145)	14 U	13 U	3 U	4 U	2.49 U	0.168 U	2 UJK	2 U	2 U	2.04 U	1 U	3 U	2 U
2,2',3,4',5,5'-HexaCB-(146)	467 J	572 J	319	828	4.39 U	37	858	729	809	65 J	360	1,400	1,250
PCBs 147 + 149	2,190 CJ	2,890 CJ	1,390 C	3,400 C	7.91 CUJ	197 C	3,200 C	2,970 C	3,330 C	317 C	1,860 C	5,400 C	4,840 C
2,2',3,4',5,6'-HexaCB-(148)	17 U	16 U	8 UJK	30 J	3.34 U	0.736 J	37 J	46 J	30 J	2.68 U	7 J	37 J	53 J
2,2',3,4',6,6'-HexaCB-(150)	13 U	12 U	3 UJK	15 J	2.42 U	0.53 UJK	25 J	20 J	17 J	1.94 U	4 J	19 J	30 J
2,2',3,5,6,6'-HexaCB-(152)	13 U	13 U	3 U	4 U	2.42 U	0.214 UJK	2 J	2 U	2 U	1.98 U	2 J	3 U	2 UJK
PCBs 153 + 168	2,400 CJ	3,070 C	1,540 C	3,540 C	11.3 CUJ	205 C	3,510 C	3,320 C	3,660 C	332 C	1,920 C	5,970 C	5,020 C
2,2',4,4',5,6'-HexaCB-(154)	46 J	47 UJK	30 J	149	2.81 U	3.69 J	129	139	128	6.75 UJK	35 J	156	245
2,2',4,4',6,6'-HexaCB-(155)	12 U	11 U	3 U	3 U	2.29 U	0.124 U	2 J	2 U	2 U	1.67 U	1 U	3 U	1 U
PCBs 156 + 157	342 CJ	440 CJ	199 CJ	305 C	3.77 CU	19.7 CJ	347 C	306 C	355 C	38 CJ	214 CJ	654 C	338 C
2,3,3',4,4',6-HexaCB-(158)	224 J	289 J	145 J	222	3.43 U	19.8	259	206	250	34.6 J	165	520	286
2,3,3',4,5,5'-HexaCB-(159)	17 U	18 U	7 U	6 U	2.38 U	0.377 U	4 U	4 U	4 U	2.76 U	3 U	9 U	3 U
2,3,3',4,5,6-HexaCB-(160)	20 U	20 U	5 U	7 U	3.82 U	0.321 U	2 U	3 U	3 U	7.95 U	3 U	9 U	4 U
2,3,3',4,5',6-HexaCB-(161)	20 U	20 U	5 U	7 U	3.72 U	0.312 U	2 U	3 U	3 U	7.64 U	2 U	9 U	4 U
2,3,3',4',5,5'-HexaCB-(162)	16 U	18 U	7 U	6 U	2.31 U	0.365 U	3 U	4 U	4 U	2.66 U	2 U	9 U	3 U
2,3,3',4',5',6-HexaCB-(164)	195 J	232 J	118 J	245	3.56 U	17.9	251	231	269	30.6 J	2 U	432	318
2,3,3',5,5',6-HexaCB-(165)	22 U	21 U	5 U	7 U	3.93 U	0.337 U	8 J	5 J	6 J	8.19 U	3 U	9 U	7 J
2,3',4,4',5,5'-HexaCB-(167)	111 J	136 J	67 J	107 J	2.7 U	7.63 J	118	105	121	15.4 J	75 J	223	116
3,3',4,4',5,5'-HexaCB-(169)	18 U	19 U	8 U	7 U	2.77 U	0.323 U	4 U	5 U	5 U	3.26 U	3 U	10 U	10 UJK
2,2',3,3',4,4',5-HeptaCB-(170)	771 J	1,010 J	572	1,260	3.91 U	65.2	1,310	1,090	1,340	114	613	2,070	1,280
PCBs 171 + 173	275 CJ	329 CJ	187 CJ	408 C	3.79 CU	20.6 C	422 C	359 C	422 C	35.6 CJ	203 CJ	642 C	443 C
2,2',3,3',4,5,5'-HeptaCB-(172)	153 J	202 J	111 J	228	3.77 U	8.38 J	248	215	241	25.8 J	116	369	243
2,2',3,3',4,5,6'-HeptaCB-(174)	847 J	1,150 J	609	1,340	3.5 U	65	1,360	1,190	1,370	123	705	2,120	1,550
2,2',3,3',4,5',6-HeptaCB-(175)	42 J	56 J	36 J	71 J	3.4 U	3.07 J	66 J	56 J	64 J	7.73 J	31 J	113 J	79 J
2,2',3,3',4,6,6'-HeptaCB-(176)	123 J	162 J	97 J	209	2.58 U	8.87 J	181	162	188	18.1 J	102 J	332	267
2,2',3,3',4,5',6'-HeptaCB-(177)	504 J	641 J	358	850	3.84 U	41.7	857	773	874	76.1 J	421	1,350	1,000
2,2',3,3',5,5',6-HeptaCB-(178)	180 J	239 J	153	350	3.61 U	14.8	320	349	323	29.4 J	152	527	446
2,2',3,3',5,6,6'-HeptaCB-(179)	386 J	508 J	298	699	2.54 U	28.8	589	553	605	56.6 J	326	1,070	885
PCBs 180 + 193	1,820 CJ	2,380 CJ	1,340 C	3,030 C	8.77 CUJ	145 C	3,130 C	2,720 C	3,030 C	261 C	1,480 C	4,690 C	3,270 C
2,2',3,4,4',5,6-HeptaCB-(181)	74 J	95 J	61.3 J	23 J	3.54 U	2.12 J	66 J	6 UJK	12 J	4.02 J	41.6 J	73 J	7 J
2,2',3,4,4',5,6'-HeptaCB-(182)	15 U	15 U	3.68 U	11 UJK	3.27 U	0.226 J	9 J	13 UJK	10 J	2.78 U	4.11 J	11 UJK	15 J
PCBs 183 + 185	616 CJ	820 CJ	458 C	962 C	3.45 CU	43.7 C	978 C	870 C	970 C	86.9 CJ	487 C	1,530 C	1,140 C
2,2',3,4,4',6,6'-HeptaCB-(184)	12 U	12 U	2.7 U	4 U	2.4 U	0.126 U	2 J	2 U	1 U	2.08 U	0.907 U	3 U	2 U
2,2',3,4,5,6,6'-HeptaCB-(186)	13 U	12 U	2.97 U	4 U	2.63 U	0.134 U	3 J	2 U	2 U	2.28 U	2 J	4 U	2 U
2,2',3,4',5,5',6-HeptaCB-(187)	1,040 J	1,380 J	850	2,000	4.09 UJ	77.1	1,770	1,720	1,760	178	887	2,920	2,390
2,2',3,4',5,6,6'-HeptaCB-(188)	12.4 U	12 U	3.06 U	4.66 U	2.92 U	0.138 U	4.11 J	11.8 J	4.53 J	2.33 U	1.71 UJK	5 J	5.12 J

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-04					SED-05				SED-06			
Sample Name	SED-04-SS-1.0	SED-04-SS-1.0-DUP	SED-04-SB-2.0	SED-04-SB-4.75	SED-04-SB-7.75	SED-05-SS-1.0	SED05-SB-2	SED05-SB-5	SED05-SB-7	SED-06-SS-1.0	SED-06-SB-2.0	SED-06-SB-5.5	SED-06-SB-8.5
Collection Date	10/09/2019	10/09/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/07/2019	10/07/2019	10/07/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019
Collection Depth (ft bml)	1	1	2	4.75	7.75	1	2	5	7	1	2	5.5	8.5
2,3,3',4,4',5,5'-HeptaCB-(189)	36.7 J	51.1 J	28.1 J	55.2 J	2.99 U	2.97 J	52.9 J	42.4 J	54.5 J	6.6 J	26.1 J	94 J	57.5 J
2,3,3',4,4',5,6-HeptaCB-(190)	175 UJK	224 J	140 J	272	2.99 U	14.4	281	228	277	26.7 J	138	435	276
2,3,3',4,4',5',6-HeptaCB-(191)	31.9 UJK	49.2 J	28.4 J	48 J	2.83 U	2.87 J	53.3 J	41.4 J	49.7 J	5.79 J	25.1 J	89 J	49.7 J
2,3,3',4,5,5',6-HeptaCB-(192)	17.2 U	17.2 U	6.71 U	5.09 U	2.97 U	0.281 U	3.14 U	3.67 U	2.92 U	2.93 U	2.09 U	8 U	3.34 U
2,2',3,3',4,4',5,5'-OctaCB-(194)	403 J	596 J	311	684	3.75 U	30.4	718	674	665	51 J	312	983	743
2,2',3,3',4,4',5,6-OctaCB-(195)	186 J	267 J	152	294	4.2 U	13.2	312	260	277	24.5 J	144	461	297
2,2',3,3',4,4',5,6'-OctaCB-(196)	223 J	318 J	210	467	3.47 U	16.3	404	387	385	30.1 J	180	612	436
PCBs 197 + 200	93 CJ	121 CJ	78.5 CJ	147 CJ	2.49 CU	5.72 CJ	136 CJ	121 CJ	116 CJ	11.6 CJ	67.5 CJ	190 CJ	156 CJ
PCBs 198 + 199	495 CJ	692 CJ	452 C	988 C	3.54 CU	30.6 C	831 C	853 C	778 C	73.4 CJ	396 C	1,230 C	929 C
2,2',3,3',4,5',6,6'-OctaCB-(201)	67.3 J	97.6 J	60.4 J	119 J	2.58 U	4.29 J	101	103	93.7 J	9.52 J	49.4 J	157	134
2,2',3,3',5,5',6,6'-OctaCB-(202)	99.6 J	156 J	97.4 J	184	2.83 U	7.38 J	160	173	146	15.1 J	79.3 J	229	196
2,2',3,4,4',5,5',6-OctaCB-(203)	305 J	416 J	273	574	3.13 U	19.8	517	489	463	43.9 J	240	748	541
2,2',3,4,4',5,6,6'-OctaCB-(204)	13.6 U	12.2 U	5.58 U	4.16 U	2.54 U	0.327 U	3.65 J	2.06 U	2.07 U	2.46 U	1.94 J	5.1 U	1.31 U
2,3,3',4,4',5,5',6-OctaCB-(205)	29.6 UJK	45.3 J	25 J	42.7 J	3.45 U	2 J	41.5 J	32.8 J	33.7 J	4.34 J	20 J	61.3 J	41.3 J
2,2',3,3',4,4',5,5',6-NonaCB-(206)	257 J	374 J	217	447	19.4 U	21.8	347	305	257	39.2 J	172	382	330
2,2',3,3',4,4',5,6,6'-NonaCB-(207)	57.6 J	69.7 UJK	45.2 J	54.4 J	14.4 U	3.25 J	67.1 J	43.8 J	39.1 J	4.87 J	33.3 J	74.2 J	46.1 J
2,2',3,3',4,5,5',6,6'-NonaCB-(208)	84 J	109 J	71 J	150	15.1 U	7.22 J	114	100	93.7 J	11.1 UJK	52.1 J	114 J	111
DecaCB-(209)	306 J	451 J	245	576	2.81 U	20.1	645	336	485	40 J	202	416	379
Conventionals													
TOC (mg/kg)	12,000	12,000	6,000 J	10,000 J	360 J	3,800 J	8,800	12,000	7,700	9,400 J	9,800 J	6,600 J	8,400 J
Total solids (%)	59.3	60.1	67.7	69	71.8	78	66.4	72.6	75	71.6	66.9	76.9	73
Grain Size (%)													
Gravel	1.87	1.38	0.44	1.58	0.01 U	7.3	0.22	2.3	0.25	5.47	1.65	1.9	0.96
Sand	51.1	50.1	63.4	60	29.8	85	60.4	59	64.2	84.1	57.5	79.1	64.8
Silt	37.5	40.1	30.1	28.8	65.1	5.7	29.7	25.8	26	7.2	35	15	25.5
Clay	9.6	8.4	6.1	9.6	5.1	2	9.6	12.9	9.5	3.2	5.9	4	8.8
Percent retained 63-micron sieve (#230	4.14	4.26	4.15	3.29	9.9	1.21	2.84	1.98	2.74	1.96	3.67	2.21	1.92
Percent retained 75-micron sieve (#200	7.22	7.34	8.92	7.39	14	2.21	6.07	3.81	5.93	3.87	5.93	5.17	4.23
Percent retained 106-micron sieve (#14	6.8	6.4	11.3	6.27	4.62	2.33	8.52	4.41	7.13	3.64	5.51	7.08	5.54
Percent retained 150-micron sieve (#10	11.3	11.3	21	12.6	0.91	6.91	17.9	10.1	14.5	8.13	11.3	17.6	13.8
Percent retained 250-micron sieve (#60	11.9	11.8	14.2	20.1	0.25	30	19.2	23.3	25.5	28.5	20.1	35	30.6
Percent retained 425-micron sieve (#40	8.59	7.99	3.59	9.43	0.14	36.7	5.61	13.8	7.81	32.3	9.81	11.1	8.21
Percent retained 850-micron sieve (#20	1.12	1.01	0.28	1	0.01 U	5.7	0.3	1.58	0.53	5.68	1.23	0.9	0.46
Percent retained 2000-micron sieve (#1	0.64	0.73	0.31	0.47	0.01 U	4.25	0.13	0.94	0.22	3.18	0.77	0.56	0.25
Percent retained 4750-micron sieve (#4	1.22	0.65	0.13	1.12	0.01 U	3.06	0.09	1.36	0.03	2.29	0.88	1.34	0.71

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-07					SED-08			SED-09				SED-10			
Sample Name	SED-07-SS-1.0	SED-07-SS-1.0-DUP	SED-07-SB-2.0	SED-07-SB-4.35	SED-07-SB-6.35	SED-08-SS-1.0	SED-08-SB-2.0	SED-08-SB-3.25	SED-09-SS-1.0	SED-09-SB-2.0	SED-09-SB-4.85	SED-09-SB-6.85	SED-10-SS-1.0	SED-10-SB-2.0	SED-10-SB-5.2	SED-10-SB-7.2
Collection Date	10/10/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	1	2	4.35	6.35	1	2	3.25	1	2	4.85	6.85	1	2	5.2	7.2
Cyanide (mg/kg)																
Total Cyanide	0.371 J-	0.469 J-	0.291	0.299	0.186	0.51 J-	0.475 J-	0.21 J-	0.41 J-	3.47 J-	0.129 J-	0.178 J-	0.902 J-	1.89 J-	0.82 J-	0.35 J-
TPH (mg/kg)																
Diesel-Range Hydrocarbons	121 J	91.9 J	15 U	14.2 U	11.1 U	13.6 U	12.9 U	25.2 J	55.4 J	407 J	13.5 U	15.5 U	17.7 U	14.2 U	79.2 U	13.9 U
Heavy-Oil (Residual) Range Hydrocarb	330 J	252 J	342	256	150	77.1	72.2	43.2 J	150 J	429 J	121	158	89.5	234	450	325
Total Metals (mg/kg)																
Arsenic	4.3	4.74	4.03	3.85	2.39	3.47	2.7	4.05	2.65	4.16	2.75	3.32	3.99	3.51	3.55	2.33
Barium	143	151	164	140	129	192	101	183	132	155	124	149	108	121 J+	134 J+	111 J+
Cadmium	0.22	0.243	0.358	0.343	0.545	0.069 U	0.121 J	0.098 J	0.0787 J	0.189	0.0793 J	0.0924 J	0.169 J	0.172	0.271	0.1 J
Chromium	22.7	24.9	22.4	19	9.76	28.7	8.5	9.41	11.9	20.1	17.8	20.3	14.9	14.8 J+	23.9 J+	16.9 J+
Copper	37.2	40.5	43.1	31.4	16.3	11.9	14.2	15.5	14	25.8	20.4	25.1	25.1	22 J+	36 J+	21.2 J+
Lead	39.9	34.3	40.3	34.8	44.9	1650	8.23	7.16	17	19.8	7.85	10.4	11.8	157	19.5	10.1
Mercury	0.132	0.189	0.219	0.129	0.0438 J	0.0276 U	0.025 U	0.027 U	0.052 J	0.0915	0.0763	0.114	0.0463 J	0.0609	0.158	0.07
Selenium	0.719 J	0.778 J	0.626 J	0.501 J	0.505 J	0.454 J	0.438 J	0.673 J	0.429 J	0.594 J	0.478 J	0.655 J	0.698 J	0.371 U	0.426 U	0.377 U
Silver	0.287	0.335	0.3	0.226	0.0924 J	0.069 U	0.063 U	0.068 U	0.071 U	0.217	0.0872 J	0.0795 U	0.0885 U	0.112 J	0.389	0.122 J
Zinc	149	153	142	218	144	58	47.2	69.1	70.2	105	50.9	56.6	85	106 J+	107 J+	60 J+
Organotins (ug/kg)																
Tri-n-butyltin	2.4 U	2.6 U	2.3 U	2.4 U	3.1 J	2.2 U	1.9 U	2 U	2.1 U	2.5 U	2.1 U	2.3 U	2.5 U	2 U	2.3 U	2.1 U
SVOCs (ug/kg)																
1,2,4-Trichlorobenzene	50.1 U	56.1 U	204 U	189 U	166 U	44.1 U	41 U	45.1 U	190 U	216 U	45.8 U	202 U	57.7 U	48.2 U	547 U	47 U
1,2-Dichlorobenzene	50.1 U	56.1 U	204 U	189 U	166 U	44.1 U	41 U	45.1 U	190 U	216 U	45.8 U	202 U	57.7 U	48.2 U	547 U	47 U
1,2-Dinitrobenzene	501 U	561 U	2,040 U	1,890 U	1,660 U	441 U	410 U	451 U	1,900 U	2,160 U	458 U	2,020 U	577 U	482 U	5,470 U	470 U
1,3-Dichlorobenzene	50 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
1,3-Dinitrobenzene	501 U	561 U	2,040 U	1,890 U	1,660 U	441 U	410 U	451 U	1,900 U	2,160 U	458 U	2,020 U	577 U	482 U	5,470 U	470 U
1,4-Dichlorobenzene	50 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
1,4-Dinitrobenzene	501 U	561 U	2,040 U	1,890 U	1,660 U	441 U	410 U	451 U	1,900 U	2,160 U	458 U	2,020 U	577 U	482 U	5,470 U	470 U
1-Methylnaphthalene	40 U	45 U	164 U	152 U	133 U	35 U	33 U	36 U	152 U	173 U	37 U	321 J	46 U	54 J	438 U	37.7 U
2,2'-oxybis(1-chloropropane)	50 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
2,3,4,6-Tetrachlorophenol	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
2,3,5,6-Tetrachlorophenol	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
2,4,5-Trichlorophenol	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
2,4,6-Trichlorophenol	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
2,4-Dichlorophenol	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
2,4-Dimethylphenol	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
2,4-Dinitrophenol	501 U	561 U	2,040 U	1,890 U	1,660 U	441 UJ	410 U	451 U	1,900 U	2,160 U	458 U	2,020 U	577 R	482 U	5,470 U	470 U
2,4-Dinitrotoluene	200 U	224 U	816 U	755 U	663 U	176 U	164 U	180 U	757 U	861 U	183 U	808 U	230 U	193 U	2,180 U	188 U
2,6-Dinitrotoluene	200 U	224 U	816 U	755 U	663 U	176 U	164 U	180 U	757 U	861 U	183 U	808 U	230 U	193 U	2,180 U	188 U
2-Chloronaphthalene	20 U	22 U	82 U	76 U	66 U	18 U	16 U	18 U	76 U	86 U	18 U	81 U	23 U	19 U	218 U	18.8 U
2-Chlorophenol	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
2-Methylnaphthalene	51 J	45 U	164 U	152 U	133 U	35 U	33 U	36 U	152 U	173 U	37 U	420	46 U	71 J	438 U	37.7 U
2-Methylphenol	50 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
2-Nitroaniline	402 U	450 U	1,640 U	1,520 U	1,330 U	354 U	329 U	361 U	1,520 U	1,730 U	367 U	1,620 U	462 U	387 U	4,380 U	377 U
2-Nitrophenol	200 U	224 U	816 U	755 U	663 U	176 UJ	164 U	180 U	1,520 U	861 U	183 U	808 U	230 U	193 U	2,180 U	188 U
3- & 4-Methylphenol (m,p-Cresol)	200	132	658	387	166 U	44 U	41 U	45 U	190 U	216 U	122	202 U	58 U	48 J	547 U	72.5 J
3,3-Dichlorobenzidine	402 UJ	450 U	1,640 U	1,520 U	1,330 U	354 UJ	329 U	361 U	1,520 U	1,730 U	367 U	1,620 U	462 R	387 U	4,380 U	377 U
3-Nitroaniline	402 U	450 U	1,640 U	1,520 U	1,330 U	354 U	329 U	361 U	1,520 U	1,730 U	367 U	1,620 U	462 R	387 U	4,380 U	377 U
4,6-Dinitro-2-methylphenol	501 U	561 U	2,040 U	1,890 U	1,660 U	441 UJ	410 U	451 U	1,900 U	2,160 U	458 U	2,020 U	577 U	482 U	5,470 U	470 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-07					SED-08			SED-09				SED-10			
Sample Name	SED-07-SS-1.0	SED-07-SS-1.0-DUP	SED-07-SB-2.0	SED-07-SB-4.35	SED-07-SB-6.35	SED-08-SS-1.0	SED-08-SB-2.0	SED-08-SB-3.25	SED-09-SS-1.0	SED-09-SB-2.0	SED-09-SB-4.85	SED-09-SB-6.85	SED-10-SS-1.0	SED-10-SB-2.0	SED-10-SB-5.2	SED-10-SB-7.2
Collection Date	10/10/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	1	2	4.35	6.35	1	2	3.25	1	2	4.85	6.85	1	2	5.2	7.2
4-Bromophenylphenyl ether	50 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
4-Chloro-3-methylphenol	200 U	224 U	816 U	755 U	663 U	176 U	164 U	180 U	757 U	861 U	183 U	808 U	230 U	193 U	2,180 U	188 U
4-Chloroaniline	50 UJ	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
4-Chlorophenylphenyl ether	50 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
4-Nitroaniline	402 U	450 U	1,640 U	1,520 U	1,330 U	354 U	329 U	361 U	1,520 U	1,730 U	367 U	1,620 U	462 U	387 U	4,380 U	377 U
4-Nitrophenol	200 U	224 U	816 U	755 U	663 U	176 U	164 U	180 U	757 U	861 U	183 U	808 U	230 U	387 U	2,180 U	188 U
Acenaphthene	78	49	337	300	231	47	16 U	18 U	76 U	171 J	69	1,960	69	1,040	396 J	36.5 J
Acenaphthylene	27 J	22 U	82 U	76 U	66 U	18 U	16 U	18 U	76 U	86 U	49	518	43 J	60	218 U	145
Aniline	100 UJ	112 U	409 U	379 U	332 U	88 UJ	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
Anthracene	49	41 J	148 J	127 J	66 U	38	27 J	29 J	76 U	87 J	71	1,200	71	421	389 J	78.1
Azobenzene	50 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
Benzo(a)anthracene	77	82	231	222	167	174	111	141	227	321	241	1,780	210 J	640	1,470	655
Benzo(a)pyrene	107	125	359	304	224	206	144	118	283	467	536	2,040	318 J	520	1,980	1210
Benzo(b)fluoranthene	102	102	349	290	207	272	162	142	236	378	431	1,580	311 J	595	1,800	1020
Benzo(ghi)perylene	103	128	292	183	108 J	158	88	47	177	443	592	998	258 J	287	1,920	986
Benzo(k)fluoranthene	36 J	37 J	170 J	127 J	133 J	86 J	82 J	76 J	114 U	149 J	165 J	629 J	107 J	256 J	688 J	376 J
Benzoic acid	2,510 UJ	2,820 U	10,200 U	9,480 U	8,320 U	2,210 UJ	2,060 U	2,260 U	9,510 U	10,800 U	2,290 U	10,100 U	2,890 R	2,420 U	27,400 U	2360 U
Benzyl alcohol	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
Bis(2-chloroethoxy)methane	50 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
Bis(2-chloroethyl)ether	50 UJ	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
Bis(2-ethylhexyl)phthalate	301 U	337 U	1,230 U	1,140 U	997 U	265 U	246 U	271 U	1,140 U	1,290 U	275 U	1,210 U	346 U	290 U	3,280 U	282 U
Butylbenzylphthalate	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
Carbazole	30 U	34 U	123 U	114 U	100 U	27 U	25 U	27 U	114 U	129 U	28 U	121 U	35 U	29 U	328 U	28.2 U
Chrysene	99	96	259	224	164	248	139	164	275	370	300	1,920	343 J	795	1,780	875
Di(2-ethylhexyl)adipate	501 U	561 U	2,040 U	1,890 U	1,660 U	441 U	410 U	451 U	1,900 U	2,160 U	458 U	2,020 U	577 U	482 U	5,470 U	470 U
Dibenzo(a,h)anthracene	20 U	22 U	82 U	76 U	66 U	27 J	16 U	18 U	76 U	86 U	30 J	196	34 J	50	218 U	77.6
Dibenzofuran	22 J	22 U	82 U	76 U	66 U	18 U	16 U	18 U	76 U	86 U	18 U	81 U	29 J	466	218 U	18.8 U
Diethyl phthalate	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
Dimethyl phthalate	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
Di-n-butyl phthalate	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
Di-n-octyl phthalate	161 U	180 U	657 U	607 U	533 U	142 U	132 U	145 U	609 U	693 U	147 U	650 U	185 U	155 U	1,760 U	151 U
Fluoranthene	253	225	768	436	758	367	372	93	535	1,070	960	2,620	248	2,610	4,670	932
Fluorene	52	33 J	180	109 J	66 U	18 U	16 U	18 U	76 U	126 J	29 J	755	47	756	369 J	36.8 J
Hexachlorobenzene	20 U	22 U	82 U	76 U	66 U	18 U	16 U	18 U	76 U	86 U	18 U	81 U	23 U	19 U	218 U	18.8 U
Hexachlorobutadiene	50 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
Hexachlorocyclopentadiene	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 R	97 U	1,090 U	94.1 U
Hexachloroethane	50 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
Indeno(1,2,3-cd)pyrene	85	87	215	144 J	103 J	144	75	46	160	327	410	951	200 J	258	1,520	788
Isophorone	50 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
Naphthalene	121	77 J	427	407	133 U	35 U	63 J	36 U	152 U	189 J	115	790	46 U	170	758 J	174
Nitrobenzene	200 U	224 U	816 U	755 U	663 U	176 U	164 U	180 U	757 U	861 U	183 U	808 U	230 U	193 U	2,180 U	188 U
N-Nitrosodimethylamine	50 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
N-Nitrosodiphenylamine	100 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
N-Nitrosodipropylamine	50 U	56 U	204 U	189 U	166 U	44 U	41 U	45 U	190 U	216 U	46 U	202 U	58 U	48 U	547 U	47 U
Pentachlorophenol	200 U	224 U	816 U	755 U	663 U	176 U	164 U	180 U	757 U	861 U	183 U	808 U	230 U	193 U	2,180 U	188 U
Phenanthrene	277	212	937	650	1,190	150	52	94	148 J	665	432	2,710	121	3,510	4,660	376
Phenol	40 U	45 U	164 U	152 U	133 U	35 U	33 U	36 U	152 U	173 U	67 J	162 U	46 U	48 J	438 U	45.8 J

Location	SED-07					SED-08			SED-09				SED-10			
Sample Name	SED-07-SS-1.0	SED-07-SS-1.0-DUP	SED-07-SB-2.0	SED-07-SB-4.35	SED-07-SB-6.35	SED-08-SS-1.0	SED-08-SB-2.0	SED-08-SB-3.25	SED-09-SS-1.0	SED-09-SB-2.0	SED-09-SB-4.85	SED-09-SB-6.85	SED-10-SS-1.0	SED-10-SB-2.0	SED-10-SB-5.2	SED-10-SB-7.2
Collection Date	10/10/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	1	2	4.35	6.35	1	2	3.25	1	2	4.85	6.85	1	2	5.2	7.2
Pyrene	303	289	887	556	864	392	1,750	1,610	598	1,370	1,350	3,780	336	2,240	5,820	1660
Pyridine	100 U	112 U	409 U	379 U	332 U	88 U	82 U	90 U	380 U	432 U	92 U	405 U	115 U	97 U	1,090 U	94.1 U
PAH Homologs (ug/kg)																
C1-Chrysenes/Benz(a)anthracenes	126	--	385	263 U	281	105 U	135	106 U	155	361	122	1,160	169	383	591	278
C1-Fluoranthenes/Pyrenes	216	--	689	394	506	105 U	323	209	240	862	292	2,930	188	1,000	1,280	391
C1-Fluorenes	118 U	--	319 U	263 U	226 U	105 U	99 U	106 U	118 U	247	107 U	594	132 U	308	333 U	115 U
C1-Phenanthrenes/Anthracenes	340	--	684	639	806	105 U	99 U	106 U	118 U	1,080	237	3,180	170	1,610	1,450	380
C2-Chrysenes/Benz(a)anthracenes	118 U	--	319 U	263 U	226 U	105 U	99 U	106 U	118 U	301	107 U	460	132 U	201	333 U	201
C2-Fluorenes	118 U	--	319 U	263 U	239	105 U	99 U	106 U	118 U	407	107 U	489	132 U	200	333 U	115 U
C2-Naphthalenes	346	--	481	560	245	105 U	99 U	106 U	118 U	562	107 U	1,780	172	548	428	261
C2-Phenanthrenes/Anthracenes	359	--	642	577	776	105 U	99 U	106 U	138	1,230	158	1,720	139	828	949	324
C3-Chrysenes/Benz(a)anthracenes	118 U	--	319 U	263 U	230	105 U	99 U	106 U	118 U	269	107 U	287 U	132 U	156	333 U	154
C3-Fluorenes	118 U	--	319 U	263 U	226 U	105 U	99 U	106 U	118 U	368	107 U	287 U	132 U	119	333 U	115 U
C3-Naphthalenes	408	--	502	623	495	105 U	99 U	106 U	118 U	1,050	107 U	1,390	187	624	708	221
C3-Phenanthrenes/Anthracenes	276	--	609	475	619	105 U	99 U	106 U	118 U	969	107 U	783	132 U	395	502	246
C4-Chrysenes/Benz(a)anthracenes	235 U	--	638 U	526 U	451 U	211 U	198 U	212 U	236 U	256 U	214 U	573 U	263 U	237 U	667 U	229 U
C4-Naphthalenes	309	--	388	485	595	105 U	99 U	106 U	118 U	1,130	107 U	692	132 U	366	563	166
C4-Phenanthrenes/Anthracenes	235 U	--	638 U	526 U	451 U	211 U	198 U	212 U	236 U	15,300	214 U	573 U	263 U	1,080	667 U	229 U
Chlorinated Herbicides (mg/kg)																
2,4,5-T	0.033 U	0.035 U	0.032 U	0.033 U	0.026 U	0.025 U	0.024 U	0.028 U	0.03 U	0.033 U	0.03 U	0.028 U	0.035 U	0.03 U	0.031 U	0.027 U
2,4-D	0.04 U	0.044 U	0.04 U	0.04 U	0.032 U	0.031 U	0.029 U	0.035 U	0.037 U	0.04 U	0.037 U	0.035 U	0.043 U	0.037 U	0.038 U	0.033 U
2,4-DB	0.099 U	0.11 U	0.098 U	0.099 U	0.079 U	0.077 U	0.072 U	0.086 U	0.09 U	0.099 U	0.092 U	0.085 U	0.11 U	0.091 U	0.093 U	0.082 U
Dalapon	0.11 U	0.12 U	0.11 U	0.11 U	0.088 U	0.086 U	0.08 U	0.096 U	0.1 U	0.11 U	0.1 U	0.095 U	0.12 U	0.1 U	0.1 U	0.091 U
Dicamba	0.053 U	0.057 U	0.052 U	0.052 U	0.042 U	0.041 U	0.038 U	0.046 U	0.048 U	0.053 U	0.049 U	0.045 U	0.056 U	0.048 U	0.049 U	0.043 U
Dichlorprop	0.041 U	0.045 U	0.041 U	0.041 U	0.033 U	0.032 U	0.03 U	0.036 U	0.038 U	0.041 U	0.038 U	0.036 U	0.044 U	0.038 U	0.039 U	0.034 U
Dinoseb	0.022 U	0.024 U	0.022 U	0.022 U	0.018 U	0.017 U	0.016 U	0.019 U	0.02 U	0.022 U	0.021 U	0.019 U	0.024 U	0.02 U	0.021 U	0.018 U
MCPA	4.6 U	5 U	4.5 U	4.6 U	3.6 U	3.6 U	3.3 U	4 U	4.2 U	4.6 U	4.3 U	4 U	4.9 U	4.2 U	4.3 U	3.8 U
MCPP (Mecoprop)	4 U	4.3 U	3.9 U	4 U	3.1 U	3.1 U	2.9 U	3.4 U	3.6 U	4 U	3.7 U	3.4 U	4.3 U	3.6 U	3.7 U	3.3 U
Pentachlorophenol	0.037 U	0.04 U	0.036 U	0.037 U	0.029 U	0.029 U	0.027 U	0.032 U	0.033 U	0.037 U	0.034 U	0.032 U	0.039 U	0.034 U	0.035 U	0.03 U
Picloram	0.042 U	0.046 U	0.041 U	0.042 U	0.033 U	0.033 U	0.031 U	0.036 U	0.038 U	0.042 U	0.039 U	0.036 U	0.045 U	0.038 U	0.04 U	0.035 U
Silvex	0.042 U	0.046 U	0.041 U	0.042 U	0.033 U	0.033 U	0.031 U	0.036 U	0.038 U	0.042 U	0.039 U	0.036 U	0.045 U	0.038 U	0.04 U	0.035 U
Organochlorine Pesticides (ng/g)																
2,4'-DDD	17.5 J-	9.64 J-	2.57	1.15	1.34	27.3 J-	4.95 J-	4.88 J-	24.8 J-	20.5 J	0.348 J-	0.093 UJ	18 J-	59.4 J-	29 J-	6.98 J-
2,4'-DDE	1.2 UJK	0.9 UJK	0.3 UJK	0.25 UJK	0.3 UJK	4.46 J-	0.17 UJK	0.24 UJK	5.86 J-	3.6 UJK	0.082 UJK	0.084 UJ	0.94 UJ	5.84 J-	1.4 UJK	0.32 J-
2,4'-DDT	1.29 J-	1.21 J-	0.091 U	0.087 U	0.131 J	19 J-	0.311 J-	0.084 UJ	31.3 J-	1.04 J	0.087 UJ	0.096 UJ	1.74 J-	4.38 J-	0.68 J-	0.089 UJ
4,4'-DDD	53.9 J-	33.7 J-	6.73	3.16	3.13	22.6 J-	11.3 J-	12 J-	68.2 J-	89.4 J	2.17 J-	0.091 J-	41.3 J-	138 J-	46 J-	10.6 J-
4,4'-DDE	11.9 J-	10.2 J-	4.16	2.58	3.17	36.5 J-	3.85 J-	1.04 J-	35.4 J-	17.2 J-	0.302 J-	0.07 UJ	10.4 J-	25.6 J-	2.73 J-	0.552 J-
4,4'-DDT	6.07 J-	5.85 J-	0.493 J	0.686 J	1.2	147 J-	1.18 J-	0.31 J-	720 J	2.14 J-	0.074 UJ	0.082 UJ	2.79 J-	65.2 J-	22.6 J-	4.34 J-
Aldrin	6.6 UJK	4.5 UJK	14 UJK	3.7 UJK	3.9 UJK	0.53 UJK	1.4 UJK	0.39 UJK	9 UJK	16 UJK	0.18 UJ	0.2 UJ	2.9 UJ	11 UJK	0.6 J-	0.19 UJ
alpha-BHC	0.06 UJ	0.061 UJ	0.056 U	0.053 U	0.052 U	0.052 UJ	0.051 UJ	0.051 UJ	0.053 UJ	0.11 UJ	0.053 UJ	0.059 UJ	0.127 J-	0.059 UJK	0.11 UJ	0.055 UJ
alpha-Chlordane	1.96 J-	1.59 J-	0.229 J	0.15 UJK	0.13 UJK	0.075 J-	0.126 J-	0.035 UJ	0.213 J-	0.382 J-	0.036 UJ	0.04 UJ	0.226 J-	0.319 J-	0.075 UJ	0.037 UJ
beta-BHC	0.14 UJ	0.14 UJ	0.13 U	0.12 U	0.12 U	0.12 UJ	0.12 UJ	0.12 UJ	0.13 UJK	0.27 UJ	0.12 UJ	0.14 UJ	0.16 UJ	0.41 UJK	0.25 UJ	0.13 UJ
beta-Chlordane	3.62 J-	2.87 J-	0.455 J	0.312 J	0.244 J	0.077 J-	0.18 J-	0.052 J-	0.328 J-	0.971 J-	0.043 UJ	0.048 UJ	0.209 J-	0.785 J-	0.089 UJ	0.045 UJ
cis-Nonachlor	0.32 J-	0.22 UJK	0.11 U	0.11 U	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ	0.23 UJ	0.11 UJ	0.12 UJ	0.13 UJ	0.15 UJK	0.22 UJ	0.11 UJ
delta-BHC	0.098 UJ	0.1 UJ	0.091 U	0.087 U	0.085 U	0.085 UJ	0.083 UJ	0.084 UJ	0.12 UJK	0.19 UJ	0.087 UJ	0.096 UJ	0.11 UJ	0.1 UJK	0.18 UJ	0.089 UJ
Dieldrin	0.28 UJK	0.12 UJ	0.11 U	0.11 U	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.45 UJK	0.23 UJ	0.11 UJ	0.12 UJ	0.14 UJ	0.1 UJ	0.22 UJ	0.11 UJ
Endosulfan I	0.26 UJ	0.27 UJ	0.24 U	0.23 U	0.23 U	0.23 UJ	0.22 UJ	0.22 UJ	0.23 UJ	0.5 UJ	0.23 UJ	0.26 UJ	0.3 UJ	0.22 UJ	0.48 UJ	0.24 UJ

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-07					SED-08			SED-09				SED-10			
Sample Name	SED-07-SS-1.0	SED-07-SS-1.0-DUP	SED-07-SB-2.0	SED-07-SB-4.35	SED-07-SB-6.35	SED-08-SS-1.0	SED-08-SB-2.0	SED-08-SB-3.25	SED-09-SS-1.0	SED-09-SB-2.0	SED-09-SB-4.85	SED-09-SB-6.85	SED-10-SS-1.0	SED-10-SB-2.0	SED-10-SB-5.2	SED-10-SB-7.2
Collection Date	10/10/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	1	2	4.35	6.35	1	2	3.25	1	2	4.85	6.85	1	2	5.2	7.2
Endosulfan II (beta)	0.19 UJ	0.19 UJ	0.17 UJ	0.17 UJ	0.16 UJ	0.16 UJ	0.16 UJ	0.16 UJ	0.18 UJK	0.36 UJ	0.17 UJ	0.18 UJ	0.21 UJ	0.16 UJ	0.34 UJ	0.17 UJ
Endosulfan sulfate	0.42 UJK	0.26 UJK	0.22 UJ	0.21 UJ	0.21 UJ	0.77 UJK	0.2 UJ	0.2 UJ	0.52 UJK	0.45 UJ	0.21 UJ	0.23 UJ	0.27 UJ	0.2 UJ	0.43 UJ	0.22 UJ
Endrin	0.1 UJ	0.67 J-	1 UJK	0.35 UJK	0.57 UJK	0.37 UJK	0.13 UJK	0.088 UJ	0.09 UJ	1.3 UJK	0.091 UJ	0.1 UJ	2.1 UJ	0.24 UJK	0.19 UJ	0.094 UJ
Endrin aldehyde	0.23 UJ	0.24 UJ	0.22 U	0.21 U	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.45 UJ	0.21 UJ	0.23 UJ	0.26 UJ	0.2 UJ	0.43 UJ	0.21 UJ
Endrin ketone	0.15 UJ	0.15 UJ	0.14 U	0.13 U	0.13 U	0.13 UJ	0.12 UJ	0.13 UJ	0.13 UJ	0.28 UJ	0.13 UJ	0.14 UJ	0.17 UJ	0.12 UJ	0.27 UJ	0.13 UJ
Heptachlor	0.12 UJ	0.13 UJ	0.11 U	0.11 U	0.11 U	0.11 UJ	0.1 UJ	0.11 UJ	0.11 UJ	0.24 UJ	0.11 UJ	0.12 UJ	0.14 UJ	0.1 UJ	0.22 UJ	0.11 UJ
Heptachlor epoxide	0.079 UJ	0.081 UJ	0.073 U	0.07 U	0.069 U	0.069 UJ	0.067 UJ	0.067 UJ	0.069 UJ	0.15 UJ	0.07 UJ	0.078 UJ	0.09 UJ	0.067 UJ	0.14 UJ	0.072 UJ
Hexachlorobenzene	0.6 J-	0.18 UJ	0.16 U	0.15 U	0.15 UJ	0.23 J-	0.19 J-	0.8 J-	1.41 J-	0.57 J-	0.15 UJ	0.17 UJ	0.88 J-	1.41 J-	0.32 UJ	0.16 UJ
Lindane	0.065 UJ	0.066 UJ	0.06 U	0.058 U	0.057 U	0.056 UJ	0.055 UJ	0.055 UJ	0.057 UJ	0.12 UJ	0.058 UJ	0.064 UJ	0.073 UJ	0.13 UJK	0.12 UJ	0.059 UJ
Methoxychlor	0.11 UJ	0.12 UJ	0.11 U	0.1 U	0.1 U	0.1 UJ	0.098 UJ	0.098 UJ	0.1 UJ	0.22 UJ	0.1 UJ	0.11 UJ	0.13 UJ	0.098 UJ	0.21 J-	0.13 J-
Mirex	0.085 UJ	0.087 UJ	0.079 U	0.076 U	0.074 U	0.074 UJ	0.072 UJ	0.073 UJ	0.075 UJ	0.16 UJ	0.076 UJ	0.084 UJ	0.097 UJ	0.072 UJ	0.16 UJ	0.078 UJ
Oxychlordane	0.2 UJ	0.2 UJ	0.18 U	0.17 U	0.17 U	0.17 UJ	0.17 UJ	0.17 UJ	0.17 UJ	0.37 UJ	0.17 UJ	0.19 UJ	0.22 UJ	0.17 UJ	0.36 UJ	0.18 UJ
trans-Nonachlor	0.7 J-	0.4 UJK	0.067 U	0.065 U	0.063 U	0.063 UJ	0.062 UJ	0.062 UJ	0.11 UJK	0.24 UJK	0.065 UJ	0.072 UJ	0.14 UJ	0.173 J-	0.13 UJ	0.066 UJ
Dioxins/Furans (pg/g)																
1,2,3,4,6,7,8-HpCDD	2490 J	195 J	38.5	89.9	41.6	31.3	73.4	12.4	136	99	2.01 J	0.973 J	143	143	144	3.34 J
1,2,3,4,6,7,8-HpCDF	952 J	77 J	11.4	35.2	12.9	13.2	20.7	7.41	140	250	20.6	1.26 UJK	7.64	232	132	3.61 J
1,2,3,4,7,8,9-HpCDF	106 J	8.39 J	1.65 UJK	3.47 J	1.16 J	2.78 UJ	2.33 J	2.18 J	55	58.2	2.38 J	0.164 U	2.52 UJ	82	5.09	0.476 J
1,2,3,4,7,8-HxCDD	9.69 J	0.556 UJ	0.167 U	0.563 J	0.314 UJ	0.39 UJ	0.812 UJK	0.374 U	2 UJ	4.15 J	0.338 U	0.25 U	0.545 UJ	2.5 J	0.643 UJK	0.217 U
1,2,3,4,7,8-HxCDF	140 J	10.1 J	2.7 J	5.61	2.72 J	17	5.92	12.2	265	279	9.12	0.566 UJ	13.4	391	15.6	1.98 J
1,2,3,6,7,8-HxCDD	73.6 J	6.13 J	1.32 J	3.41 J	1.61 J	1.08 UJ	2.36 J	0.642 J	7.71	24.6	0.334 U	0.217 U	2.94 J	10.8	6.12 UK	0.231 UJK
1,2,3,6,7,8-HxCDF	57.9 J	3.85 J	1.01 J	2.88 J	0.986 J	4.66 J	1.92 J	2.94 J	69.3	87.2	5.45	0.205 U	3.67 J	103	9.4	0.611 UJ
1,2,3,7,8,9-HxCDD	22.1 J	1.62 UJ	0.45 J	1.3 J	0.701 J	0.804 UJ	1.46 UJK	0.397 J	3.71 J	8.57	0.342 U	0.236 U	1.17 UJ	4.33 J	2.12 UJK	0.225 U
1,2,3,7,8,9-HxCDF	26.6 J	1.85 UJ	0.561 J	1.13 J	0.454 UJ	1.43 UJ	1.01 J	0.984 UJK	28.3 J	28.2 J	0.389 U	0.43 UJ	3.12 J	33.9	2.71 J	0.263 UJK
1,2,3,7,8-PeCDD	3.84 J	0.301 UJ	0.241 UJK	0.432 UJK	0.244 J	0.322 UJ	0.762 J	0.213 U	9.72	48.3	0.309 U	0.148 U	0.577 UJ	13.7	1.51 J	0.122 U
1,2,3,7,8-PeCDF	12.3 J	1.03 UJ	0.381 UJ	0.683 J	0.794 J	7.27	3.01 J	4.12 J	129	135	1.04 J	0.371 UJ	7.2	144	6.53	0.858 J
2,3,4,6,7,8-HxCDF	49.9 J	3.52 J	0.793 J	2.4 J	0.744 J	1.2 UJ	1.22 J	0.648 UJK	17.2	31.9	0.682 J	0.227 U	1.31 UJ	22.5	4.45 J	0.17 U
2,3,4,7,8-PeCDF	33.8 J	2.62 J	0.619 J	2.08 J	0.746 J	3.56 J	1.98 J	1.95 J	64.9	114	0.858 J	0.23 UJK	3.59 J	73	6.11	0.572 J
2,3,7,8-TCDD	15.5 J	1.1 J	0.262 J	0.514 J	0.21 J	0.233 J	0.456 J	0.191 U	28.2	42.6	0.524 J	0.174 J	0.643 UJK	20.5	1.02 UK	0.133 U
2,3,7,8-TCDF	3.8 UJK	0.618 UJK	0.582 UJ	0.679 UJ	0.683 UJ	6.49	3.41	5.18	108	238	4.5	0.76 UJ	5.66	147	8.85	0.823 UJ
OCDD	28,200 J	2,140 J	533	1,200	581	478	888	130	1,230	997	21.4	9.08 J	717	1,490	2,680	49.2
OCDF	3,850 J	366 J	24.5	90.6	37.2	20.5	61.6	10.4	381	345	6.72 J	0.742 J	14.8	475	90.4	3.91 J
Total HpCDDs	4,550 J	336 J	105	193	92.9	88.1	148	28.5	305	221	4.85 J	2.33 J	280	349	405	8.01 J
Total HpCDFs	4,780 J	415 J	42.3 JK	135 JK	50.4 J	29.3 J	70 J	15.2 J	292 JK	465 J	27.7 JK	2.07 JK	20.3 J	442 J	253	6.8 J
Total HxCDDs	533 JK	40 JK	12 J	28 J	13.1 J	13.7 J	23 JK	4.41 JK	64 JK	97.4 JK	1.5 J	0.885 J	46.4 J	74.2 JK	62.8 JK	1.76 JK
Total HxCDFs	1,800 JK	144 JK	20.7 J	61.8 JK	22.9 JK	34.9 JK	35.5 J	21 JK	491 J	647 JK	20.7 J	1.42 JK	35.1 JK	670 JK	136 JK	5.65 JK
Total PeCDDs	76 JK	6.36 JK	1.97 JK	5.79 JK	2.27 JK	6.55 JK	5.04 J	0.35 J	42.7 J	95.9 JK	0.309 UJ	0.148 UJ	5.83 JK	46.5 J	8.52 JK	0.598 J
Total PeCDFs	438 J	36 JK	8.46 JK	28.5 JK	10.2 JK	23.4 JK	19.1 JK	11.9 J	520 J	819 JK	9.54 JK	1.92 JK	29.4 JK	574 JK	50 J	5.02 JK
Total TCDDs	45 JK	3.1 JK	0.975 JK	3.25 JK	1.11 JK	73.5 JK	4.28 JK	2.05 JK	295 JK	123 JK	0.862 J	0.574 JK	5.72 JK	103 JK	5.91 JK	0.317 UJ
Total TCDFs	84 JK	7.26 JK	3.67 JK	11.2 JK	5.16 JK	24.8 JK	17.5 JK	20.8 JK	807 JK	1,550 JK	13.4 JK	3.92 JK	34.3 JK	832 JK	54.7 JK	3.16 JK
PCB Congeners (pg/g)																
2-MonoCB-(1)	36 J	37.3 J	53.6 J	54.7 J	22.1 J	15.9 J	11.6 UJK	2.28 U	782	7,460	49 J	5.76 J	267	514	17 UJK	3.26 UJK
3-MonoCB-(2)	8 J	9.54 J	8.97 J	6.81 J	2.6 UJK	13 J	3.17 U	2.25 U	17.9 J	65 J	2.7 U	2.93 U	23.4 J	16.8 J	3.61 U	2.62 U
4-MonoCB-(3)	27 J	32.4 J	33.6 J	33.2 J	12.8 J	32.2 UJK	2.43 U	1.7 U	373	3,090	27.2 J	4.55 UJK	73.5 J	229	8.77 J	2.07 U
2,2'-DiCB-(4)	171 J	171 J	103 J	119 J	36.1 J	27.9 J	39.5 J	23.5 J	1,350	3,160	21.2 UJK	7.38 U	329	1,140	29.1 J	7.11 U
2,3-DiCB-(5)	8 U	5.6 U	14.7 U	7.43 U	1.79 U	6.37 U	9.93 U	8.45 U	8 U	19 U	6.6 U	8.55 U	5.29 U	15 U	10.8 U	7.69 U
2,3'-DiCB-(6)	134	141	56.5 UJK	59 J	23.2 J	12.6 J	18.7 J	7.55 U	954	1,330	9.46 UJK	7.64 U	65.7 J	714	30.2 J	6.87 U
2,4-DiCB-(7)	23 J	24.1 J	13 U	13.5 UJK	4.35 J	5.52 U	8.97 U	7.63 U	35 J	172	5.96 U	7.72 U	17 UJK	73 J	9.3 U	6.95 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-07					SED-08			SED-09				SED-10			
Sample Name	SED-07-SS-1.0	SED-07-SS-1.0-DUP	SED-07-SB-2.0	SED-07-SB-4.35	SED-07-SB-6.35	SED-08-SS-1.0	SED-08-SB-2.0	SED-08-SB-3.25	SED-09-SS-1.0	SED-09-SB-2.0	SED-09-SB-4.85	SED-09-SB-6.85	SED-10-SS-1.0	SED-10-SB-2.0	SED-10-SB-5.2	SED-10-SB-7.2
Collection Date	10/10/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	1	2	4.35	6.35	1	2	3.25	1	2	4.85	6.85	1	2	5.2	7.2
2,4'-DiCB-(8)	478	523	205	191 J	70.7 J	53.8 J	69.6 UJK	28.9 UJK	1,830	3,980	47.2 J	7.23 U	448	2,010	66.6 J	6.51 U
2,5-DiCB-(9)	32 J	30.7 J	14 U	16.7 J	5.82 J	6.1 U	9.69 U	8.24 U	47 J	151	6.44 U	8.34 U	23.4 J	77 J	9.88 U	7.5 U
2,6-DiCB-(10)	8 UJK	9.42 J	11.1 U	5.53 U	0.97 U	4.76 U	5.47 U	4.23 U	26 J	86 J	3.96 U	5.13 U	11.5 J	28 J	9.48 U	4.77 U
3,3'-DiCB-(11)	8 U	13 UJK	13.8 U	6.97 U	8.22 UJ	21.8 J	9.34 U	7.95 U	55 J	82 J	6.21 U	8.04 U	54.5 J	74 UJK	9.8 U	7.23 U
PCBs 12 + 13	53 CJ	51.5 CJ	13.3 CU	25.3 CUJK	14.9 CJ	28.6 CJ	8.69 CU	7.4 CU	256 C	714 C	5.78 CU	7.48 CU	22.9 CJ	140 CJ	9.44 CU	6.73 CU
3,5-DiCB-(14)	7 U	5.02 U	13.5 U	6.82 U	1.51 U	5.72 U	8.94 U	7.61 U	7 U	17 U	5.94 U	7.7 U	4.75 U	14 U	9.58 U	6.92 U
4,4'-DiCB-(15)	235	235	90.3 J	99.8 J	51.3 J	84.2 J	25.5 J	6.29 U	792	2,130	20.8 J	7.14 U	161	729	37.1 UJK	6.29 U
2,2',3-TriCB-(16)	455	457	177	185	74.5 J	41.8 J	57.7 J	31 J	407	733	6.44 UJK	6.84 U	287	727	24.4 J	5.26 U
2,2',4-TriCB-(17)	681	678	225	258	139	49.6 J	73.5 J	33.7 J	664	1,210	8.01 UJK	6.2 U	313	1,000	37 UJK	4.77 U
PCBs 18 + 30	1,060 C	1,060 C	421 C	471 C	220 C	90.2 CJ	139 CJ	78 CJ	1,550 C	2,860 C	20.7 CJ	5.26 CU	770 C	2,210 C	82.5 CJ	6.1 CJ
2,2',6-TriCB-(19)	118	116	47.4 UJK	48.7 J	20.4 J	21.5 J	13.9 J	6.07 J	102	140	4.02 U	6.66 U	104 J	163	6.5 U	5.01 U
PCBs 20 + 28	2,130 C	2,100 C	733 C	835 C	452 C	162 CJ	370 C	137 CJ	2,210 C	4,240 C	31.7 CJ	4.37 CU	847 C	3,860 C	160 CJ	8.73 CJ
PCBs 21 + 33	1,140 C	1,150 C	381 C	395 C	194 C	141 CJ	107 CJ	71.7 CJ	292 C	687 C	5.58 CUJK	4.45 CU	463 C	1,070 C	42.4 CJ	3.42 CU
2,3,4'-TriCB-(22)	552	568	200	216	104	67.3 J	77.7 J	40.4 J	316	879	6.13 UJK	4.34 U	296	841	32.5 J	3.34 U
2,3,5-TriCB-(23)	5 U	4 U	4.69 U	2.6 U	0.833 U	5.24 U	3.73 U	2.97 U	5 U	6 U	2.72 U	4.35 U	3.1 U	6 U	3.84 U	3.34 U
2,3,6-TriCB-(24)	5 U	4 U	5.1 U	2.83 U	0.922 U	5.53 U	4.02 U	3.2 U	5 U	7 U	2.93 U	4.68 U	3.26 U	6 U	4.24 U	3.6 U
2,3',4-TriCB-(25)	234	222	68.6 J	149	85 J	58.6 J	151	10.3 J	1,510	2,520	19.1 J	4.08 U	65.9 J	1,380	51.2 J	3.13 U
PCBs 26 + 29	386 C	371 C	120 CJ	310 C	206 C	29 CJ	183 CJ	19.9 CJ	1,780 C	2,860 C	23 CJ	4.38 CU	136 CJ	1,460 C	57.1 CJ	3.37 CU
2,3',6-TriCB-(27)	96 J	91 J	30 J	38 J	18.2 J	8.57 J	9.62 UJK	5.44 J	70 J	109	2.95 U	4.72 U	46.9 J	115	4.13 U	3.62 U
2,4',5-TriCB-(31)	1,620	1,630	621	703	325	123	291	127	2,590	5,100	32.9 J	4.83 UJK	849	3,630	147	7.21 J
2,4',6-TriCB-(32)	370	357	131	130	63.8 J	30.5 J	48.4 J	25.3 J	343	574	5.4 J	4.38 U	209	522	18.2 J	3.37 U
2,3',5'-TriCB-(34)	31 J	28 J	10.4 UJK	11.8 J	7.16 J	5.59 U	4.02 U	3.19 U	33 J	65 J	2.93 U	4.68 U	5.63 UJK	45 J	4.1 U	3.6 U
3,3',4,-TriCB-(35)	31 J	28 J	12.6 J	13.3 J	7.27 J	138	13 UJK	4.24 U	62 J	119	3.98 U	6.5 U	7.78 J	71 J	5.83 U	4.67 U
3,3',5-TriCB-(36)	7 U	5 UJK	5.69 U	4.29 U	1.09 U	5.99 UJK	5.26 U	4.21 U	7 U	9 U	3.95 U	6.45 U	5.41 U	10 U	5.41 U	4.64 U
3,4,4'-TriCB-(37)	410	424	167	177	84 J	130	46.6 J	28.9 J	141	389	4.27 U	6.8 U	144	477	28.5 J	4.96 U
3,4,5-TriCB-(38)	7 U	5 U	5.77 U	4.35 U	1.09 U	5.83 U	5.4 U	4.32 U	7 U	9 U	4.05 U	6.62 U	5.62 U	10 U	5.83 U	4.76 U
3,4',5-TriCB-(39)	6 U	5 U	5.3 U	4 U	0.995 U	5.52 U	4.99 U	4 U	6 U	9 U	3.75 U	6.12 U	5.32 U	9 U	5.54 U	4.4 U
PCBs 40 + 71	917 C	930 C	482 C	594 C	287 C	93.7 CJ	199 C	95.1 CJ	1,250 C	2,870 C	13.7 CJ	3.02 CU	537 C	1,920 C	77.9 CJ	4.99 CJ
2,2',3,4-TetraCB-(41)	98 J	67 UJK	45 J	26.6 J	17.2 J	15.6 J	30.1 J	22.2 UJK	68 UJK	14 UJK	4.37 U	4.31 U	128	161 UK	9.24 J	5.21 U
2,2',3,4'-TetraCB-(42)	769	792	333	443	205	74 J	150	54.6 J	1,140	2,430	10.6 J	3.44 U	347	1,520	60.1 J	4.15 U
2,2',3,5-TetraCB-(43)	78 J	82 J	55.3 J	63.2 J	25 J	23.4 J	22 UJK	12.8 J	72 J	8 U	3.93 U	3.88 U	47 J	5 U	7.62 UJK	4.68 U
PCBs 44/47/65	2,760 C	2,750 C	2,200 C	2,120 C	831 C	264 CJ	570 C	223 CJ	3,820 C	8,300 C	46 CJ	5.55 CUJK	1,260 C	5,450 C	222 CJ	11.8 CUJK
PCBs 45 + 51	364 C	361 C	161 CJ	199 CJ	94.8 CJ	56.1 CJ	75.2 CJ	40.9 CJ	665 C	1,310 C	7.69 CJ	2.19 CU	334 C	919 C	32.2 CJ	2.29 CU
2,2',3,6'-TetraCB-(46)	119	126	56 J	68 J	32 J	22 J	26 J	13.1 J	199	408	2.23 U	2.34 U	108 J	281	7.48 J	2.45 U
2,2',4,5-TetraCB-(48)	327	339	185	198	104	61.6 J	65.9 J	49.2 J	94 J	387	3.35 U	3.3 U	265	560	24.1 J	3.99 U
PCBs 49 + 69	2,560 C	2,480 C	1,520 C	2,520 C	864 C	157 CJ	431 C	141 CJ	3,620 C	7,470 C	42.1 CJ	4.68 CJ	781 C	4,410 C	193 CJ	9.72 CJ
PCBs 50 + 53	274 C	287 C	177 CJ	200 CJ	77.8 CJ	39.1 CJ	54.5 CJ	29.2 CJ	476 C	961 C	4.89 CJ	2.09 CU	259 C	671 C	23.9 CJ	2.18 CU
2,2',5,5'-TetraCB-(52)	3,470	3,560	4,990	5,460	1,450	237	681	269	4,830	10,600	61.8 J	7.01 J	1,350	6,150	288	15.2 J
2,2',6,6'-TetraCB-(54)	5 J	4 J	3 J	3 J	1 UJK	1.9 U	1.91 U	2.03 U	8 J	15 J	1.63 U	1.93 U	7.86 J	10 J	2.94 U	1.82 U
2,3,3',4-TetraCB-(55)	17 J	13 J	14 UJK	6 U	2 U	31.1 J	4.57 U	4.58 U	11 U	10 U	2.64 U	2.38 U	11.8 J	12 U	5.73 U	3.19 U
2,3,3',4'-Tetra CB-(56)	818	818	556	535	228	124	161	98.7	766	2,270	9.03 J	2.46 U	438	1,580	84.8 J	4.38 J
2,3,3',5-TetraCB-(57)	10 J	12 J	7 U	8 UJK	2 U	11.5 U	4.63 U	4.64 U	13 J	24 J	2.67 U	2.4 U	5.7 U	15 UJK	5.91 U	3.22 U
2,3,3',5'-TetraCB-(58)	43 J	40 J	11 UJK	19 J	11 J	11.4 U	4.63 U	4.65 U	27 J	60 J	2.68 U	2.41 U	5.68 U	33 J	5.89 U	3.23 U
PCBs 59/62/75	192 CJ	203 CJ	83 CJ	128 CJ	58 CJ	36 CJ	45.6 CJ	17.5 CJ	291 CJ	648 C	3.37 CJ	2.65 CU	101 CJ	431 C	15.9 CJ	3.19 CU
2,3,4,4'-TetraCB --(60)	94 J	100 J	164	119	33 J	59.5 J	41.3 J	52.6 J	70 J	53 J	2.6 U	2.34 U	188	265	13.2 J	3.13 U
PCBs 61/70/74/76	3,610 C	3,660 C	3,890 C	2,830 C	1,040 C	386 CJ	592 C	384 CJ	2,510 C	7,430 C	32.1 CJ	4.22 CUJK	1,410 C	5,950 C	338 CJ	15.7 CUJK
2,3,4',5-TetraCB-(63)	84 J	83 J	55 J	54 J	23 J	45.5 J	16.7 J	8.98 UJK	71 J	157	2.61 U	2.34 U	31.4 J	132	7.97 J	3.14 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-07					SED-08			SED-09				SED-10			
Sample Name	SED-07-SS-1.0	SED-07-SS-1.0-DUP	SED-07-SB-2.0	SED-07-SB-4.35	SED-07-SB-6.35	SED-08-SS-1.0	SED-08-SB-2.0	SED-08-SB-3.25	SED-09-SS-1.0	SED-09-SB-2.0	SED-09-SB-4.85	SED-09-SB-6.85	SED-10-SS-1.0	SED-10-SB-2.0	SED-10-SB-5.2	SED-10-SB-7.2
Collection Date	10/10/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	1	2	4.35	6.35	1	2	3.25	1	2	4.85	6.85	1	2	5.2	7.2
2,3,4',6-TetraCB-(64)	852	899	700	615	260	113	233	109	1,380	3,220	15.7 J	2.64 U	555	2,240	90 J	4.73 J
2,3',4,4'-TetraCB-(66)	2,270	2,280	1,340	1,390	630	191 J	282	191 J	954	3,360	10.7 J	2.41 U	812	3,270	173 J	7.4 UJK
2,3',4,5-TetraCB-(67)	56 J	55 J	23 J	49 J	17 J	89.8 J	37 J	5.79 J	70 J	176	2.35 U	2.11 U	24.3 J	221	10.6 UJK	2.83 U
2,3',4,5'-TetraCB-(68)	87 J	84 J	31 J	64 J	27 J	19.8 J	10.6 J	4.12 U	49 J	117	2.37 U	2.13 U	5.08 U	64 J	5.34 U	2.86 U
2,3',5,5'-TetraCB-(72)	191	178	47 J	103 J	45 J	23.6 J	12.9 J	4.46 U	92 J	203	2.57 U	2.31 U	9.64 J	101	9.01 UJK	3.1 U
2,3',5',6-TetraCB-(73)	45 J	43 J	20 J	8 U	1 U	10 J	4.28 U	3.83 U	50 J	6 U	2.69 U	2.65 U	22.1 J	4 U	3.97 U	3.2 U
3,3',4,4'-TetraCB-(77)	149	139	87 J	85 J	43 J	124	25.2 J	14.8 J	110	287	2.71 U	2.2 U	80.9 J	246	15.7 J	3.06 U
3,3',4,5-TetraCB-(78)	7 U	5 U	7 U	6 U	2 U	11.4 U	4.54 U	4.56 U	10 U	9 U	2.63 U	2.36 U	5.66 U	12 U	5.61 U	3.17 U
3,3',4,5'-TetraCB-(79)	33 J	81 J	6 U	87 J	30 J	10.1 U	8.59 UJK	4.13 U	9 U	52 J	2.38 U	2.14 U	9.3 UJK	50 J	5 U	2.87 U
3,3',5,5'-TetraCB-(80)	8 J	6 J	6 U	5 U	1 U	10.1 U	4.04 U	4.05 U	9 U	8 U	2.33 U	2.1 U	5.02 U	10 U	5 U	2.81 U
3,4,4',5-TetraCB-(81)	8 U	6 U	8 U	6 U	2 U	25.9 J	4.35 U	4.45 U	12 U	10 U	2.4 U	2.17 U	6.18 U	11 U	5.95 U	3.07 U
2,2',3,3',4-PentaCB-(82)	328	382	744	415	109	93.3 J	46.1 J	32.4 J	105	222	4.11 U	3.42 U	121	308	20.2 J	3.81 U
2,2',3,3',5-PentaCB-(83)	290	310	393	306	90 J	61 J	36.5 UJK	11.9 J	144	329	4.47 U	3.71 U	42.4 J	228	14.3 UJK	4.13 U
2,2',3,3',6-PentaCB-(84)	1,230	1,250	1,880	1,260	346	97.3	159	58.8 J	698	1,600	9.23 J	3.4 U	215	1,040	65 J	5.45 UJK
PCBs 85/116/117	530 C	586 C	1,060 C	602 C	167 CJ	121 CJ	67.4 CJ	42.5 CJ	179 CUJK	406 C	4.12 CJ	2.6 CU	151 CJ	448 C	33.4 CJ	3.29 CUJK
PCBs 86/87/97/109/119/125	2,650 C	2,780 C	5,130 C	3,140 C	822 C	382 CJ	280 CJ	147 CJ	708 C	1,700 C	15.7 CJ	4.05 CUJK	496 CJ	1,850 C	141 CJ	14.4 CUJK
PCBs 88 + 91	949 C	921 C	1,010 C	1,130 C	283 C	83.4 CJ	96.4 CJ	32.3 CJ	495 C	1,150 C	8.48 CJ	3.24 CU	142 CJ	709 C	45.2 CJ	3.6 CU
2,2',3,4,6'-PentaCB-(89)	35 J	36 J	47 J	30 J	11 J	13.7 U	8.39 UJK	4.43 UJK	31 J	75 J	4.04 U	3.36 U	20.9 J	65 J	7.88 U	3.74 U
PCBs 90 + 101	5,640 C	5,510 C	7,990 C	6,160 C	1,700 C	517 C	519 C	198 CJ	1,400 C	3,730 C	42.2 CJ	6.59 CUJK	648 C	3,140 C	320 CJ	27.4 CJ
2,2',3,5,5'-PentaCB-(92)	1,390	1,340	1,590	1,420	506	125	125	36.2 J	620	1,450	14.2 J	3.2 U	120	807	74.2 J	5.86 J
PCBs 93 + 100	82 CJ	78 CJ	46 CJ	189 CJ	48 CJ	24.8 CJ	10.3 CUJK	4 CU	72 CJ	169 CJ	3.82 CU	3.18 CU	19.2 CJ	86 CJ	7.24 CU	3.54 CU
2,2',3,5,6'-PentaCB-(94)	20 J	19 J	24 J	22 J	8 J	13.3 U	6.49 U	4.23 U	25 UJK	44 J	4.04 U	3.36 U	9.09 U	31 J	7.62 U	3.74 U
2,2',3,5',6-PentaCB-(95)	4,190	4,110	6,080	5,160	1,300	299	464	168	1,770	4,180	38.6 J	4.65 UJK	562	2,580	227	17.4 J
2,2',3,6,6'-PentaCB-(96)	30 J	32 J	40 J	34 J	11 J	6.07 J	5.67 J	2.75 J	46 J	80 J	1.19 U	1.57 U	14.4 J	54 J	2.3 U	1.8 U
PCBs 98 + 102	175 CJ	171 CJ	182 CJ	151 CJ	50 CJ	42 CJ	24.7 CJ	6.67 CJ	146 CJ	333 C	3.95 CU	3.29 CU	44.2 CJ	206 C	7.61 CU	3.66 CU
2,2',4,4',5-PentaCB-(99)	3,270	3,190	3,330	2,790	901	319	249	83.2 J	694	1,710	12.6 J	3.28 UJK	381	1,680	128	10.2 UJK
2,2',4,5',6-PentaCB-(103)	179	169	92 J	257	66 J	11.7 U	12.8 J	3.74 U	83 J	198	3.58 U	2.98 U	14.4 UJK	110	6.91 U	3.31 U
2,2',4,6,6'-PentaCB-(104)	3 U	2 U	6 U	2 U	1 U	3.28 U	2.02 U	1.55 U	7 U	4 U	1.06 U	1.44 U	3.08 U	2 U	2.32 U	1.52 U
2,3,3',4,4'-PentaCB-(105)	717	836	2,820	1,260	246	215	91.1 J	72.2 J	200	354	8.4 UJK	7.08 UJK	266	555	59.5 J	9.66 J
2,3,3',4,5-PentaCB-(106)	10 U	8 U	9 U	5 U	2 U	24.6 U	5.64 U	4.04 U	14 U	12 U	2.7 U	3.18 U	6.53 U	12 U	3.85 U	3.39 U
2,3,3',4',5-PentaCB-(107)	348	338	433	307	101	132	34.2 J	11.6 UJK	126	291	2.59 U	3.04 U	41.8 J	232	22 UJK	3.25 U
PCBs 108 + 124	78 CJ	87 CJ	256 C	123 CJ	25 CJ	59.6 CJ	11.1 CJ	5.63 CUJK	22 CJ	38 CJ	2.74 CU	3.23 CU	21.3 CJ	56 CJ	5.96 CUJ	3.44 CU
PCBs 110 + 115	5,870 C	5,890 C	8,850 C	6,080 C	1,570 C	485 C	666 C	217 C	2,620 C	5,610 C	49.8 CJ	9.75 CJ	801 C	4,000 C	313 C	26.5 CJ
2,3,3',5,5'-PentaCB-(111)	17 J	16 J	9 U	16 J	6 J	26.4 J	4.51 U	2.94 U	10 U	15 J	2.81 U	2.34 U	6.6 U	8 UJK	5.27 U	2.6 U
2,3,3',5,6-PentaCB-(112)	6 U	6 U	9 U	6 U	1 U	31.2 J	4.43 U	2.89 U	9 U	9 U	2.76 U	2.3 U	6.22 U	5 U	5.2 U	2.56 U
2,3,4,4',5-PentaCB-(114)	46 J	47 J	148	69 J	17 J	56.3 UJK	6.37 UJK	4.49 UJK	17 U	30 J	2.55 U	3.28 U	17.5 J	42 UJK	4.41 U	3.59 U
2,3',4,4',5-PentaCB-(118)	3,310	3,430	6,890	3,810	941	519	282	138	898	2,080	24.8 J	13.3 J	599	2,070	147	24.3 UJK
2,3',4,5,5'-PentaCB-(120)	105 J	88 J	31 J	59 J	21 J	81.4 J	5.87 UJK	2.88 U	29 J	58 J	2.76 U	2.29 U	6.41 U	42 J	5.21 U	2.55 U
2,3',4,5',6-PentaCB-(121)	6 U	6 U	10 U	26 J	5 J	9.41 U	4.58 U	2.98 U	10 U	9 UJK	2.85 U	2.37 U	6.43 U	5 U	5.41 U	2.64 U
2,3,3',4',5'-PentaCB-(122)	29 UJK	29 J	66 J	34 J	7 J	27.2 U	6.08 U	4.36 U	15 U	13 U	2.92 U	3.43 U	9.75 UJK	21 J	4.23 U	3.66 U
2,3',4,4',5'-PentaCB-(123)	35 UJK	34 J	95 J	48 J	2 U	30.9 U	5.5 U	3.97 U	16 U	19 UJK	2.89 U	3.38 U	14.5 J	21 J	4.27 U	3.33 U
3,3',4,4',5-PentaCB-(126)	11 U	11 U	11 U	6 U	11 J	28.6 U	4.25 UJ	4.21 U	18 U	15 U	3.09 U	3.41 U	10.2 U	12 U	2.51 UJ	2.53 UJ
3,3',4,5,5'-PentaCB-(127)	10 U	8 U	9 U	4 U	2 U	24.8 U	5.68 U	4.07 U	14 U	12 U	2.72 U	3.2 U	6.57 U	12 U	3.74 U	3.42 U
PCBs 128 + 166	745 C	775 C	1,200 C	681 C	161 CJ	132 CJ	61.3 CJ	22.6 CJ	170 CJ	310 C	7.6 CJ	4.13 CUJK	87.6 CJ	297 C	51.1 CJ	6.91 CUJK
PCBs129/138/163	6,930 C	6,800 C	8,730 C	5,940 C	1,690 C	1,050 C	673 C	193 CJ	1,900 C	4,000 C	92.9 CJ	26.5 CJ	699 C	2,630 C	597 C	65.2 CJ
2,2',3,3',4,5'-HexaCB-(130)	494	491	576	389	116	174	37.3 J	11 J	162	356	8.23 U	3.99 U	39.7 J	236	35.5 J	5.25 U
2,2',3,3',4,6-HexaCB-(131)	64 J	69 J	127	74 J	21 J	42 U	6.27 U	7.65 U	25 U	36 J	8.8 U	4.26 U	8.88 U	27 J	10.5 U	5.61 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-07					SED-08			SED-09				SED-10			
Sample Name	SED-07-SS-1.0	SED-07-SS-1.0-DUP	SED-07-SB-2.0	SED-07-SB-4.35	SED-07-SB-6.35	SED-08-SS-1.0	SED-08-SB-2.0	SED-08-SB-3.25	SED-09-SS-1.0	SED-09-SB-2.0	SED-09-SB-4.85	SED-09-SB-6.85	SED-10-SS-1.0	SED-10-SB-2.0	SED-10-SB-5.2	SED-10-SB-7.2
Collection Date	10/10/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	1	2	4.35	6.35	1	2	3.25	1	2	4.85	6.85	1	2	5.2	7.2
2,2',3,3',4,6'-HexaCB-(132)	2,340	2,310	2,840	2,230	565	271	220	57.8 J	726	1,580	29.1 J	5.5 J	190	1,030	181	19.2 UJK
2,2',3,3',5,5'-HexaCB-(133)	208	189	149	222	94 J	91 J	16 J	6.84 U	89 J	217	7.87 U	3.81 U	10.2 J	102	12.3 J	5.02 U
2,2',3,3',5,6-HexaCB-(134)	386	398	548	382	122	127	36.6 J	9.28 UJK	156	308	9.57 U	4.64 U	31.1 J	205	33.4 J	6.11 U
PCBs 135 + 151	2,990 C	3,080 C	2,590 C	2,730 C	1,270 C	418 C	320 C	71.9 CJ	1,160 C	2,540 C	40.7 CJ	5.96 CJ	251 C	1,470 C	254 C	24.8 CJ
2,2',3,3',6,6'-HexaCB-(136)	1,140	1,180	1,150	1,440	459	105	108	26 J	342	798	13.9 J	2.1 J	87.3 J	474	87.7 J	8.12 J
2,2',3,4,4',5-HexaCB-(137)	178	180	446	205	42 J	161	13.3 UJK	6.92 UJK	43 J	66 J	7.64 U	3.7 U	25.9 J	86 J	13.2 J	4.87 U
PCBs 139 + 140	140 CJ	143 CJ	173 CJ	189 CJ	45 CJ	51 CJ	13.4 CJ	6.25 CU	60 CJ	150 CJ	7.19 CU	3.48 CU	13.1 CJ	86 CJ	8.55 CU	4.59 CU
2,2',3,4,5,5'-HexaCB-(141)	1,060	1,010	1,280	875	264	224	137	36.7 J	280	598	17.4 J	4.79 J	115 J	355	109	11.6 J
2,2',3,4,5,6-HexaCB-(142)	14 U	13 U	13 U	7 U	3 U	39 U	5.73 U	6.99 U	23 U	17 U	8.04 U	3.9 U	8.27 U	11 U	9.78 U	5.13 U
2,2',3,4,5,6'-HexaCB-(143)	13 U	12 U	13 U	7 U	3 U	36 U	5.3 U	6.48 U	21 U	16 U	7.45 U	3.61 U	7.72 U	10 U	8.87 U	4.75 U
2,2',3,4,5',6-HexaCB-(144)	289	300	361	262	43 J	76 J	33.4 J	9.6 J	76 J	170	4.08 UJK	2.24 U	33.9 J	105	28.7 J	2.69 J
2,2',3,4,6,6'-HexaCB-(145)	5 U	2 U	5 J	2 J	2 U	6 U	2.24 U	2.1 U	10 U	4 U	1.64 U	1.85 U	4.32 U	3 U	3.28 U	2 U
2,2',3,4',5,5'-HexaCB-(146)	1,740	1,600	1,280	1,400	567	396	141	24.9 UJK	538	1,280	19.5 J	3.48 J	112 J	785	115	9.11 J
PCBs 147 + 149	6,660 C	6,320 C	6,140 C	6,760 C	2,300 C	731 C	614 C	141 CJ	1,980 C	4,900 C	77 CJ	11.7 CJ	482 C	2,620 C	535 C	43.6 CJ
2,2',3,4',5,6'-HexaCB-(148)	56 J	53 J	30 J	100 J	53 J	23 J	3.41 UJK	2.63 U	21 J	58 J	1.97 U	2.29 U	5.87 U	27 J	4.13 U	2.46 U
2,2',3,4',6,6'-HexaCB-(150)	41 J	40 J	26 J	127	36 J	6 U	2.15 U	2.01 U	13 UJK	31 J	1.57 U	1.77 U	4.11 U	15 UJK	3.12 U	1.92 U
2,2',3,5,6,6'-HexaCB-(152)	4 U	5 J	7 J	5 UJK	2 UJK	15 J	2.23 U	2.09 U	10 U	7 J	1.63 U	1.84 U	4.19 U	4 J	3.18 U	1.99 U
PCBs 153 + 168	7,000 C	6,650 C	6,320 C	5,210 C	1,800 C	858 C	681 C	159 CJ	1,680 C	3,980 C	90.7 CJ	17.7 CJ	569 C	2,540 C	607 C	57.8 CJ
2,2',4,4',5,6'-HexaCB-(154)	309	302	177	624	188	32 J	19.1 J	2.22 U	127	280	3.13 UJK	1.96 U	15.1 J	162	16.1 UJK	2.12 U
2,2',4,4',6,6'-HexaCB-(155)	4 U	2 U	3 U	8 J	3.14 UJK	6 U	1.95 U	1.98 U	8 U	5 UJK	1.35 U	1.41 U	3.46 U	2 U	2.54 U	1.59 U
PCBs 156 + 157	524 C	550 C	1,190 C	632 C	148 CJ	242 C	51.7 CJ	22.9 CJ	132 CJ	253 C	9.33 CJ	4.67 CUJK	77.9 CJ	209 C	49.3 CJ	8.52 CUJK
2,3,3',4,4',6-HexaCB-(158)	407	413	767	433	101	148	46.2 J	16.8 J	133	260	6.82 J	2.57 U	60.5 J	181	40.8 J	5.31 J
2,3,3',4,5,5'-HexaCB-(159)	6 U	6 U	7 U	3 U	2.16 U	30 U	4.77 U	3.32 U	16 U	13 U	2.84 U	2.51 U	5.53 U	13 U	4.95 U	4.06 U
2,3,3',4,5,6-HexaCB-(160)	10 U	9 U	9 U	5 U	2.07 U	28 U	4.25 U	5.19 U	16 U	12 U	5.97 U	2.89 U	5.88 U	8 U	6.81 U	3.81 U
2,3,3',4,5',6-HexaCB-(161)	9 U	9 U	9 U	5 U	2.08 U	27 U	4.32 U	5.27 U	16 U	12 U	6.06 U	2.94 U	5.66 U	8 U	6.72 U	3.87 U
2,3,3',4',5,5'-HexaCB-(162)	14 J	14 J	53 J	3 U	2.06 U	64 J	4.64 U	3.23 U	15 U	13 U	2.77 U	2.44 U	5.32 U	12 U	4.73 U	3.96 U
2,3,3',4',5',6-HexaCB-(164)	502	487	536	386	117	105	48 J	13.7 J	134	299	5.98 UJK	2.75 U	48.2 J	195	42.7 J	4.42 UJK
2,3,3',5,5',6-HexaCB-(165)	10 U	10 U	10 U	20 J	8.65 J	54 J	4.49 U	5.48 U	17 U	16 J	6.3 U	3.05 U	6.06 U	8 U	7.15 U	4.02 U
2,3',4,4',5,5'-HexaCB-(167)	178	191	346	196	46.9 J	208	17.4 UJK	6.82 J	64 J	102 J	3.59 J	2.51 U	28.5 J	82 J	16.9 UJK	3.95 U
3,3',4,4',5,5'-HexaCB-(169)	8 U	7 U	8 U	4 U	3.38 U	34 U	4.92 U	3.25 U	19 U	14 U	3.01 U	2.62 U	6.36 U	13 U	5.63 U	4.58 U
2,2',3,3',4,4',5-HeptaCB-(170)	1,770	1,560	1,390	1,070	369	569	215	56 J	750	1,200	34.4 J	8.15 UJK	199	671	180	26.2 J
PCBs 171 + 173	611 C	543 C	462 C	373 C	149 CJ	234 C	66.8 CJ	18.2 CJ	269 C	449 C	11.2 CJ	2.89 CU	61.6 CJ	237 C	62.3 CJ	7.8 CUJK
2,2',3,3',4,5,5'-HeptaCB-(172)	348	312	230	189	79.7 J	206 UK	42 UJK	10.7 J	154	273	5.79 J	2.96 U	42.8 J	142	36 J	5.76 UJK
2,2',3,3',4,5,6'-HeptaCB-(174)	2,040	1,810	1,310	1,210	523	382	248	61.4 J	752	1,380	36.1 J	8.48 J	190	775	210	25 J
2,2',3,3',4,5',6-HeptaCB-(175)	106 J	104 J	59 J	58 J	24.8 J	104	9.81 UJK	2.95 UJK	51 J	91 J	2.15 U	2.24 U	10.1 J	45 J	12.6 J	2.25 U
2,2',3,3',4,6,6'-HeptaCB-(176)	343	325	192	210	86.4 J	85 J	34.7 J	7.47 J	136	256	5.06 J	1.82 U	28.2 J	133	34.9 J	3.66 UJK
2,2',3,3',4,5',6'-HeptaCB-(177)	1,340	1,190	824	914	354	264	146	35.2 J	600	1,110	23.7 J	4.79 UJK	120	551	119	13.4 J
2,2',3,3',5,5',6-HeptaCB-(178)	584	554	292	426	185	538	61.4 J	12.6 UJK	267	495	9.31 UJK	2.38 U	49.9 J	232	60.2 J	5.16 J
2,2',3,3',5,6,6'-HeptaCB-(179)	1,100	1,070	617	789	362	190	112	25.6 J	398	836	16.4 J	2.74 UJK	88.4 J	438	111	10.2 J
PCBs 180 + 193	4,260 C	3,770 C	2,840 C	2,470 C	990 C	840 C	561 C	137 CJ	1,660 C	2,880 C	84 CJ	19.4 CJ	450 C	1,630 C	473 C	56.7 CJ
2,2',3,4,4',5,6-HeptaCB-(181)	11 UJK	13 J	17 J	13 J	3.99 J	224	5.01 U	4.57 U	64 J	66 J	3.98 U	2.74 U	10.1 J	88 J	5.17 U	3.35 U
2,2',3,4,4',5,6'-HeptaCB-(182)	23 J	23 J	13 UJK	13 UJK	3.34 U	36 J	2.77 U	2.48 U	14 U	27 J	2.1 U	2.19 U	5.24 U	21 J	3.74 U	2.2 U
PCBs 183 + 185	1,400 C	1,260 C	958 C	893 C	381 C	402 C	169 CJ	39.4 CJ	553 C	1,040 C	27.7 CJ	5.98 CJ	138 CJ	548 C	168 CJ	16.2 CJ
2,2',3,4,4',6,6'-HeptaCB-(184)	3 U	3 U	4 U	3 J	2.66 U	9 U	2.2 U	1.98 U	11 U	6 J	1.67 U	1.74 U	3.91 U	7 J	2.95 U	1.75 U
2,2',3,4,5,6,6'-HeptaCB-(186)	4 U	4 U	4 U	2 U	2.79 U	22 UJK	2.32 U	2.08 U	12 U	5 U	1.76 U	1.83 U	4.29 U	4 J	3.12 U	1.85 U
2,2',3,4',5,5',6-HeptaCB-(187)	3,070	2,890	1,520	1,990	833	844	325	70.9 J	1,200	2,350	46.5 J	9.01 J	258	1,220	327	32.2 J
2,2',3,4',5,6,6'-HeptaCB-(188)	9 J	7 J	6.75 J	22.2 J	7.32 J	28 J	2.34 U	2.18 U	11 U	9 J	1.79 U	1.9 U	4.1 U	5 J	2.99 U	1.81 U

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

Location	SED-07					SED-08			SED-09				SED-10			
Sample Name	SED-07-SS-1.0	SED-07-SS-1.0-DUP	SED-07-SB-2.0	SED-07-SB-4.35	SED-07-SB-6.35	SED-08-SS-1.0	SED-08-SB-2.0	SED-08-SB-3.25	SED-09-SS-1.0	SED-09-SB-2.0	SED-09-SB-4.85	SED-09-SB-6.85	SED-10-SS-1.0	SED-10-SB-2.0	SED-10-SB-5.2	SED-10-SB-7.2
Collection Date	10/10/2019	10/10/2019	10/08/2019	10/08/2019	10/08/2019	10/10/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019	10/10/2019	10/09/2019	10/09/2019	10/09/2019
Collection Depth (ft bml)	1	1	2	4.35	6.35	1	2	3.25	1	2	4.85	6.85	1	2	5.2	7.2
2,3,3',4,4',5,5'-HeptaCB-(189)	75 J	72 J	68.8 UJK	55.8 J	19.6 J	95 J	8.77 UJK	3.01 U	39.9 J	61 J	2.91 U	3.14 U	9.79 J	30 J	12.8 J	4.13 U
2,3,3',4,4',5,6-HeptaCB-(190)	343	307	259	206	74.3 J	142	47.3 J	12.8 J	168	283	6.53 UJK	2.41 U	44.7 J	164	41.2 J	5.37 J
2,3,3',4,4',5',6-HeptaCB-(191)	68 J	58 J	52.2 J	41.2 J	14.3 J	272	8.02 UJK	3.8 U	38.1 J	54 J	3.31 U	2.28 U	10.1 J	36 J	7.89 UJK	2.78 U
2,3,3',4,5,5',6-HeptaCB-(192)	5 U	5 U	5.64 U	2.57 U	2.79 U	35 U	4.32 U	3.94 U	17.2 U	11 U	3.43 U	2.36 U	5.95 U	10 U	4.22 U	2.89 U
2,2',3,3',4,4',5,5'-OctaCB-(194)	847	763	643	555	187	202	113	31.3 J	333	474 J+	20.8 J	3.8 J	68.8 J+	279 J+	161	16.8 UJK
2,2',3,3',4,4',5,6-OctaCB-(195)	359	325	241	227	81.8 J	278	43.2 J	12.8 J	173	213 J+	7.55 J	3.11 U	32.6 J+	127 J+	53.6 J	6.51 J
2,2',3,3',4,4',5,6'-OctaCB-(196)	618	552	351	329	128	253	60.9 J	17.3 J	219	271 J+	12.6 UJK	2.43 U	44.1 J+	170 J+	96.8 J	9.95 UJK
PCBs 197 + 200	205 CJ	183 CJ	118 CJ	123 CJ	43.5 CUJK	175 CJ	19.4 CJ	5.76 CJ	91.1 CJ	107 CJ+	3.92 CJ	1.85 CU	13.9 CJ+	70 CJ+	34.9 CJ	3.62 CUJK
PCBs 198 + 199	1,300 C	1,160 C	729 C	761 C	276 C	887 C	149 CJ	36.3 CJ	480 C	612 CJ+	24.9 CJ	4.85 CJ	91.6 CJ+	403 CJ+	322 C	28.3 CJ
2,2',3,3',4,5',6,6'-OctaCB-(201)	174	165	99.1 J	122	42.3 J	204	15.8 J	4.99 UJK	64 J	90 J+	3.57 J	1.86 U	11.4 J+	54 J+	38.5 J	3.54 J
2,2',3,3',5,5',6,6'-OctaCB-(202)	250	221	165	204	63.4 J	1,030	28.8 J	7.62 J	120	248	6.33 J	1.88 U	28.1 J	142	104 J	7.88 J
2,2',3,4,4',5,5',6-OctaCB-(203)	748	659	442	439	148	451	83.6 J	23.4 J	281	342 J+	15.2 J	3.06 J	58.5 J+	229 J+	160	15.2 J
2,2',3,4,4',5,6,6'-OctaCB-(204)	2.37 U	3.27 U	3.57 U	1.7 U	3.74 U	35 J	2.87 U	1.96 U	11.3 U	5 UJ	1.83 U	1.89 U	3.3 UJ	5 UJ	3.82 U	2.57 U
2,3,3',4,4',5,5',6-OctaCB-(205)	50.6 J	46.5 J	32.4 J	30.9 J	12.7 J	224	6.16 UJK	3.39 U	25.8 J	22 J+	2.25 U	2.67 U	4.21 UJK	13 J+	7.85 J	4.21 U
2,2',3,3',4,4',5,5',6-NonaCB-(206)	332 J+	288 J+	345	418	174	773	86.2 J	16 UJK	349	851	20.8 J	3.98 U	71.2 J	577	679	48.2 J
2,2',3,3',4,4',5,6,6'-NonaCB-(207)	48.9 J+	46.4 J+	41.7 J	52.3 J	17.8 UJK	331	9.15 UJK	3.85 U	74.2 J	119	3.17 J	3.05 U	11.9 J	89 J	66.7 J	4.76 J
2,2',3,3',4,5,5',6,6'-NonaCB-(208)	159	132	121	174	65.6 J	397	36.7 J	3.86 U	103	269	8.16 J	2.85 U	22.7 J	150	346	21.3 J
DecaCB-(209)	490	414	455	633	221	1,160	87.6 J	15.8 J	462	2,400	34.2 J	3.4 J	71.8 J	1,210	1580	73.4 J+
Conventionals																
TOC (mg/kg)	26,000 J	22,000 J	22,000 J	11,000 J	6,700 J	5,100 J	1,400	1,000	7,000 J	18,000	8,100	12,000	19,000 J	15,000	33,000	9,100
Total solids (%)	63.8	58.1	61.6	68.5	76.3	72.5	76.9	72.4	67.7	61.6	69.1	63.1	56.1	66.6	59.6	68.3
Grain Size (%)																
Gravel	7.38	16.3	0.65	0.55	1.48	18.3	1.34	17.3	1.82	2.43	0.12	0.24	2.4	11.8	0.69	1.06
Sand	38.4	34.6	43.3	72.6	83.4	70.7	83.4	70.2	79.8	51.3	61.8	59.7	58.6	60.3	53.7	78.3
Silt	40.8	37.1	42.3	19.7	10	7.8	10.3	9.2	13	37.7	27.3	28.4	29.9	22.8	30.4	13.2
Clay	13.4	12	13.8	7.2	5.1	3.2	4.9	3.3	5.3	8.5	10.8	11.7	9.1	5.2	15.2	7.5
Percent retained 63-micron sieve (#230	2.37	2.1	4.03	3.11	1.02	0.63	2.18	1.05	2.23	4.63	3.74	3.83	2.64	3.78	2.62	2.22
Percent retained 75-micron sieve (#200	4.51	3.96	8.92	7.66	2.6	1.31	7.34	2.64	4.5	7.53	8.99	10.5	5.22	8.25	5.24	5.47
Percent retained 106-micron sieve (#14	4.86	4.53	7.9	9.87	3.24	1.85	13.3	3.67	6.12	6.48	14.1	17.8	4.35	8.18	5.81	7.98
Percent retained 150-micron sieve (#10	8.77	7.98	10.2	17	13.5	9.94	26.2	7.8	33.6	13.1	29.2	22.5	7.94	13.5	22	43.7
Percent retained 250-micron sieve (#60	11.1	9.87	8.7	26.1	42.6	28.9	24.5	25.5	26.4	13.2	5.05	3.03	20.8	16.3	16.5	17.1
Percent retained 425-micron sieve (#40	4.89	4.6	3.2	8.4	19.4	22.2	8.23	24.5	6.15	5.38	0.56	1.16	14	7.67	1.11	1.4
Percent retained 850-micron sieve (#20	1.87	1.52	0.37	0.44	1	5.81	1.56	5.11	0.74	1.01	0.12	0.83	3.58	2.6	0.4	0.47
Percent retained 2000-micron sieve (#1	2.94	2.39	0.35	0.38	0.41	7.92	1	5.83	0.91	0.83	0.01	0.15	1.51	3.02	0.45	0.72
Percent retained 4750-micron sieve (#4	4.44	13.9	0.3	0.17	1.07	10.4	0.34	11.4	0.9	1.6	0.11	0.09	0.9	8.74	0.24	0.34

Table 3
Sediment Sampling Analytical Results
Siltronic Corporation
Portland, Oregon

NOTES:
-- = not analyzed.
C = reported by the laboratory as a coelution of congeners.
ft bml = feet below mudline.
J = result is an estimated value.
J- = result is an estimated value with a negative bias.
J+ = result is an estimated value with a positive bias.
K = reported by laboratory as estimated maximum potential concentration.
mg/kg = milligrams per kilogram.
ng/g = nanograms per gram.
PAH = polycyclic aromatic hydrocarbon.
PCB = polychlorinated biphenyl.
pg/g = picograms per gram.
R = result is rejected.
SVOC = semivolatile organic compound.
TOC = total organic carbon.
TPH = total petroleum hydrocarbons.
U = result is non-detect at detection limit or estimated detection limit.
ug/kg = micrograms per kilogram.

FIGURES

Figure 1
Area of Interest

Siltronic Corporation
Portland, Oregon

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USG
User Community

Legend

- SDU6W and SDU7W
- River Mile Markers
- Area of Interest
- Ordinary High Water Mark (2004)
- Siltronic Property
- Navigation Channel
- Alternative F Mod SMA Footprint

0 125 250
Feet

Notes:
SMA = sediment management area.

Source: Aerial photograph obtained from Esri ArcGIS Online; Decision Units
SDU6W and SDU7W obtained from USEPA; Ordinary High Water Mark obtained from City of Portland Corporate GIS; parcel boundaries and railroad data obtained from Metro Regional Land Information System; navigation channel dataset obtained from Lower Willamette Group.

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Print Date: 1/15/2020

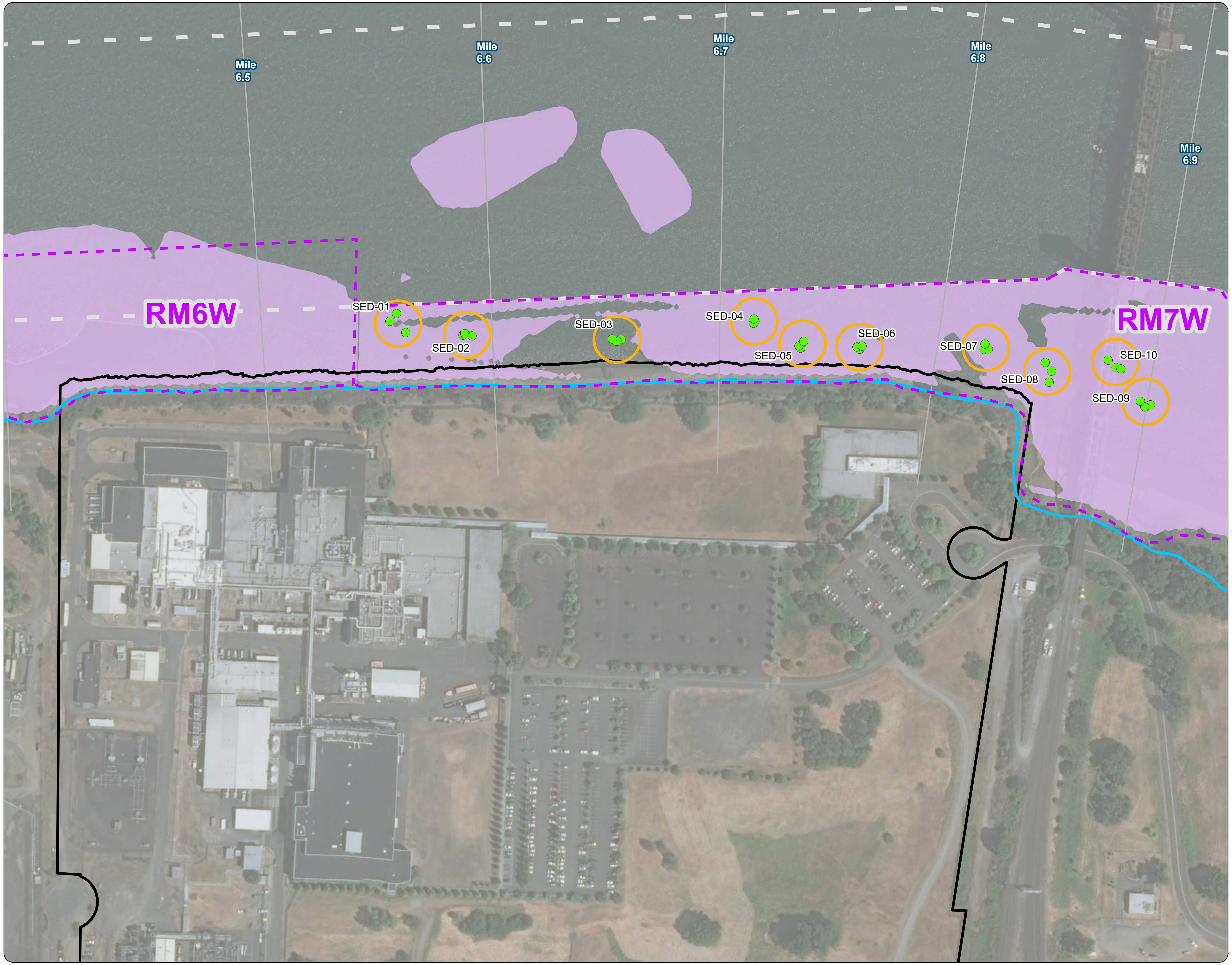
Approved By:

Produced By: aguse

Project: 8128.02.05-03

Figure 2
Surface Sampling Locations

Siltronic Corporation
Portland, Oregon



Legend

- ● Sediment Sampling Location
- ◯ 50-Foot Radius Area
- - - SDU6W and SDU7W
- ▭ Ordinary High Water Mark (2004)
- ▭ Siltronic Property
- ▭ Navigation Channel
- — River Mile Markers
- ▨ Alternative F Mod SMA Footprint

Notes:
SMA = sediment management area.

Source: Aerial photograph obtained from Esri ArcGIS Online; outfall locations obtained from City of Portland Bureau of Environmental Services; Decision Units SDU6W and SDU7W obtained from USEPA; Ordinary High Water Mark obtained from City of Portland Corporate GIS; parcel boundaries and railroad data obtained from Metro Regional Land Information System; navigation channel dataset obtained from Lower Willamette Group.

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Print Date: 1/15/2020

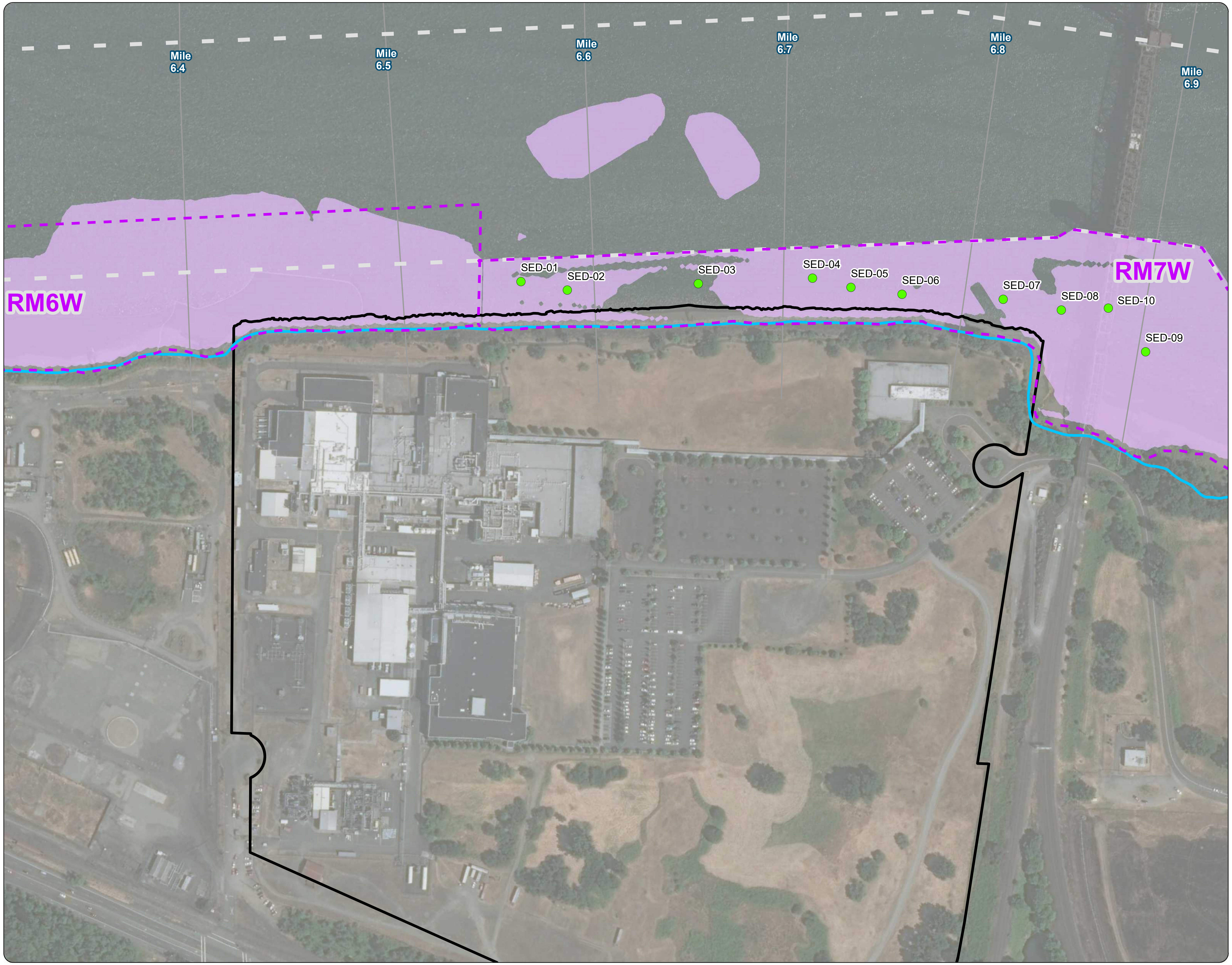
Approved By:

Produced By: aguse

Project: 8128.02.05-03

Figure 3
Subsurface Sampling Locations

Siltronic Corporation
Portland, Oregon



Legend

Notes:
SMA = sediment management area.

Source: Aerial photograph obtained from Esri ArcGIS Online; outfall locations obtained from City of Portland Bureau of Environmental Services; Decision Units SDU6W and SDU7W obtained from USEPA; Ordinary High Water Mark obtained from City of Portland Corporate GIS; parcel boundaries and railroad data obtained from Metro Regional Land Information System; navigation channel dataset obtained from Lower Willamette Group.

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Approved By:

Produced By: aguse

Project: 8128.02.05-03

ATTACHMENT A

WORK PLAN/QAPP/HASP

MAUL
FOSTER
ALONGI

MEMORANDUM

To: Mr. Hunter Young
Date: January 20, 2020

From: Phil Wiescher, PhD, and Michael Murray, RG
Project No.: 8128.02.19

RE: Sediment Sampling Work Plan, Willamette River Mile 6.55 To 6.9 West

Maul Foster & Alongi, Inc. (MFA) prepared a May 30, 2019, sediment sampling work plan on behalf of its client, Siltronic Corporation (Siltronic). The work plan includes a quality assurance project plan and health and safety plan. The work plan describes the procedures and methodologies for sediment-sampling activities conducted on the west side of the Willamette River in Portland, Oregon, approximately 6.55 to 6.9 miles upstream of the confluence with the Columbia River (Willamette river mile 6.55 to 6.9 west), referred to as the Area of Interest (AOI). The AOI, which extends from the shoreline to the navigation channel, includes the in-water area adjacent to the Siltronic property located at 7200 NW Front Avenue in Portland, Oregon, and is part of the U.S. Environmental Protection Agency (USEPA) identified sediment decision unit RM 7 west.

The work plan is included in the data package submittal, at the request of the USEPA. The work plan was previously provided as a draft version (dated July 31, 2019)[1] for the USEPA's anticipated review. The USEPA declined review in an August 5, 2019, e-mail but agreed that it would review data received post-sampling to determine if they were of acceptable quality for use at the Portland Harbor Superfund Site.

Several planned changes were made to the work plan before sampling activities began in October 2019. These changes are not reflected in the attached work plan, since the USEPA declined review. Instead, the planned changes to the work plan and the basis for the changes, as well as deviations from the work plan, are summarized below:

- Target coordinates for locations SED-01, -02, -03 were adjusted to account for other another party's planned sampling activities in the AOI vicinity. The final locations targeted for sampling are shown in the attached Revised Figure 3-3.

---

[1] The attached work plan is dated May 30, 2019, and is the same document provided as draft for USEPA review.

- The final locations/coordinates at which samples were collected are provided as part of the data package and in a few cases differed from the target locations; because of low water levels, these locations required field adjustment to account for vessel access.

- The subsurface sediment core processing location was moved from on-vessel (as proposed in the work plan) to a secure, covered upland location on Siltronic property. This change was made to facilitate sediment documentation efforts, account for potential inclement weather, provide ample lighting for sample documentation, and expedite core processing such that samples were obtained within 24 hours of sediment core collection. Sediment cores were stored upright on ice until processed. The change to upland expedited processing was made partly in response to the September 12, 2019, USEPA comments on the predesign investigation (PDI) evaluation report.[2]

- The work plan states that if potential nonaqueous-phase liquid (NAPL) is observed, then a jar water sheen test (i.e., "shake test") will be performed over the suspected NAPL interval to further estimate (qualitatively) the presence of NAPL (see Appendix C of the work plan for detailed procedures). This test was conducted as planned. In addition, the site-specific NAPL field test developed by Anchor-QEA for the Gasco Sediment Site (i.e., the "spoon test") was performed in two instances by MFA geologists in conjunction with the shake test. However, the spoon test was not further systematically performed by MFA geologists because the acceptance, utility, repeatability, and reliability of this test are unproven.

- Investigation-derived waste (IDW) management was slightly modified for liquid wastes. As stated in the work plan Section 4.2.3, excess sediment and decontamination fluids used for sampling equipment were stored in 55-gallon drums and staged at a designated upland area (Siltronic hazardous waste area—Bay 4). Sediments were characterized for disposal, and disposal was managed appropriately by a licensed hazardous-waste handler. For liquid IDW, disposal characterization was not conducted as planned. To minimize costs associated with analytical characterization, liquid IDW was assumed to be hazardous and was disposed of appropriately.

ATTACHMENTS

Revised Figure 3-3 (Proposed Sample Locations)
Sediment Sampling Work Plan, Willamette River Mile 6.55 to 6.9 West

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[2] USEPA. EPA review comments on PDI evaluation report and acoustic fish tracking study 12-month addendum. U.S. Environmental Protection Agency, September 12, 2019.

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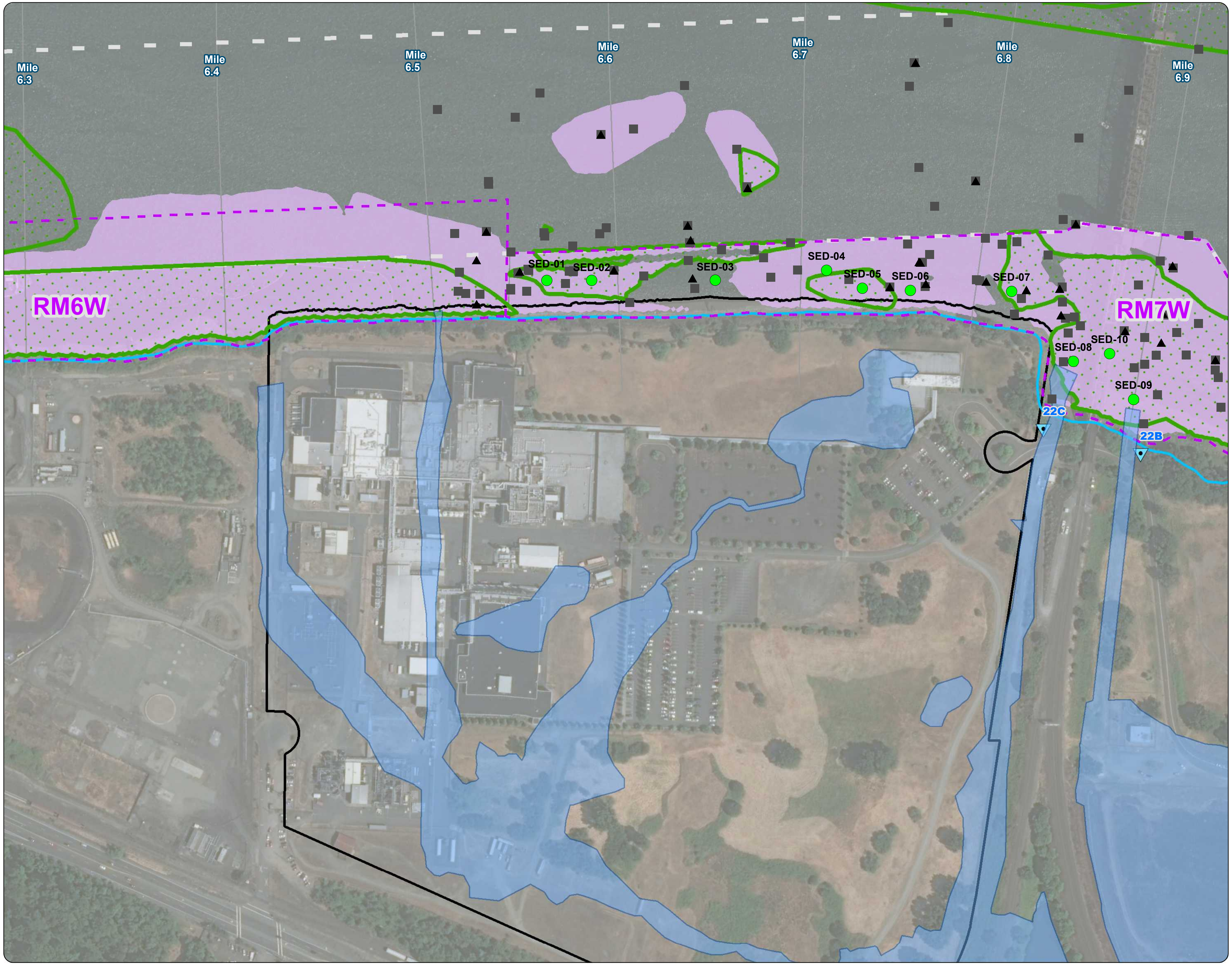
Print Date: 9/24/2019

Approved By:

Produced By: aguse

Project: 8128.02.05-03



Revised Figure 3-3
Proposed Sampling Locations

Siltronic Corporation
Portland, Oregon

Legend

- ● Proposed Sediment Sampling Location
- ▼ Outfall Location (with Outfall ID)

Prior Sample Locations

- ▲ Subsurface
- ■ Surface
- 🟩 PDI SMA Footprint
- ☐ Ordinary High Water Mark (2004)
- ☐ Siltronic Property
- Navigation Channel
- SDU6W and SDU7W
- River Mile Markers
- ▨ Alternative F Mod SMA Footprint
- ▨ Historical Surface Water Features

0 130 260
Feet

Notes:
PDI = Pre-Design Investigation.
SMA = sediment management area.

Source: Aerial photograph obtained from Esri ArcGIS Online; outfall locations obtained from City of Portland Bureau of Environmental Services; Decision Units SDU6W and SDU7W obtained from USEPA; Ordinary High Water Mark obtained from City of Portland Corporate GIS; parcel boundaries and railroad data obtained from Metro Regional Land Information System; navigation channel dataset obtained from Lower Willamette Group.

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SEDIMENT SAMPLING WORK PLAN, WILLAMETTE RIVER MILE 6.55 TO 6.9 WEST

SILTRONIC CORPORATION
PORTLAND, OREGON

Prepared for
SILTRONIC CORPORATION
PORTLAND, OREGON
May 30, 2019
Project No. 8128.02.05

Prepared by
Maul Foster & Alongi, Inc.
2001 NW 19th Avenue, Suite 200, Portland, OR 97209

SEDIMENT SAMPLING WORK PLAN, WILLAMETTE RIVER MILE 6.55 TO 6.9 WEST

SILTRONIC CORPORATION
PORTLAND, OREGON

The material and data in this work plan were prepared under the supervision and direction of the undersigned.

MAUL FOSTER & ALONGI, INC.

Phil Wiescher, PhD
Senior Environmental Scientist

Michael R. Murray, RG
Senior Hydrogeologist

Courtney Savoie, RG
Project Geologist

CONTENTS

TABLES AND ILLUSTRATIONS

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
AOI	Area of Interest
ASTM	American Society for Testing and Materials
bml	below mudline
cm	centimeter
COC	contaminant of concern
DGPS	differential global positioning system
FSP	field sampling plan
MFA	Maul Foster & Alongi, Inc.
NAPL	nonaqueous-phase liquid
PAH	polycyclic aromatic hydrocarbon
PID	photoionization detector
Pre-RD Group	Pre-Remedial Design Group
PSEP	Puget Sound Estuary Program
QA/QC	quality assurance and quality control
QAPP	quality assurance project plan
RD	remedial design
RM	river mile
ROD	Record of Decision
Siltronic	Siltronic Corporation
SMA	sediment management area
TOC	total organic carbon
USEPA	U.S. Environmental Protection Agency

1 INTRODUCTION

Maul Foster & Alongi, Inc. (MFA) prepared this sediment sampling work plan on behalf of its client, Siltronic Corporation (Siltronic). This work plan describes sediment sampling activities for the west side of the Willamette River in Portland, Oregon, approximately 6.55 to 6.9 miles upstream of the confluence with the Columbia River (Willamette river mile [RM] 6.55 to 6.9 west), referred to as the Area of Interest (AOI). The AOI, which extends from the shoreline to the navigation channel, includes the in-water area adjacent to the Siltronic property located at 7200 NW Front Avenue in Portland, Oregon and is part of the U.S. Environmental Protection Agency (USEPA) identified sediment decision unit RM 7 west (see Figure 1-1).

1.1 Purpose

USEPA's Record of Decision (ROD) describes a post-ROD sampling effort for the Portland Harbor Superfund Site, to delineate and better refine the sediment management area (SMA) footprints, refine the conceptual site model, update current study area conditions, and support remedial design (RD) (USEPA, 2017). This work plan was prepared in order to address portions of the above-described sampling effort and is consistent with methodologies identified in the USEPA-approved Pre-Remedial Design Group (Pre-RD Group) work plan and field sampling plans (FSPs) to ensure data compatibility with the Pre-RD Group post-ROD sampling effort (AECOM and Geosyntec, 2018a,b). This work plan complies with the aforementioned USEPA-approved approaches for sediment sample collection to support a more comprehensive characterization of current surface and subsurface sediment conditions, sufficient to enable actual initiation of RD activities.

1.2 Objectives

The following objectives are identified for this work plan:

- Update and evaluate current sediment conditions in the AOI;
- Provide data that will be used to inform the scope and extent of SMAs in the vicinity, i.e., refining the horizontal and vertical extent of sediments exceeding cleanup level and remedial action levels. These data may be used to inform the need for or type of technology assignments consistent with the decision tree provided in the ROD; and,
- To support the third-party allocation by generating sediment data to evaluate potential contaminant transport pathways to the AOI.

1.3 Work Plan Organization

Investigation activities will include collection and analysis of surface and subsurface sediment samples to characterize chemicals present in the Willamette River in the AOI.

Standard field operating procedures for collecting sediment samples, sample description, and decontaminating non-dedicated equipment are described in the quality assurance project plan (QAPP) (Appendix A of this work plan). The QAPP also defines the laboratory and analytical quality procedures and the quality assurance and quality control (QA/QC) requirements for sampling and analysis. A health and safety plan specific to the activities described in this work plan is provided as Appendix B.

2 PROJECT MANAGEMENT PLAN

The following describes the duties and responsibilities of personnel and firms involved in the work; project organization; reporting relationships; lines of communication; and management authorities.

2.1 Project Organization

Project management for implementation of this work plan, including planning, coordination sampling, documentation, and reporting tasks, will be undertaken by MFA. All project work will be supervised by an Oregon-registered geologist employed at MFA. MFA will use subcontractors for a number of activities, including sediment sampling and laboratory services. Stakeholders and contractors involved with this project are listed below.

Project Management and Property Owner
Siltronic Corporation
7200 NW Front Avenue
Portland, Oregon 97202-8941
(503) 219-7832
Contact: Myron Burr, Director, EHS

Technical Consultant Project Management
MFA
2001 NW 19th Avenue, Suite 200
Portland, Oregon 97209
(971) 713-3579
Contact: Michael Murray, RG

Data Validation
AlterEcho
14500 Avion Parkway, Suite 300
Chantilly, Virginia 20151
(312) 345-8966
Contact: Rob Young

Subcontracted Services
Research Support Services, Inc.
321 NE High School Road, Suite D3/563
Bainbridge Island, Washington 98110
(206) 550-5202
Contact: Eric Parker

Apex Laboratories, LLC
12232 SW Garden Place
Tigard, Oregon 97223
(503) 718-2323
Contact: Philip Nerenberg

Specialty Analytical
9011 SE Jannsen Road
Clackamas, Oregon 97015
(503) 607-1331
Contact: Marty French

3 SCOPE OF WORK

3.1 Permit Applications

The following permits for conducting sediment sampling in the AOI will be completed and acquired before fieldwork is initiated:

- U.S. Army Corps of Engineers NW Permit 6;
- Oregon Department of State Lands Removal-Fill General Authorization; and,
- Oregon Department of Environmental Quality 401 Water Quality Certification

3.2 Sampling Design and Approach

3.2.1 Positioning Methodology

Prior surface and subsurface sediment sampling efforts in the AOI were conducted by the Pre-RD Group in 2018; NW Natural in 2010, 2011, and 2018; and the Lower Willamette Group in 1997, 2004, 2005, 2007 and 2008. Sampling locations for these earlier investigations are shown in Figures 3-1 and 3-2, respectively. The sampling efforts intend to build on the prior work and generate data of sufficient density to facilitate RD in the AOI.

Station positioning and vertical control procedures described herein are consistent with Section 4.2 of both the surface and subsurface FSPs (AECOM and Geosyntec, 2018a,b).

A differential global positioning system (DGPS) on the contractor support vessel will be used to locate the horizontal sampling position for each proposed sample station shown on Figure 3-3, using the coordinates listed in the attached table. Coordinates will be programmed into the navigation system on the contractor vessel. Sampling stations will be located to an accuracy of ± 2 meters. DGPS will be used to record the final location of each sample station.

Vertical positioning will be achieved by referencing the nearest staff gauge to the AOI, which is U.S. Geological Survey Gauge 14211720, for the Willamette River at Portland. The gauge is not visible from the AOI, so real-time river levels from this gauge will be downloaded from the Northwest River Forecast Center, where the gauge is identified with the number PRTO3. Gauge height will be converted from the Columbia River Datum to the North American Vertical Datum of 1988. Depth to the mudline will be measured to the nearest one tenth of a foot with a fathometer and lead line prior to surface or subsurface sediment sample collection.

3.2.2 Surface Sediment Sampling

Surface sediment sampling will be conducted consistent with Section 4.3 of the Pre-RD Group surface sediment FSP (AECOM and Geosyntec, 2018a). Sampling consists of targeted (not random) surface sediment samples to more fully characterize and refine historical and recent releases to the Willamette River. The targeted surface sediment samples may also inform refinement of the SMA footprints. Proposed surface sediment sample locations are shown in Figure 3-3.

A total of ten surface sediment samples will be collected in the AOI. All surface sediment samples will consist of a three-point composite collected with a power grab sampler or similar (e.g., van Veen grab sampler). At each proposed station, three grab samples will be collected within a relatively small footprint (i.e., less than 25 feet) where possible and composited into one sample for analysis. Surface sediment will be collected from a target depth of 0 to 30 centimeters (cm) below mudline (bml). Approximately 56 ounces (equal volume) of sediment will be collected from each of the three surface grabs. The sediment will be sampled using a stainless-steel spoon, then transferred to a stainless-steel bowl for compositing. Approximately 56 ounces (equal volume) of sediment will be collected from the composited sediment for analysis. The spoon and container will be rinsed free of solids between subsample composite stations, but not decontaminated. Decontamination of the sampling device and field equipment will take place between sample stations (see Appendix A for decontamination procedures). The volume of sediment from the three-point surface grabs will be homogenized until uniform in color and texture. Sediments will be collected from the center of the sampler, avoiding sediments in contact with the sides of the sampler. Large organisms and pieces of debris will be removed and noted in the field notes.

The following acceptance criteria will be used to guide surface sediment collection:

- No or minimal excess water leaking from the jaws of the sampler;
- No excessive turbidity in the overlying water of the sampler;
- Sampler did not over-penetrate;
- Sediment surface appears to be intact, with minimal disturbance; and,

- Program-specific penetration depth has been achieved (target of 20 cm to 30 cm, but less can be accepted after several attempts).

If varying substrate conditions prevent achievement of target penetration depths, the sample location will be identified as one of four substrate types and the following contingency plans will be implemented, as described in Sections 4.3.2 and 4.4 of the surface sampling FSP (AECOM and Geosyntec, 2018a):

- Substrate Bin #1—Soft Sediment: overpenetration may be expected and sampling weights adjusted.
  - A minimum 20-cm recovery depth is expected in each acceptable grab in this type of substrate. Sampler weights will be adjusted to minimize overpenetration. It is expected that a three-point composite can be obtained within the 25-foot radius of the proposed surface sediment location.
- Substrate Bin #2—Soft Sediment with Debris: silt, sandy silt, and silty sand with good recovery are expected; however, the presence of debris makes it difficult to consistently achieve a target recovery depth of >20 cm (especially when debris is caught in the grab sampler jaws and some material is lost during retrieval because the jaws did not make a tight seal). Debris is classified specifically as wood, trash, scrap metal, concrete, or subsurface obstructions such as steep slopes that prevent collection of soft sediment under Bin #1 conditions. The goal for minimum average composite recovery depth is 10 cm for each sample. Contingency plan and acceptance criteria for recovery depths include the following steps:
  - At the target surface sediment location, conduct up to six bucket attempts within a 50-foot radius to collect acceptable grabs (target three attempts within 25-foot radius and three attempts in 50-foot radius). All attempts will be logged and documented in the field notes. Retain the three best/deepest penetrating samples and calculate the average sample recovery depth.
- Substrate Bin #3—Natural Hard Sediment Bottom: this type of dense sand and gravel, stiff silt, or uncemented cobble substrate is expected to produce consistently low penetration depths (less than the target recovery depth of 20 cm) in each grab. Acceptance criteria and contingency planning at areas encountering low sample recoveries in Substrate #3 include the following steps:
  - At the surface sediment location, conduct up to six bucket attempts within a 50-foot radius, using all weights, and retain the three best/deepest bucket attempts. All attempts will be logged and documented in the field notes. Calculate the average sample depth of the three best samples.
- Substrate Bin #4—No Recoverable Sediment: this type of substrate is expected to be impenetrable bedrock, riprap, or very dense/cemented cobbles. Acceptance criteria and contingency planning for areas encountering Substrate #4 include the following steps:

  - At the surface sediment location, three attempts will be made to collect an acceptable sample within a 50-foot radius. If no acceptable sample is obtained after three attempts (e.g., no recoverable amount of sediment), the sample location will be modified in the field. All attempts will be logged and documented in the field notes.

Sample location coordinates and sample identification numbers are provided in the attached table. Samples will be processed on the sampling vessel and will be transported in coolers on ice (at 0 to 6 degrees Celsius [°C]) to the analytical laboratory. Surface sediment samples will be analyzed for the full ROD Table 17 suite of sediment contaminants of concern (COCs) and conventionals (i.e., grain size and total organic carbon [TOC]). Analysis will also be conducted for cyanide, polycyclic aromatic hydrocarbon [PAH] homologs, and chlorinated herbicides, as specified in the attached table.

Surface sediment procedures and analytical methods are described further in Appendix A.

3.2.3 Subsurface Sediment Sampling

Surface sediment sampling will be conducted consistent with Section 4.3 of the Pre-RD Group subsurface sediment FSP (AECOM and Geosyntec, 2018b). Ten sediment cores for collection of subsurface sediment will be completed in the AOI (see Figure 3-3). The cores will be colocated at surface sediment grab locations.

Subsurface sediment cores, collected with a vibracore sediment sampling device, will have a target collection depth of 15 feet bml or the depth of refusal. The attached table presents the location, core depths, location identification numbers, and collection depths. The visual appearance of the subsurface core samples will be logged and processed at 2-foot continuous intervals (based on the recovered depth) along the entire length of the accepted core. Subsurface samples will be collected at 2-foot intervals, unless lithology indicates otherwise, with a minimum interval thickness of 1 foot and a maximum thickness of 3 feet. The first sample will be collected beginning from the top of the core (e.g., 0-to-2-foot interval). Up to two additional samples will be collected, one at the middle and one at the bottom intervals of the core. Additional sampling intervals will be archived. Approximately 56 ounces (equal volume) of sediment will be collected from each sampling interval. The sediment interval will be sampled using a stainless-steel spoon, placed in a stainless-steel bowl for homogenizing, then placed in 8 or 16-ounce jars or similar containers.

Subsurface core collection will be performed consistent with Section 4.3 of the subsurface sediment FSP (AECOM and Geosyntec, 2018b):

- Core tube caps will be removed immediately before placement into the coring device in order to minimize potential core contamination;
- The position will be recorded when the vibracore first rests on the sediment surface;
- The vibracore will be advanced without power (under its own weight), then vibration will be applied until the core tube is advanced to the target depth or to refusal;

- After a brief pause, the core tube will be extracted from the sediment, using only the minimum vibratory power needed for extraction;
- As soon as the core tube daylights to the surface water/air interface, a bottom cap will be placed over the tube to prevent material loss from the core catcher; and,
- Inspect the exterior sidewalls of the core tube for signs of potential nonaqueous-phase liquid (NAPL) and scrapes/scoring of the walls from contact with dense gravel. If NAPL is suspected, then take appropriate field precautions as described in Appendix B-1 of the subsurface FSP, included as an attachment in Appendix C (AECOM and Geosyntec, 2018b). When coring in areas with potential NAPL, sorbent booms and pads may be proactively deployed around the coring area and the coring equipment/vessels to minimize dispersion of NAPL sheens that may appear on the water surface.
- While on the vessel, personnel will record the following core collection data in field notes and on a boring log form, included as Appendix D:
  - Date/Time. Local date and time when the vibracoring began at each station;
  - Depth to Mudline. Water depth at the sampling station at the time of core collection;
  - Total Drive Length. Core tube length and the depth of the core tube penetration into the subsurface;
  - Recovered Length. Thickness of the sediment column retained in the core tube before sectioning and removal of the core catcher;
  - Sediment Observation. Average grain size, color, notable odors, debris, etc. Visual description will follow the American Society for Testing and Materials (ASTM) visual-soil classification procedure (i.e. ASTM D2488);
  - The core will be accepted, rejected, or stored on the vessel pending another drive attempt. If a core sample does not meet the core acceptance criteria (listed below), then field protocols will be followed as described in Section 4.3.2 of the subsurface sediment FSP (AECOM and Geosyntec, 2018b) and as outlined below;
  - After core acceptance, water will be carefully decanted from the top of the core tube to minimize sediment disturbance. Cores will be cut into segments approximately 4 to 6 feet long for handling and storage. Core tubes will be capped with aluminum foil and plastic caps, and will be inscribed on the sidewalls with core and segment identification and "up" arrow; and,
  - Sediment cores will be processed on the sampling vessel.

The following acceptance criteria will be used to guide subsurface sediment collection:

- Overlying water is present and the sediment surface is intact;
- The core has 80 percent target recovery versus penetration (or document why recovery is less after three attempts);

- The core tube is in good condition (not excessively bent);
- The core appears representative of surrounding area; and,
- Target penetration depth has been achieved or bedrock is encountered. If the target depth is not reached because of cobbles, debris, refusal, or other difficult coring conditions, an additional core will be attempted as described in the contingency plan. Contingency plan procedures are discussed below.

If samples cannot be collected at a proposed sampling location because of substrate or other field conditions, no more than three attempts will be made to relocate the core within a 50-foot radius of the planned location if accessible (AECOM and Geosyntec, 2018b). If not accessible (i.e., under a structure/vessel, shallow water depth), then the target radius will be increased for sample collection (e.g., 125 feet). If the first core attempt meets the acceptance criteria, then no additional cores will be collected at that station. If not, then up to two additional cores will be attempted and retained (stored on vessel deck). The best (percent recovery) of three attempts will be retained and processed.

The subsurface sediment core will be processed on the vessel, consistent with Section 4.4 procedures of the subsurface sediment FSP noted below (AECOM and Geosyntec, 2018b):

- The core tube will be split open longitudinally to preserve the material stratigraphy inside, using a table saw, handheld circular saw, radial saw, shearing tool, X-ACTO® knife (if liner used), or similar device; and
- A photoionization detector (PID) with 10.6-electron volt lamp will be used for prescreening of each core. As soon as the core is split open, the PID monitor will be held in the ambient air space just above the open core and slowly moved down the core from top to bottom. PID readings will be recorded in the field notebook.
- If there is a "PID hit" or if sheens/petroleum-like odors are observed, then a headspace screening will be conducted. Head space screening will involve the following:
  - A small representative sample will be collected from each sample interval to be screened, using a decontaminated sampling spoon. The material will be placed in a resealable plastic bag or glass jar with a septum lid;
  - The bag or jar will be tightly sealed (the jar with aluminum foil and plastic lid with septum opening), and the material will be allowed to warm at least to the ambient temperature (>32 degrees Fahrenheit). The sample will be allowed to sit for at least ten to no more than 60 minutes to allow headspace concentrations to develop and will be shaken periodically for at least 30 seconds;
  - The PID probe tip will be inserted into the container within the headspace, with care taken to avoid taking sediment or moisture into the probe; and
  - The highest reading (excluding possible erratic readings) on the meter will be recorded for the sample.

- Cores will be photographed prior to sampling. The sample ID, date, and orientation of the core will be included in each photograph;
- The visual appearance of the sediment cores will be described following ASTM D-2488 Standard Practice for Identification of Soils (Visual-Manual Procedure, ASTM D-2488);
- If potential NAPL is observed, then a jar sheen test will be performed over the suspected NAPL interval to further estimate (qualitatively) the presence of NAPL (see Appendix C for detailed procedures);
- Subsurface sample intervals will be 2 feet unless field conditions indicate otherwise (e.g., a change in lithology, odor, sheen);
- After the cores have been described and the sample intervals have been determined, sediment will be collected within the determined sample interval, homogenized until uniform in color and texture, and placed into appropriate sample containers for laboratory analysis; and,
- Core lithology, PID readings, sample identifications, and sample depth intervals will be recorded in field notes.

Sample location coordinates and sample identification numbers are provided in the attached table. Samples will be processed on the sampling vessel and will be transported in coolers on ice (at 0 to 6ºC) to the analytical laboratory. Subsurface sediment samples will be analyzed for the full ROD Table 17 suite of sediment COCs and conventionals (i.e., grain size and TOC) (see the attached table). Analysis will also be conducted for cyanide, PAH homologs, and chlorinated herbicides, as specified in the attached table.

Subsurface sediment sampling procedures and analytical methods are described further in Appendix A.

3.3 Laboratory Analysis and Quality Assurance and Quality Control

Laboratory analyses will be completed consistent with the protocols described in the QAPP (Appendix A). The QAPP was designed to guide aspects of field sample handling and analytical laboratory procedures, including QA/QC requirements.

Sediment samples collected by MFA will be submitted under standard chain-of-custody procedures and will be analyzed for the following (see the attached table):

- Organochlorine pesticides (including 2,4'- and 4.4'-DDx (dichlorodiphenyltrichloroethane and its derivatives), total chlordane, and total toxaphene) by USEPA Method 1699;
- Semivolatile organic compounds (including 1,2-dichlorobenzene, bis2-ethylhexyl phthalate, and polycyclic aromatic hydrocarbons) by USEPA Method 8270D;

- Metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver, and zinc) by USEPA Method 6020B;
- Total cyanide by USEPA Method 335.4;
- Polychlorinated biphenyl congeners by USEPA Method 1668C;
- Chlorinated herbicides by USEPA Method 8151A;
- Dioxins/furans by USEPA Method 1613B;
- Diesel- and lube-oil-range hydrocarbons by USEPA Method NWTPH-Dx;
- Tributyltin by Krone et al.;
- TOC by USEPA Method 9060A;
- Grain Size by Puget Sound Estuary Program (PSEP)/ASTM D422; and,
- Total solids by PSEP 1986.

Additional sediment sample volume will be submitted to the laboratory and archived at -18ºC. Potential followup analyses include the following (see the attached table):

- Alkylated PAH homologs by USEPA 8270D modified.

All analyses will be reported on a dry-weight basis.

3.4 Reporting

MFA will prepare and submit a report describing the completed work, including description and documentation of the fieldwork, data validation memoranda, tables and figures summarizing the sampling effort, and evaluation of the analytical results.

4 SCHEDULE

The following is the anticipated schedule:

Task	Timeline to Completion
Sediment Sampling Work Plan	May 2019
Sampling Permits Applied for and Obtained	June 2019
Field Evaluations	July 2019
Data Report	October 2019–December 2019

LIMITATIONS

The services undertaken in completing this work plan were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This work plan is solely for the use and information of our client unless otherwise noted. Any reliance on this work plan by a third party is at such party's sole risk.

Opinions and recommendations contained in this work plan apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this work plan.

REFERENCES

AECOM and Geosyntec. 2018a. Surface sediment field sampling plan, Portland Harbor pre-remedial design investigation studies, Portland Harbor Superfund site. Prepared for U.S. Environmental Protection Agency, Seattle, Washington. AECOM, Portland, Oregon, and Geosyntec Consultants, Inc., Seattle, Washington. March 29 (revised September 27, 2018).

AECOM and Geosyntec. 2018b. Subsurface sediment coring field sampling plan, Portland Harbor pre-remedial design investigation studies, Portland Harbor Superfund site. Prepared for U.S. Environmental Protection Agency, Seattle, Washington. AECOM, Portland, Oregon, and Geosyntec Consultants, Inc., Seattle, Washington. April 3 (revised July 12, 2018).

USEPA. 2017. Record of decision, Portland Harbor Superfund site, Portland Oregon. U.S. Environmental Protection Agency Region 10, Seattle, Washington. January.

TABLE

Table
Sampling and Analyses Summary
Siltronic Corporation
Portland, Oregon

Location IDs	Sample Location		Sample Matrix	Total Depth (feet bml)	No. of Samples per Location^a	Sample Depth(s) (feet bml)^b	Analytical Suite												
	Latitude	Longitude					Organochlorine Pesticides by USEPA 1699	SVOCs by USEPA 8270D	Metals^c by USEPA 6020B	Total Cyanide by ASTM D7511	PCB Congeners by USEPA 1668C	Chlorinated Herbicides by USEPA 8151A	PCDD/Fs by USEPA 1613B	Diesel and Lube Oil TPH by USEPA NWTPH-Dx	Tributyltin by Krone et al.	PCDD/Fs by USEPA 1613B	TOC by USEPA 9060A	Grain Size by PSEP/ASTM D422	PAH Homologs
SED-01	45.578351	-122.753321	Surface Sediment	1	1	0 - 1	x	x	x	x	x	x	x	x	x	x	x	x	o
			Subsurface Sediment	15	3	0 - 2	x	x	x	x	x	x	x	x	x	x	x	x	o
						2 - 4	o	o	o	o	o	o	o	o	o	o	o	o	o
						4 - 6	o	o	o	o	o	o	o	o	o	o	o	o	o
						6 - 8	x	x	x	x	x	x	x	x	x	x	x	x	o
						8 - 10	o	o	o	o	o	o	o	o	o	o	o	o	o
						10 - 12	o	o	o	o	o	o	o	o	o	o	o	o	o
						12 - 14	x	x	x	x	x	x	x	x	x	x	x	x	o
SED-02	45.578167	-122.753471	Surface Sediment	1	1	0 - 1	x	x	x	x	x	x	x	x	x	x	x	x	o
			Subsurface Sediment	15	3	0 - 2	x	x	x	x	x	x	x	x	x	x	x	x	o
						2 - 4	o	o	o	o	o	o	o	o	o	o	o	o	o
						4 - 6	o	o	o	o	o	o	o	o	o	o	o	o	o
						6 - 8	x	x	x	x	x	x	x	x	x	x	x	x	o
						8 - 10	o	o	o	o	o	o	o	o	o	o	o	o	o
						10 - 12	o	o	o	o	o	o	o	o	o	o	o	o	o
						12 - 14	x	x	x	x	x	x	x	x	x	x	x	x	o
SED-03	45.57806	-122.753017	Surface Sediment	1	1	0 - 1	x	x	x	x	x	x	x	x	x	x	x	x	o
			Subsurface Sediment	15	3	0 - 2	x	x	x	x	x	x	x	x	x	x	x	x	o
						2 - 4	o	o	o	o	o	o	o	o	o	o	o	o	o
						4 - 6	o	o	o	o	o	o	o	o	o	o	o	o	o
						6 - 8	x	x	x	x	x	x	x	x	x	x	x	x	o
						8 - 10	o	o	o	o	o	o	o	o	o	o	o	o	o
						10 - 12	o	o	o	o	o	o	o	o	o	o	o	o	o
						12 - 14	x	x	x	x	x	x	x	x	x	x	x	x	o
SED-04	45.577223	-122.750855	Surface Sediment	1	1	0 - 1	x	x	x	x	x	x	x	x	x	x	x	x	o
			Subsurface Sediment	15	3	0 - 2	x	x	x	x	x	x	x	x	x	x	x	x	o
						2 - 4	o	o	o	o	o	o	o	o	o	o	o	o	o
						4 - 6	o	o	o	o	o	o	o	o	o	o	o	o	o
						6 - 8	x	x	x	x	x	x	x	x	x	x	x	x	o
						8 - 10	o	o	o	o	o	o	o	o	o	o	o	o	o
						10 - 12	o	o	o	o	o	o	o	o	o	o	o	o	o
						12 - 14	x	x	x	x	x	x	x	x	x	x	x	x	o

Location IDs	Sample Location		Sample Matrix	Total Depth (feet bml)	No. of Samples per Location^{a}	Sample Depth(s) (feet bml)^{b}	Analytical Suite												
	Latitude	Longitude					Organochlorine Pesticides by USEPA 1699	SVOCs by USEPA 8270D	Metals^{c} by USEPA 6020B	Total Cyanide by ASTM D7511	PCB Congeners by USEPA 1668C	Chlorinated Herbicides by USEPA 8151A	PCDD/Fs by USEPA 1613B	Diesel and Lube Oil TPH by USEPA NWTPH-Dx	Tributyltin by Krone et al.	PCDD/Fs by USEPA 1613B	TOC by USEPA 9060A	Grain Size by PSEP/ASTM D422	PAH Homologs
SED-05	45.576971	-122.750634	Surface Sediment	1	1	0 - 1	x	x	x	x	x	x	x	x	x	x	x	x	o
			Subsurface Sediment	15	3	0 - 2	x	x	x	x	x	x	x	x	x	x	x	x	o
						2 - 4	o	o	o	o	o	o	o	o	o	o	o	o	o
						4 - 6	o	o	o	o	o	o	o	o	o	o	o	o	o
						6 - 8	x	x	x	x	x	x	x	x	x	x	x	x	o
						8 - 10	o	o	o	o	o	o	o	o	o	o	o	o	o
						10 - 12	o	o	o	o	o	o	o	o	o	o	o	o	o
						12 - 14	x	x	x	x	x	x	x	x	x	x	x	x	o
SED-06	45.576771	-122.750215	Surface Sediment	1	1	0 - 1	x	x	x	x	x	x	x	x	x	x	x	x	o
			Subsurface Sediment	15	3	0 - 2	x	x	x	x	x	x	x	x	x	x	x	x	o
						2 - 4	o	o	o	o	o	o	o	o	o	o	o	o	o
						4 - 6	o	o	o	o	o	o	o	o	o	o	o	o	o
						6 - 8	x	x	x	x	x	x	x	x	x	x	x	x	o
						8 - 10	o	o	o	o	o	o	o	o	o	o	o	o	o
						10 - 12	o	o	o	o	o	o	o	o	o	o	o	o	o
						12 - 14	x	x	x	x	x	x	x	x	x	x	x	x	o
SED-07	45.576374	-122.749314	Surface Sediment	1	1	0 - 1	x	x	x	x	x	x	x	x	x	x	x	x	o
			Subsurface Sediment	15	3	0 - 2	x	x	x	x	x	x	x	x	x	x	x	x	o
						2 - 4	o	o	o	o	o	o	o	o	o	o	o	o	o
						4 - 6	o	o	o	o	o	o	o	o	o	o	o	o	o
						6 - 8	x	x	x	x	x	x	x	x	x	x	x	x	o
						8 - 10	o	o	o	o	o	o	o	o	o	o	o	o	o
						10 - 12	o	o	o	o	o	o	o	o	o	o	o	o	o
						12 - 14	x	x	x	x	x	x	x	x	x	x	x	x	o
SED-08	45.575696	-122.749148	Surface Sediment	1	1	0 - 1	x	x	x	x	x	x	x	x	x	x	x	x	o
			Subsurface Sediment	15	3	0 - 2	x	x	x	x	x	x	x	x	x	x	x	x	o
						2 - 4	o	o	o	o	o	o	o	o	o	o	o	o	o
						4 - 6	o	o	o	o	o	o	o	o	o	o	o	o	o
						6 - 8	x	x	x	x	x	x	x	x	x	x	x	x	o
						8 - 10	o	o	o	o	o	o	o	o	o	o	o	o	o
						10 - 12	o	o	o	o	o	o	o	o	o	o	o	o	o
						12 - 14	x	x	x	x	x	x	x	x	x	x	x	x	o

Table
Sampling and Analyses Summary
Siltronic Corporation
Portland, Oregon

Location IDs	Sample Location		Sample Matrix	Total Depth (feet bml)	No. of Samples per Location^a	Sample Depth(s) (feet bml)^b	Analytical Suite												
	Latitude	Longitude					Organochlorine Pesticides by USEPA 1699	SVOCs by USEPA 8270D	Metals^c by USEPA 6020B	Total Cyanide by ASTM D7511	PCB Congeners by USEPA 1668C	Chlorinated Herbicides by USEPA 8151A	PCDD/Fs by USEPA 1613B	Diesel and Lube Oil TPH by USEPA NWTPH-Dx	Tributyltin by Krone et al.	PCDD/Fs by USEPA 1613B	TOC by USEPA 9060A	Grain Size by PSEP/ASTM D422	PAH Homologs
SED-09	45.575224	-122.748819	Surface Sediment	1	1	0 - 1	x	x	x	x	x	x	x	x	x	x	x	x	o
			Subsurface Sediment	15	3	0 - 2	x	x	x	x	x	x	x	x	x	x	x	x	o
						2 - 4	o	o	o	o	o	o	o	o	o	o	o	o	o
						4 - 6	o	o	o	o	o	o	o	o	o	o	o	o	o
						6 - 8	x	x	x	x	x	x	x	x	x	x	x	x	o
						8 - 10	o	o	o	o	o	o	o	o	o	o	o	o	o
						10 - 12	o	o	o	o	o	o	o	o	o	o	o	o	o
						12 - 14	x	x	x	x	x	x	x	x	x	x	x	x	o
SED-10	45.575604	-122.748682	Surface Sediment	1	1	0 - 1	x	x	x	x	x	x	x	x	x	x	x	x	o
			Subsurface Sediment	15	3	0 - 2	x	x	x	x	x	x	x	x	x	x	x	x	o
						2 - 4	o	o	o	o	o	o	o	o	o	o	o	o	o
						4 - 6	o	o	o	o	o	o	o	o	o	o	o	o	o
						6 - 8	x	x	x	x	x	x	x	x	x	x	x	x	o
						8 - 10	o	o	o	o	o	o	o	o	o	o	o	o	o
						10 - 12	o	o	o	o	o	o	o	o	o	o	o	o	o
						12 - 14	x	x	x	x	x	x	x	x	x	x	x	x	o

NOTES:

ASTM = American Society for Testing and Materials.

bml = below mudline.

ID = identification.

NWTPH = Northwest Total Petroleum Hydrocarbons.

o = archive.

PAH = polycyclic aromatic hydrocarbons.

PCB = polychlorinated biphenyl. - -

PCDD/Fs - polychlorinated dibenzo p dioxins and furans.

PSEP = Puget Sound Estuary Program.

SVOC = semivolatile organic compound.

TOC = total organic carbon.

TPH = total petroleum hydrocarbons.

USEPA = U.S. Environmental Protection Agency.

x = analyze.

[a] Surface sediment samples will consist of a three-point composite. Additional subsurface samples will be collected and archived.

[b] Sample depth intervals provided in this table are conceptual and based on a recovery depth of 14 feet. The midpoint and bottom depth sampling intervals will vary based on depth recovered and lithology. See Section 3.2.3 of work plan for details of sample collection depths.

[c] Metals = arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver, and zinc.

FIGURES

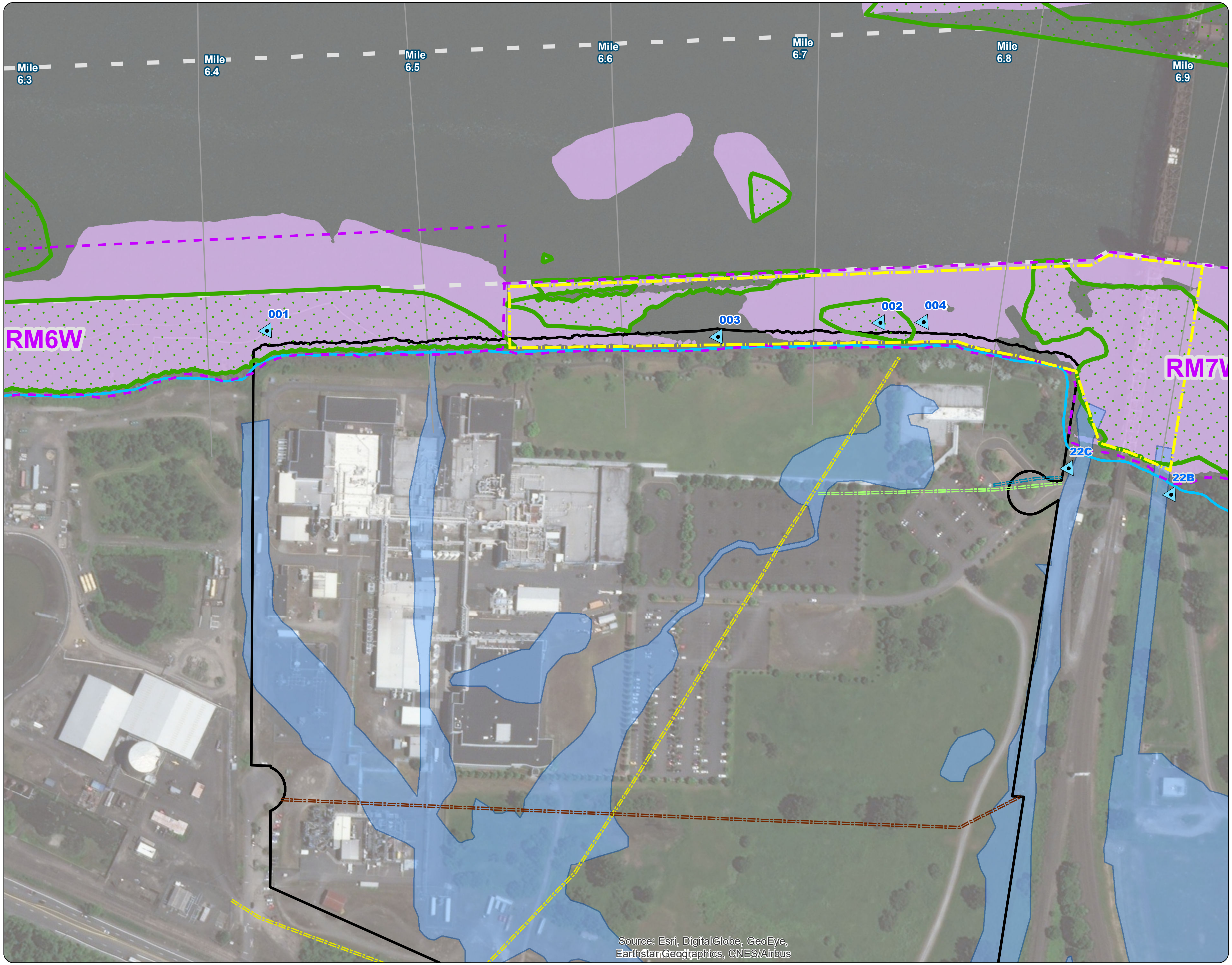

Figure 1-1
Area of Interest

Siltronic Corporation
Portland, Oregon

ATTORNEY/CLIENT PRIVILEGED

Legend

- ▼ Outfall Location (with Outfall ID)
- - - SDU6W and SDU7W
- -·-· Olympic Pipeline on Siltronic Property
- -·-· Approximate location of abandoned Portland Gas & Coke Company (NW Natural) Pipeline on Siltronic Property
- -·-· Approximate location of Union Oil Pipeline on Siltronic Property
- -·-· Approximate location of Standard Oil Pipeline on Siltronic Property
- — River Mile Markers
- ▭ Area of Interest
- 🟩 PDI SMA Footprint
- ▭ Ordinary High Water Mark (2004)
- ▭ Siltronic Property
- - - Nav Channel
- ▨ Alternative F Mod SMA Footprint
- ▨ Historical Surface Water Features

0 125 250
Feet

Notes:
PDI = Pre-Design Investigation.
SMA = sediment management area.

Source: Aerial photograph obtained from Esri ArcGIS Online; Decision Units SDU6W and SDU7W obtained from USEPA; ordinary high water mark obtained from City of Portland Corporate GIS; parcel boundaries and railroad data obtained from Metro Regional Land Information System; navigation channel dataset obtained from Lower Willamette Group.

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Print Date: 5/17/2019
Approved By:
Produced By: jputnam
Project: 8128.02.05-03

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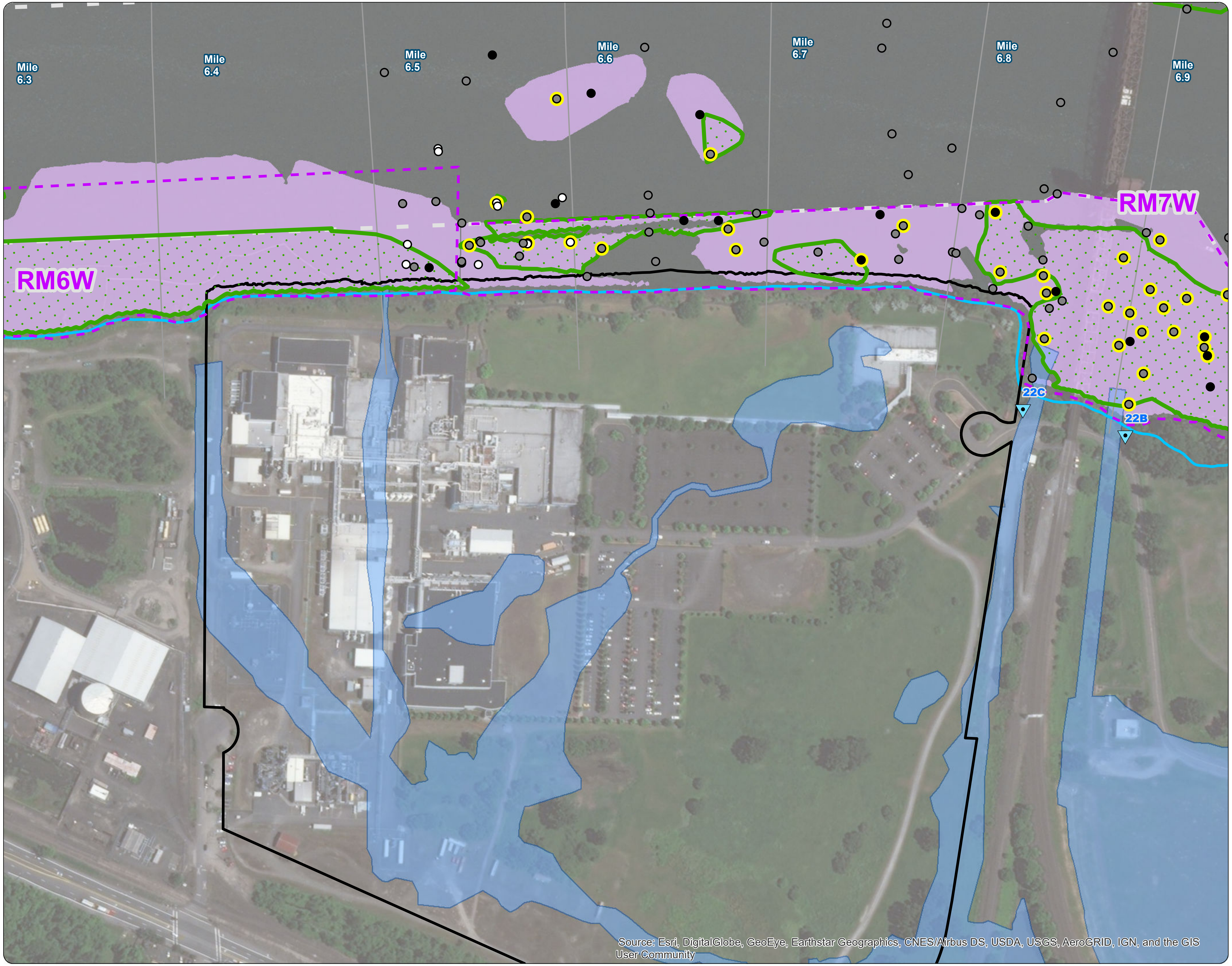
Print Date: 5/30/2019

Approved By:

Produced By: aguse

Project: 8128.02.05-03



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 3-1
Prior Surface Sediment Results

Siltronic Corporation
Portland, Oregon

ATTORNEY/CLIENT PRIVILEGED

Legend

Prior Suface Sampling Points

- ● LWG
- ○ NWN
- ● Pre-RD
- ● Yellow halo indicated RAL or PTW Exceedances
- ▼ Outfall Location (with Outfall ID)
- - - SDU6W and SDU7W
- — River Mile Markers
- ▨ PDI SMA Footprint
- ☐ Ordinary High Water Mark (2004)
- ☐ Siltronic Property
- Nav Channel
- 🟪 Alternative F Mod SMA Footprint
- 🟦 Historical Surface Water Features

0 125 250
Feet

Notes:
Data are only shown between river miles 6.5 and approximately 7.0.
NWN did not analyze for PeCDD, PeCDF, or TCDD.
LWG = Lower Willamette Group.
NWN = NW Natural.
Pre-RD = Pre-Remedial Design Group.
PDI = Pre-Design Investigation.
PTW = principal threat waste.
RAL = remedial action level.
SMA = sediment management area.

Source: Aerial photograph obtained from Esri ArcGIS Online; Outfall locations obtained from City of Portland Bureau of Environmental Services; Decision Units SDU6W and SDU7W obtained from USEPA; Ordinary High Water mark obtained from City of Portland Corporate GIS; Parcel boudaries and railroad data obtained from Metro Regional Land Information System; Navigation channel dataset obtained from Lower Willamette Group.

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Figure 3-2
Prior Suburface Sediment Results

Siltronic Corporation
Portland, Oregon

DRAFT

ATTORNEY/CLIENT PRIVILEGED

Legend

Prior Sempling Points

- ● LWG
- ○ NWN
- ● Pre-RD
- ● Yellow halo indicates RAL or PTW Exceedance
- ▼ Outfall Location (with Outfall ID)
- SDU6W and SDU7W
- River Mile Markers
- Nav Channel
- 🟩 PDI SMA Footprint
- ☐ Ordinary High Water Mark (2004)
- ☐ Siltronic Property
- ▨ Alternative F Mod SMA Footprint
- ▨ Historical Surface Water Features

0 130 260
Feet

Notes:
Data are only shown between river miles 6.5 and approximately 7.0.
NWN did not analyze for PeCDD, PeCDF, or TCDD.
LWG = Lower Willamette Group.
NWN = NW Natural.
Pre-RD = Pre-Remedial Design Group.
PDI = Pre-Design Investigation.
PTW = principal threat waste.
RAL = remedial action level.
SMA = sediement management area.

Source: Aerial photograph obtained from Esri ArcGIS Online; Outfall locations obtained from City of Portland Bureau of Environmental Services; Decision Units SDU6W and SDU7W obtained from USEPA; Ordinary High Water mark obtained from City of Portland Corporate GIS; Parcel boudaries and railroad data obtained from Metro Regional Land Information System; Navigation channel dataset obtained from Lower Willamette Group.

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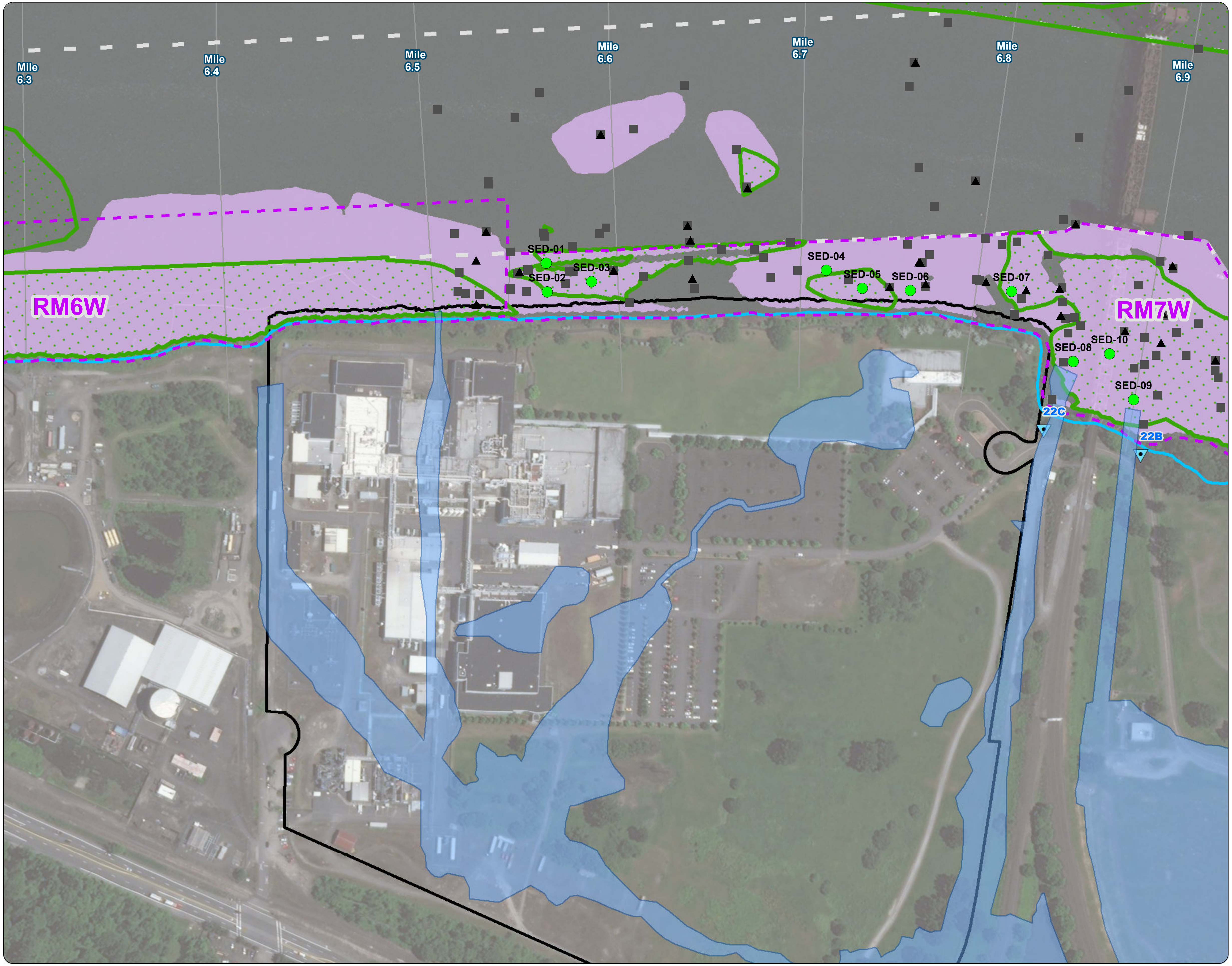

Figure 3-3 Proposed Samping Locations

Siltronic Corporation
Portland, Oregon

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Legend

- ● Proposed Sediment Sampling Location
- ▽ Outfall Location (with Outfall ID)

Prior Sample Locations

- ▲ Subsurface
- ■ Surface
- 🟩 PDI SMA Footprint
- ☐ Ordinary High Water Mark (2004)
- ☐ Siltronic Property
- – – Nav Channel
- – – SDU6W and SDU7W
- — River Mile Markers
- ▨ Alternative F Mod SMA Footprint
- ▨ Historical Surface Water Features

0 130 260
Feet

Notes:
PDI = Pre-Design Investigation.
SMA = sediment management area.

Source: Aerial photograph obtained from Esri ArcGIS Online; outfall locations obtained from City of Portland Bureau of Environmental Services; Decision Units SDU6W and SDU7W obtained from USEPA; Ordinary High Water mark obtained from City of Portland Corporate GIS; Parcel boundaries and railroad data obtained from Metro Regional Land Information System; navigation channel dataset obtained from Lower Willamette Group.

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APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

SILTRONIC CORPORATION
PORTLAND, OREGON

Prepared for
SILTRONIC CORPORATION
PORTLAND, OREGON
May 30, 2019
Project No. 8128.02.05

Prepared by
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MAUL
FOSTER
ALONGI

QUALITY ASSURANCE PROJECT PLAN

SILTRONIC CORPORATION

The material and data in this project plan were prepared under the supervision and direction of the undersigned.

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TABLES AND ILLUSTRATIONS

FOLLOWING PLAN:

TABLES

ACRONYMS AND ABBREVIATIONS

AOI	area of interest
COC	contaminant of concern
DQO	data quality objective
EDD	electronic data deliverable
IDW	investigation-derived waste
LCS	laboratory control samples
LDS	laboratory duplicate samples
MFA	Maul Foster & Alongi, Inc.
MS/MSD	matrix spike and matrix spike duplicate
PCB	polychlorinated biphenyl
the Property	7200 NW Front Avenue in Portland, Oregon
QA/QC	quality assurance and quality control
QAM	quality assurance manager
QAPP	quality assurance project plan
RD	remedial design
RPD	relative percent difference
SMA	sediment management area
SOP	standard operating procedure
USEPA	U.S. Environmental Protection Agency
VOCs	volatile organic compounds
Work Plan	sediment sampling work plan

1 INTRODUCTION

This quality assurance project plan (QAPP) presents procedures for conducting field work and sampling to support the sediment sampling work plan (Work Plan) to which this QAPP is an appendix. This QAPP was prepared to provide specific details on how sediment samples will be collected; identify analytical methods associated reporting-limit and screening-level needs; and define field and laboratory quality assurance and quality control (QA/QC) requirements and procedures.

1.1 Objectives

The objectives of this QAPP are to establish protocols to ensure the data generated are of sufficient quality to support the data quality objectives (DQOs) and to ensure quality assurance and quality control QA/QC protocols to maintain consistency of field and laboratory aspects of data collection and generation. This QAPP was prepared utilizing procedures consistent with the Pre-Remedial Design (Pre-RD) Group U.S. Environmental Protection Agency (USEPA)-approved QAPP (AECOM, and Geosyntec, 2018). This QAPP is also consistent with the following USEPA guidance documents:

- Guidance for Quality Assurance Project Plans, USEPA QA/G-5 (USEPA, 2002)
- USEPA Requirements for Quality Assurance Project Plans, USEPA QA/R-5 (USEPA, 2001)

2 SPECIAL TRAINING AND CERTIFICATION

All personnel performing work at the Property will be health- and safety-trained as specified in the health and safety plan (see Appendix B of the work plan). The health and safety plan describes the specialized training and certification required for personnel and requisite documentation of this training.

3 DATA OBJECTIVES

3.1 Data Quality Objectives and Decision Criteria

The DQO process is a series of logical steps to plan for the resource-effective acquisition of environmental data. It is both flexible and iterative, and it applies to both decision-making (e.g., compliance/non-compliance with a standard) and estimation (e.g., ascertaining the mean concentration level of a contaminant). The DQO process is used to establish performance and acceptance criteria, which serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of the study (USEPA, 2006). The seven steps of the DQO process, as outlined by the USEPA, are listed below along with the specific DQOs of this QAPP:

1. State the problem—Define the problem; identify members of the planning team; define the budget and schedule.
    - This sampling effort is designed to update and evaluate current sediment conditions in the Area of Interest (AOI), defined in the Work Plan to which this QAPP is an appendix.
2. Identify the goal of the study—State how environmental data will be used to meet study objectives and solve the problem; identify study questions; define alternative outcomes.
    - The goal of the study to provide data to inform the nature and extent of sediment management areas (i.e., refining the horizontal and vertical extent of sediments exceeding remediation action levels) and evaluate potential contaminant transport pathways to the AOI.
3. Identify information inputs—Identify data and information needed to answer study questions.
    - Surface sediment samples and subsurface sediment cores will be collected at ten locations and analyzed within the AOI for sediment contaminants of concern (COCs) listed in Section 3.3. of the Work Plan.
4. Define the boundaries of the study—Specify target population and characteristics of interest; define spatial and temporal limits; define scale of inference.
    - The AOI is located on the west side of the Willamette River in Portland, Oregon, approximately 6.55 to 6.9 miles upstream of the confluence with the Columbia River (Willamette river mile 6.55 to 6.9 west). The AOI extends from the shoreline to the navigation channel. The AOI includes the in-water area adjacent to, and immediately southeast of, the Siltronic property located at 7200 NW Front Avenue in Portland, Oregon and is part of the USEPA identified sediment decision unit RM 7 west.
5. Develop the analytic approach—Define parameters of interest; specify type of inference; develop logic for drawing conclusions from findings.
    - Data will be collected from the surface and subsurface sediment, evaluated for the COCs listed in Section 3.3. of the Work Plan. Results from the sediment samples will be assessed against Record of Decision sediment criteria.
6. Specify performance or acceptance criteria—Specify criteria for new data collection (performance metrics) and decision making (probability limits).
    - The measurement performance criteria for data associated with the specific analyses include precision, accuracy, representativeness, completeness, comparability, and sensitivity. To meet these requirements, QC criteria are provided in the standard field and laboratory methods, as discussed below in this QAPP.
7. Develop the plan for obtaining data—Develop the QAPP.

- The basis of the sampling design and rationale for the sediment sampling is included in the Work Plan.

This QAPP presents the methods for collecting and analyzing data for the parameters of interest in the environmental media, as well as the associated performance metrics needed to achieve the DQOs.

3.2 Quality Objectives and Criteria of Measurement

3.2.1 Precision

Precision is the measure of agreement among repeated measurements of the same property under identical or substantially similar conditions, calculated as either the range or the standard deviation (USEPA, 2002). Precision is measured by making repeated analyses on the same analytical instrument (laboratory duplicates) or replicate collections of samples in the field (field duplicates). Precision criteria are expressed as the relative percent difference (RPD) between the primary and duplicate samples. The acceptance limits for RPD are based on the sample matrix and the analytical method used.

The RPD is calculated using the equation:

$$RPD = \frac{(X_s - X_d)}{(X_s + X_d)/2} \times 100\%$$

Where:
X_s = result for primary sample

X_d = result for duplicate sample

For field duplicates, the precision goals for this project are RPD = 50%. For laboratory duplicates (chemistry), the RPD goals are defined by the laboratory acceptance criteria determined from control limits or defined by the specific method. Regarding grain size analysis, laboratory triplicates and relative standard deviation goals are defined by the laboratory acceptance criteria as defined by the specific method.

3.2.2 Accuracy and Bias

Accuracy is defined as the measure of the overall agreement of a measurement to a known value and includes a combination of random error (precision) and systematic error (bias) components of both sampling and analytical operations (USEPA, 2002). Inasmuch as the “true” concentration of sampled media is not known, the degree of accuracy in the measurement is inferred from recovery data determined by sample spiking and/or the analyses of reference standards. The criterion for accuracy is expressed as the percent recovery of the sample spiking. The acceptance limits for percent recovery are based on the analytical method used.

Percent recovery is calculated using the equation:

$$Percent\ Recovery = \frac{X_{ss} - X_s}{T} \times 100\%$$

Where:

X_{ss} = result for spiked sample

X_s = result for sample

T = true value of added spike

Bias is defined as the systematic or persistent distortion of a measurement process that causes error in one direction (USEPA, 2002). Data bias is addressed in the field and the laboratory by calibrating equipment, collecting and analyzing QC blank samples, and analyzing QC standard samples.

3.2.3 Completeness

Data completeness is defined as a measure of the amount of valid data needed from a measurement system (USEPA, 2002). It is measured as the total number of samples collected, for which the valid analytical data are obtained, divided by the total number of samples collected, and multiplied by 100.

$$Percent\ Completeness = \frac{Valid\ Data}{Total\ Data\ Planned} \times 100\%$$

The QA objective for completeness for the parameters will be 90 percent.

3.2.4 Representativeness

Data representativeness is a qualitative term that expresses, "…the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition" (USEPA, 2002). Data representativeness is evaluated by assessing the accuracy and precision of the sampling program. The criterion for evaluating representativeness will be satisfied by confirming that the sample collection procedures are consistently followed. Sampling procedures are described in the Work Plan.

3.2.5 Comparability

Data comparability is a qualitative term that expresses the measure of confidence with which one data set can be compared to another and can be combined for decision-making purposes (USEPA, 2002). Data comparability will be achieved by using standard sampling and operating procedures and analytical methods. Data comparability will be assessed through documentation of QA/QC procedures.

3.2.6 Sensitivity

Data sensitivity is defined as the capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest (USEPA, 2002). Analytical sensitivity is readily evaluated by comparing method reporting limits and/or method detection limits to risk-based screening values, such as Record of Decision Table 17 COC cleanup levels. The method reporting limits specified through the DQO process are provided in Tables 3-1 and 3-2. Results measured between the reporting limits and method detection limits will be reported for all analytes and assigned the appropriate qualifier.

4 DATA GENERATION AND ACQUISITION

4.1 Sample Design

The Work Plan may be submitted for USEPA courtesy review and may not require formal approval before field work activities begin.

Below are sampling design overviews for the proposed sediment sampling. Complete sampling designs and rationales are described in the Work Plan.

4.1.1 Surface Sediment Sampling

Consistent with the methodology outlined in the Pre-RD QAPP, surface sediment data will be collected as co-located samples to correspond with ten sediment core samples (AECOM and Geosyntec, 2018). See the Work Plan to which this QAPP is an appendix for additional details on sampling procedures and approach.

4.1.2 Subsurface Sediment Sampling

Subsurface sediment coring is designed to refine the vertical and horizontal extent of contamination. Ten subsurface core locations are planned in targeted areas that have limited spatial coverage vertically and/or horizontally. Sediment cores will be collected and logged as described in the Work Plan to which this QAPP is an appendix.

4.2 Sample Methods

4.2.1 Nomenclature

The field personnel will be responsible for labeling samples and establishing identification. All data will be keyed to the sample's unique sample designation. The unique sample designation will be used on sample containers and associated field data forms and will be used to key the sample identification in the project database.

The field personnel will clearly label each sample container, using permanent ink on a waterproof sample label, as soon as possible following collection. At a minimum, the following information will be written on the sample label:

- Unique sample identification code
- Time and date of collection
- Project number
- Preservative, if appropriate

In order to maintain sample identification consistency in the project database, the unique sample identification code will be assigned according to the following convention: unique sample number-matrix type-depth (if applicable). The following codes and information will be included in the sample identification code:

- Matrix type codes include the following:
    - SS = surface sediment
    - SB = subsurface sediment
- Depth below mudline: the sample collection end depth will be used
- Field duplicate samples will include "DUP" at the end of the ID
- Equipment rinsate blanks will include "RB" at the end of the ID

For example, a surface sediment sample collected from core at location four from 0 to 1 feet bgs would have the following sample ID: SED-04-SS-1.0. A subsurface sediment sample collected from the same location at 13 to 15 feet bgs would be SED-04-SB-15.0, and a field duplicate of the subsurface sample would be SED-04-SB-15.0-DUP.

4.2.2 Collection Methods

The sample collection methods, location control, and field equipment to be used are described in detail in the Work Plan.

4.2.3 Investigation Derived Waste

Investigation-derived waste (IDW)—including excess sediment following sample collection, decontamination fluids used for sampling equipment (nonphosphate detergent wash, distilled water rinse, and methanol), and disposable wastes (i.e., gloves, paper towels, foil, etc.)—will be temporally stored in sealable 5-gallon buckets, then transferred to sealable 55-gallon drums. Sediment and liquid IDW will be stored in separate drums. Each of the sealed drums will then be staged at a designated upland area (Siltronic hazardous waste area Bay 4) for disposal characterization. Each drum will be labeled to indicate the date sealed, sampling location, and contents. Sediment and liquid IDW will be evaluated to determine whether it is characteristic hazardous waste. One composite sample per every five 55-gallon drums of sediment or liquid will be analyzed for ignitability (D001), corrosivity (D002), and toxicity (D004 to D043), consistent with 40 Code of Federal Regulations Part 261 subpart C. Additional analytical suites, which will be evaluated as part of the surface/subsurface sediment sampling programs that are not covered by D001 through D043, will also be run (e.g., dioxins) as specified in Table 4-1. A minimum of one sediment IDW and one liquid IDW sample will be analyzed. Analysis will be conducted by Specialty Analytical laboratory. Following IDW characterization, all IDW disposal will be managed appropriately by a licensed hazardous waste handler.

All disposable materials used in sample processing, such as paper towels and disposable coveralls and gloves, will be placed in heavyweight garbage bags or other appropriate containers. Disposable supplies will be removed from the AOI by sampling personnel and placed in an appropriate refuse container for disposal at a solid waste landfill.

4.3 Sample Handling

Field sampling personnel will be responsible for the collection, labeling, description, documentation, handling, packaging, storage, and shipping of investigative samples obtained in the field. Proper sample handling and custody procedures are required to retain sample integrity from collection in the field through laboratory analysis and data reporting.

The field investigation personnel and analytical laboratory contractor will be responsible for following sample custody procedures during sampling and analysis, as well as for providing sample tracking. Sample custody procedures will be used to document the history of samples from the time of sample collection through shipment, analysis, and disposal. Samples and sample documentation will be maintained in the physical possession of authorized field personnel or under control in a secure location.

4.3.1 Sample Custody in the Field

The field investigation contractor personnel will be responsible for completing the COC forms upon sample collection. Each COC form will contain, at a minimum, the following information:

- Project number
- Project name
- Project manager
- Unique sample identification code
- Time and date of collection
- Field personnel sampler's name
- Separate shipping papers
- Signature, printed name, organization name, and date and time of transfer of all persons having custody of samples
- Sample matrix
- Quantity of sample containers

- Requested analyses for each sample
- Requested analytical turnaround time
- Any additional information on requested analysis, such as holding time, specific matrix spike and matrix spike duplicate (MS/MSD) samples

4.3.2 Sample Packaging and Shipment

Persons in possession of the samples will be required to sign and date the COC form whenever samples are transferred between individuals or organizations (with the exception of freight carriers). Samples will be placed in laboratory-provided coolers on ice (at 0 to 6 degrees Celsius) for transport to the laboratory. Containers associated with each sample will be packaged in plastic bags to prevent cross contamination. Packing material (e.g., bubble wrap) will be used in coolers to prevent breakage during transport to the laboratory.

Samples will be delivered to the laboratory by ground transportation (laboratory courier or field personnel), and the following custody procedures will be followed: samples will be packed in the appropriate shipping containers. The top copy of the COC form will accompany the samples. If transported by courier, the laboratory courier will retain a second copy of the COC and shipping forms to allow sample tracking. The COC form will accompany the samples from point of release from the sampling vessel to the laboratory. If transported to the laboratory by field personnel, COCs will be signed and copies distributed at the time of sample delivery to the laboratory.

The laboratory will implement its in-house custody procedures, which begin when sample custody is transferred to laboratory personnel.

4.3.3 Sample Custody in the Laboratory

The sample custodian of the analytical laboratory contractor will be responsible for handling and documentation of samples received at the laboratory. The designated sample custodian will accept custody of the received samples and will verify that the COC form matches the samples received. The shipping container, or set of containers, will be given a laboratory identification number, and each sample will be assigned a unique sequential identification number.

4.4 Laboratory Procedures

The analytical laboratories named in the Work Plan have established programs of sample custody that are designed to ensure that each sample is accounted for at all times. The objectives of these sample custody programs include the following:

- Unique identification of the samples, as appropriate for the data required
- Analysis of the correct samples and traceability to the appropriate record
- Preservation of sample characteristics

- Protection of samples from loss or damage
- Documentation of any sample alteration (e.g., filtration, preservation)
- Establishing a record of sample integrity for legal purposes

The standard operating procedures (SOPs) for sample custody protocol are maintained by the laboratories and adhered to by laboratory personnel. The sample custody SOPs are in the laboratories' SOP libraries and/or QA manuals.

4.4.1 Intra- and Inter-Laboratory Sample Transfer

The laboratory project manager will ensure that a sample-tracking record is maintained that follows each sample through all stages of laboratory processing. The sample-tracking record must contain, at a minimum, the names of individuals responsible for performing the analysis; the dates of sample extraction, preparation, and analysis; and the type of analysis being performed.

Any sample, homogenate, or sample extract that will need further analysis that is not performed by the initial contracted laboratory and that requires inter- or intra-laboratory transfer will be subject to all specifications described in the previous section. Sample matrices and analyses per specific laboratory, as shown in Tables 3-1 and 3-2, will not be subcontracted to outside laboratories or transferred to other laboratories within the specific laboratory organization without consultation with the quality assurance manager (QAM).

4.4.2 Archived Samples

All excess sediment samples submitted to the analytical laboratory will be archived at less than -18 degrees C. The laboratories will maintain chain-of-custody documentation and proper storage conditions for the entire time that the samples are in their possession. All laboratories for this project will store the excess samples for up to 12 months following completion of data validation. The laboratories will not dispose of the samples for this project until they are authorized to do so by the QAM.

4.5 Analytical Methods

All analytical methods used will comply with relevant requirements of applicable state or federal programs, or other EPA-approved methods. Analytical methods specific to this QAPP are provided in Tables 3-1 and 3-2.

4.5.1 Method Reporting Limits and Screening Level Values

The laboratory will make every effort to meet sample reporting limits that achieve the selected human health and ecological screening criteria specified in Tables 3-1 and 3-2. Unforeseen matrix interference could cause elevated quantitation limits for some compounds. All reasonable means, including additional cleanup steps and method modifications, will be used to bring sample reporting limits below the screening levels. Typical laboratory reporting limits are provided in Tables 3-1 and 3-2 and may change depending on the contracted laboratory.

USEPA Method 1613B (Dioxin/Furan), 1668C (Polychlorinated biphenyls [PCB] Congeners), and 1699 (Organochlorine Pesticides) results will also be evaluated and reported with estimated detection limits.

4.5.2 Holding Times and Sample Preservation

Sample preservation and holding times are summarized for each matrix and analysis in Tables 4-2 and 4-3. All samples will be preserved by storage at between 0 and 6 degrees C.

4.6 Quality Control

The quality of data will be monitored and verified by maintaining logs, documenting field activities, and collecting and analyzing field and laboratory QC samples. Table 4-4 summarizes the field and laboratory QC samples, along with the required collection frequency, for each sample matrix. The required field QC samples will be matrix-specific.

4.6.1 Field Quality Control Samples

The field QC samples will be used to assess the accuracy and precision of the field sample collection and handling activities.

4.6.1.1 Equipment Blanks

Field equipment blanks will be used to assess the introduction of chemical contaminants during sampling and field processing activities. Field equipment blanks will consist of rinsate blanks collected by pouring anywhere from 3 to 6 liters of de-ionized water over or through decontaminated sampling equipment and collected in the appropriate sample containers (1-liter amber glass). Equipment surfaces exposed during actual sampling will be rinsed. These samples will be analyzed along with the field samples. No rinsate blanks will be collected from disposable field equipment. Field equipment rinsate blanks will be generated for all chemical parameter groups, with one equipment blank being collected for every 20 analytical samples and submitted for analysis to the laboratory for the same constituents targeted in that day's sampling.

The criterion for field rinsate blanks is that analyte concentrations must be below the method reporting limits. Consistent with USEPA (2017a,b) data validation guidelines, analytical results for investigative samples will be qualified if the analyte is detected in the rinsate blank.

4.6.1.2 Trip Blanks

Trip blanks are collected for volatile organic compound sample analysis to assess the contamination of samples during transport to the Property, during collection of the sample, and during transport to the laboratory. Trip blanks are prepared in the laboratory using analyte-free water. Trip blanks should be inspected for air bubbles by both the laboratory (before shipping) and the field team. Any vials containing visible air bubbles should be discarded. One trip blank is included for each sample cooler collected for analysis of volatile organic compounds (i.e., VOCs by USEPA Method 8260C) and shipped to the laboratory. The criterion for trip blanks is that target analyte concentrations must be below the method reporting limits. Consistent with USEPA (USEPA, 2017b) data validation guidelines, analytical results for investigative samples will be qualified if the target analyte is detected in the trip blank. Trip blanks are not anticipated to be analyzed for this investigation as VOCs are not being analyzed.

4.6.1.3 Field Duplicates

Field duplicates are additional samples collected at a sampling location from the bowl or container of field-composite material and then split into two unique samples to enable statistical analysis of the resulting data. Two sets of samples from a single source are prepared, labeled with unique sample numbers, and submitted to the laboratory. One field duplicate will be prepared for every 20 environmental samples collected.

4.6.2 Laboratory Quality Control Samples

Samples will be submitted to an ORELAP- or NELAP-accredited laboratory or laboratories. The laboratories will follow the SOPs that have been developed consistent with the method requirements of the analytical methods, indicated in Tables 4-2 and 4-3, and with test methods for evaluating solid waste: physical/chemical methods EPA 530/SW-846 (USEPA, 1986).

The laboratory QC samples will be used to assess the accuracy and precision of the field sample collection and handling activities. Laboratory QC samples will be analyzed at the required frequency described in Table 4-4, as applicable, based on analytical method and sample matrix.

4.6.2.1 Calibration Verification

The laboratory calibration ranges specified in SW-846 (USEPA, 1986) will be followed.

Preventive maintenance of laboratory equipment will be the responsibility of the laboratory personnel and analysts. This maintenance includes routine care and cleaning of instruments, as well as inspection and monitoring of carrier gases, solvents, and glassware used in analyses. The preventive-maintenance approach for specific equipment will follow the manufacturers' specifications and good laboratory practices.

4.6.2.2 Matrix Spike/Matrix Spike Duplicate

Matrix spike samples are analyzed to assess the matrix effects on the accuracy of analytical measurements. MS/MSD samples will be prepared by spiking known amounts of analytes to investigative samples before extraction and preparation and analysis. The recoveries for the MS/MSD samples will be used to assess the accuracy and precision in the analytical method by measuring how well the analytical method recovers the target compounds in the investigative matrices. For each matrix type, at least one set of MS/MSD samples will be analyzed for each batch of samples for every 20 (or fewer) samples received. The MS/MSD samples will be designated on the COC form.

The criteria for acceptable percent recovery and RPD for MS/MSD samples are presented in Table 3-1 and 3-2.

4.6.2.3 Surrogate Spikes

Surrogate spiking consists of adding reference compounds to samples before sample preparation for organic analysis. Surrogate compound spiking is used to assess method accuracy on a sample-specific basis. Surrogate compounds will be added to samples, in accordance with the analytical method requirements. Surrogate spike percent recovery acceptance limits are determined by the analytical method. The surrogate spike percent recovery results will be reported by the laboratory.

4.6.2.4 Method Blanks

Method blanks are prepared using analyte-free (reagent) water and are processed with the same methodology (e.g., extraction, digestion) as the associated investigative samples. Method blanks are used to document contamination resulting from the analytical process in the laboratory. A method blank shall be prepared and analyzed in every analytical batch.

The method blank results are used to verify that reagents and preparation do not impart unacceptable bias to the investigative sample results. The presence of analytes in the method blank sample will be evaluated against method-specific thresholds. If analytes are present in the method blank above the method-specific threshold, corrective action will be taken to eliminate the source of contamination before proceeding with analysis. Investigative samples of an analytical batch associated with method blank results outside of acceptance limits will be qualified as appropriate by the QAM.

4.6.2.5 Laboratory Control Samples

Laboratory control samples (LCSs) are prepared by spiking laboratory-certified, reagent-grade water with the analytes of interest or a certified reference material that is prepared and analyzed. The result for percent recovery of the LCS is a data quality indicator of the accuracy of the analytical method and laboratory performance. The criteria for acceptable percent recovery of LCSs are presented in Tables 3-1 and 3-2.

4.6.2.6 Laboratory Duplicate Samples

Laboratory duplicate samples (LDSs) are prepared by the laboratory by splitting an investigative sample into two separate aliquots and performing separate sample preparation and analysis on each aliquot. The results for RPD of the primary investigative sample and the respective LDS are used to measure precision in the analytical method and laboratory performance. For nonaqueous matrices, sample heterogeneity may affect the measured precision for the LDS. The criteria for acceptable RPD of LDSs are presented in Table 3-1 and 3-2.

4.7 Instrument and Equipment Testing, Inspection, and Maintenance

Instruments for field parameter measurements will follow the sample and analysis plan protocol and manufacturers' recommendations for testing, inspection, and maintenance. Field equipment used for obtaining samples will be decontaminated as required and stored in a clean and secure location.

Laboratory instruments and equipment will comply with the contracted laboratories' QA/QC procedures for testing, inspection, and maintenance. Laboratory instrument and equipment testing, inspection, and maintenance documentation will be provided to the QAM if requested.

Instruments for field parameter measurements will follow the Work Plan requirements and manufacturers' recommendations for calibration. Calibration will be conducted at the beginning of each sampling event. Calibration checks will be conducted at the beginning of each sampling day. Calibration may be conducted again during a sampling event, as necessary, based on the results of the calibration check. Calibration records will be recorded in the field logbooks.

4.8 Inspection and Acceptance of Supplies and Consumables

The supplies and consumables that will be used during field operations include, though are not limited to, the following: decontamination fluids, preservatives, reagent water for equipment blanks, equipment tubing, and filters. No materials will be used after the manufacturers' expiration dates. Only water certified by the manufacturer will be used to prepare equipment blanks. If contamination is visible in materials, the item will be discarded. Non-dedicated field equipment will be decontaminated prior to use in accordance with Section 4.9.

The analytical laboratory will inspect supplies and consumables before their use in analysis. The materials description in the analytical methods will be used as a guideline for establishing acceptance criteria. Purity of reagents will be evaluated through analysis of LCSs and method blank samples. The laboratory shall maintain an inventory of supplies and consumables. No materials will be used after the manufacturers' expiration dates.

4.9 Sample Equipment Decontamination

Sampling equipment and reusable materials that contact sample media will be decontaminated between uses. Decontamination will generally involve the following:

- Initial rinse with vessel river water to dislodge particles
- Nonphosphate detergent wash, consisting of a dilute measure of Liqui-Nox or other phosphate-free detergent
- Distilled water rinse

Additional rinses with methanol are not anticipated but may be considered based on sample conditions (e.g., excessive oily/tar residue).

4.10 Non-direct Measurements

Non-direct measurements are defined as existing data obtained from non-measurement sources, such as literature files or existing databases. To assess data usability, historical data will be reviewed for accordance with project-specific DQOs and QA/QC criteria.

4.11 Data Management

4.11.1 Field Logbooks and Forms

Field investigation personnel will be responsible for maintaining a daily record of significant events, observations, and measurements during field investigations. Field records may be recorded in a bound logbook or paper or electronic field data sheets. A separate entry will be made for each sample collected. Specific field recording procedures will be identified in the Work Plan as needed. Field logbooks and forms will be included in the project files at the end of field activities to provide a record of sampling.

4.11.2 Laboratory Data

The laboratory shall record the results of each analysis in a Laboratory Information Management System in accordance with the contracted laboratory's quality assurance plan. Data will be provided to MFA as electronic data deliverables (EDDs). EDDs will be imported directly into an EQuIS database used for data storage. Validated laboratory results will be exported and provided as part of the final report for each project.

5 DATA QUALITY ASSESSMENT

5.1 Assessment and Response Actions

Performance and/or systems audits of field and laboratory activities are not anticipated as part of this QAPP. If performance and/or systems audits of field and laboratory activities are performed, they will be conducted consistent with the methodology outlined in Section 5 of the Pre-RD Group QAPP (AECOM and Geosyntec, 2018).

6 DATA VALIDATION AND USABILITY

This section describes the stages of data quality assessment after data have been received. It addresses data reduction, review, verification, and validation. It also discusses the procedures for evaluating the usability of data with respect to the DQOs set forth in Section 4.

6.1 Data Reduction, Validation, and Reporting

The analytical laboratory will submit a four-tab-delimited EDD containing all reported results. EDDs will be incorporated into MFA's EQuIS database. Analytical data will also be made available in PDF format. The analytical data package will include laboratory QA and QC results to permit independent and conclusive determination of data quality. Only the compounds presented in Tables 3-1 and 3-2, and associated QA/QC compounds, will be reported by the analytical laboratory. Data quality will be determined by using the data evaluation procedures described in this section. The results of the data evaluation will be used to determine if the project DQOs are being met and will be presented in a data validation memorandum as an appendix to the final report.

6.2 Laboratory Data Evaluation

Initial data reduction, evaluation, and reporting at the analytical laboratory will be carried out as described in USEPA SW-846 (USEPA, 1986), as appropriate. Additional laboratory data qualifiers may be defined and reported to further explain the laboratory's QC concerns about a particular sample result. All additional data qualifiers will be defined in the laboratory narrative report associated with each case.

6.3 Data Deliverables

Standard (Tier II) laboratory data deliverables will include:

- Transmittal cover letter
- Case narrative
- Analytical results
- COC
- Surrogate, labeled analogue, and internal standard recoveries
- Method blank results
- LCS/LCSD results
- MS/MSD results
- Laboratory duplicate results
- EDD

Tier IV laboratory deliverable will be provided as requested. In addition to the Tier II deliverable list, these will include:

- Calibration and calibration verification records
- Chromatograms and raw instrument data
- Preparatory records

6.4 Data Quality Assurance and Quality Control Review

Laboratory data will be evaluated for precision, completeness, accuracy, representativeness, comparability, sensitivity, and compliance with the analytical method and with the laboratory accuracy and precision performance criteria listed on Tables 3-1 and 3-2. A Tier II (Stage 2AVM) validation will be conducted, as defined in the USEPA Guidance for Labeling Externally Validated Data (USEPA, 2009), on 90 percent of the data. A Tier IV (Stage 4VM) validation (USEPA 2009) will be conducted on the remaining 10 percent of the data. Data qualifiers will be assigned to the sample results following applicable sections of the USEPA procedures for data review (USEPA, 2014, 2016, 2017a, 2017b, or most recent).

Data qualifiers, as defined by the USEPA, are used to classify sample data according to their conformance to QC requirements. The most common qualifiers are listed below.

- J—Estimate, qualitatively correct but quantitatively suspect.
- R—Reject, data not suitable for any purpose.
- U—Not detected at a specified reporting limit.

Poor surrogate recovery, blank contamination, and calibration problems, among other issues, can cause the sample data to be qualified. Whenever sample data are qualified, the reasons for the qualification will be stated in the data evaluation report.

Any USEPA Method 1613B, 1668C (PCB Congeners), and 1699 (Organochlorine Pesticides) estimated maximum possible concentration (EMPC) qualifiers assigned by the laboratory will be reported, along with any validation assigned qualifiers, with the final data. EMPCs will be evaluated consistent with USEPA Region 10 PCDD/PCDF DV (USEPA 2014) guidelines and USEPA NFG use of regional guidance and/or professional judgment in evaluating these results.

QC criteria not defined in the guidelines for evaluating analytical data are adopted, where appropriate, from the analytical method.

The components of data evaluation will be performed by the entities noted in the following list:

- Data reduction will be performed by the analytical laboratory.
- Data verification will be performed both by the laboratory and by the data validator (i.e., MFA and AlterEcho).
- Data validation and usability determination will be performed by the data validator (i.e., MFA and AlterEcho).

The following information will be reviewed during data evaluation, as applicable:

- Sampling locations and blind sample numbers
- Sampling dates
- Requested analysis

- COC documentation
- Sample preservation
- Holding times
- Method blanks
- Surrogate and internal standard recoveries
- MS/MSD results
- Laboratory duplicates
- Field duplicates
- Field blanks
- LCS/LCSD results
- Method reporting limits above requested levels
- Laboratory qualifiers
- Any additional comments or difficulties reported by the laboratory
- Overall assessment

The Tier IV data evaluation will also review:

- Calibration and calibration verification records
- Chromatograms and raw instrument data
- Calculation of instrument and sample results
- Preparatory records

While data verification is a technical process in which the data's adherence to precision, accuracy, representativeness, completeness, comparability, and sensitivity is evaluated, it still does not answer the final question of the usability of the data and the implications of any departures from data expectations. The data validation process is designed to answer these questions through: (1) the assignment of data qualifiers based on the data verification results; and (2) a case-by-case review of data quality issues with respect to QAPP objectives to render a final assessment of data usability.

The final step of data evaluation entails a comparison of data quality performance with the QAPP-specific DQOs. Section 3.2 of this QAPP discusses the DQOs. Validation of the analytical data is the process of determining that the data support the DQOs. Validation is performed by the independent validator (i.e., AlterEcho) as well as MFA. The results of the data evaluation review will be summarized for the data package. Data qualifiers will be assigned to sample results on the basis of USEPA guidelines, as applicable.

6.5 Data Management and Reduction

MFA uses EQuIS to manage all laboratory data. The laboratory will provide the analytical results in electronic EQuIS-deliverable format. After data evaluation, data qualifiers will be entered into the EQuIS database.

Data may be reduced to summarize particular data sets and to aid interpretation of the results. Statistical analyses may also be applied to results. Data-reduction QC checks will be performed on all hand-entered data, any calculations, and any data graphically displayed. Data may be further reduced and managed using one or more of the following computer software applications:

- Microsoft Excel® (spreadsheet)
- EQuIS (database)
- AutoCad and/or ArcGIS (graphics)
- USEPA ProUCL (statistical software)

LIMITATIONS

The services undertaken in completing this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

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TABLES

Table 3-1
Sediment Analtyical Methods and Performance Criteria
Siltronic Corporation
Portland, Oregon

Analyte	Units	Method	PH ROD Table 17 Sediment CUL	MDL	PQL	MS/MSD Accuracy (Percent)	MS/MSD RPD (Percent)	LCS/LCSD Accuracy (Percent)	LCS/LCSD Precision (RPD)	Laboratory Duplicate Precision (RPD)	Completeness (RPD)
Conventionals											
Total solids	%	PSEP 1986	--	--	1.0	--	--	--	--	10	90
Total Organic Carbon	mg/kg	USEPA 9060	--	--	200	--	--	90-110	--	20	90
Grain Size											
Gravel	%	ASTM D422	--	--	0.01	--	--	--	--	--	90
Coarse Sand	%	ASTM D422	--	--	0.01	--	--	--	--	--	90
Medium Sand	%	ASTM D422	--	--	0.01	--	--	--	--	--	90
Fine Sand	%	ASTM D422	--	--	0.01	--	--	--	--	--	90
Silt	%	ASTM D422	--	--	0.01	--	--	--	--	--	90
Clay	%	ASTM D422	--	--	0.01	--	--	--	--	--	90
Metals											
Arsenic	mg/kg	USEPA 6020A	3	0.481	0.962	75-125	40	80-120	20	40	90
Barium	mg/kg	USEPA 6020A	--	0.481	0.962	75-125	40	80-120	20	40	90
Cadmium	mg/kg	USEPA 6020A	0.51	0.0962	0.192	75-125	40	80-120	20	40	90
Chromium	mg/kg	USEPA 6020A	--	0.481	0.962	75-125	40	80-120	20	40	90
Copper	mg/kg	USEPA 6020A	359	1.92	3.85	75-125	40	80-120	20	40	90
Lead	mg/kg	USEPA 6020A	196	0.0962	0.192	75-125	40	80-120	20	40	90
Mercury	mg/kg	USEPA 6020A	0.085	0.0385	0.0769	75-125	40	80-120	20	40	90
Selenium	mg/kg	USEPA 6020A	--	0.481	0.962	75-125	40	80-120	20	40	90
Silver	mg/kg	USEPA 6020A	--	0.0962	0.192	75-125	40	80-120	20	40	90
Zinc	mg/kg	USEPA 6020A	459	1.92	3.85	75-125	40	80-120	20	40	90
Cyanide											
Total Cyanide	mg/kg	ASTM D7511	--	0.05	0.1	64-136	47	84-116	20	20	90
Dioxins/Furans											
1,2,3,4,6,7,8-HpCDD	ng/kg	USEPA 1613B	--	0.14	5	70-130	20	70-140	20	--	90
1,2,3,4,6,7,8-HpCDF	ng/kg	USEPA 1613B	--	0.103	5	70-130	20	82-122	20	--	90
1,2,3,4,7,8,9-HpCDF	ng/kg	USEPA 1613B	--	0.155	5	70-130	20	78-138	20	--	90
1,2,3,4,7,8-HxCDD	ng/kg	USEPA 1613B	--	0.125	5	70-130	20	70-164	20	--	90
1,2,3,4,7,8-HxCDF	ng/kg	USEPA 1613B	0.4	0.171	5	70-130	20	72-134	20	--	90
1,2,3,6,7,8-HxCDD	ng/kg	USEPA 1613B	--	0.128	5	70-130	20	76-134	20	--	90
1,2,3,6,7,8-HxCDF	ng/kg	USEPA 1613B	--	0.176	5	70-130	20	84-130	20	--	90
1,2,3,7,8,9-HxCDD	ng/kg	USEPA 1613B	--	0.131	5	70-130	20	64-162	20	--	90
1,2,3,7,8,9-HxCDF	ng/kg	USEPA 1613B	--	0.24	5	70-130	20	78-130	20	--	90
1,2,3,7,8-PeCDD	ng/kg	USEPA 1613B	0.2	0.121	5	70-130	20	70-142	20	--	90
1,2,3,7,8-PeCDF	ng/kg	USEPA 1613B	--	0.095	5	70-130	20	80-134	20	--	90
2,3,4,6,7,8-HxCDF	ng/kg	USEPA 1613B	--	0.183	5	70-130	20	70-156	20	--	90
2,3,4,7,8-PeCDF	ng/kg	USEPA 1613B	0.3	0.0812	5	70-130	20	68-160	20	--	90
2,3,7,8-TCDD	ng/kg	USEPA 1613B	0.2	0.0884	1	70-130	20	67-158	20	--	90

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2,3,7,8-TCDF	ng/kg	USEPA 1613B	0.40658	0.094	1	70-130	20	75-158	20	--	90
OCDD	ng/kg	USEPA 1613B	--	0.183	10	70-130	20	78-144	20	--	90
OCDF	ng/kg	USEPA 1613B	--	0.179	10	70-130	20	63-170	20	--	90
PCB Congeners											
Total PCBs	ng/kg	USEPA 1668C/Calculation	9	--[a]	--[a]	50-150	35	60-135	30	--	90
Organochlorine Pesticides											
2,4'-DDD	ug/kg	USEPA 1699	--	0.006	0.05	50-150	25	50-150	25	25	90
2,4'-DDE	ug/kg	USEPA 1699	--	0.005	0.05	50-150	25	50-150	25	25	90
2,4'-DDT	ug/kg	USEPA 1699	--	0.006	0.05	50-150	25	50-150	25	25	90
4,4'-DDD	ug/kg	USEPA 1699	114	0.004	0.05	50-150	25	50-150	25	25	90
4,4'-DDE	ug/kg	USEPA 1699	226	0.004	0.05	50-150	25	50-150	25	25	90
4,4'-DDT	ug/kg	USEPA 1699	246	0.005	0.05	50-150	25	50-150	25	25	90
Total DDx	ug/kg	USEPA 1699/Calculation	6.1	--	--	--	--	--	--	--	90
Aldrin	ug/kg	USEPA 1699	2	0.013	0.05	50-150	25	50-150	25	25	90
alpha-BHC	ug/kg	USEPA 1699	--	0.004	0.05	50-150	25	50-150	25	25	90
alpha-Chlordane	ug/kg	USEPA 1699	--	0.003	0.05	50-150	25	50-150	25	25	90
beta-BHC	ug/kg	USEPA 1699	--	0.009	0.05	50-150	25	50-150	25	25	90
beta-Chlordane	ug/kg	USEPA 1699	--	0.003	0.05	50-150	25	50-150	25	25	90
Chlordane (Total)	ug/kg	USEPA 1699/Calculation	1.4	--	--	--	--	--	--	--	90
cis-Nonachlor	ug/kg	USEPA 1699	--	0.008	0.05	50-150	25	50-150	25	25	90
delta-BHC	ug/kg	USEPA 1699	--	0.006	0.05	50-150	25	50-150	25	25	90
Dieldrin	ug/kg	USEPA 1699	0.07	0.008	0.05	50-150	25	50-150	25	25	90
Endosulfan I	ug/kg	USEPA 1699	--	0.016	0.05	50-150	25	50-150	25	25	90
Endosulfan II (beta)	ug/kg	USEPA 1699	--	0.011	0.05	50-150	25	50-150	25	25	90
Endosulfan sulfate	ug/kg	USEPA 1699	--	0.014	0.05	50-150	25	50-150	25	25	90
Endrin	ug/kg	USEPA 1699	--	0.007	0.05	50-150	25	50-150	25	25	90
Endrin aldehyde	ug/kg	USEPA 1699	--	0.012	0.05	50-150	25	50-150	25	25	90
Endrin ketone	ug/kg	USEPA 1699	--	0.009	0.05	50-150	25	50-150	25	25	90
Heptachlor	ug/kg	USEPA 1699	--	0.008	0.05	50-150	25	50-150	25	25	90
Heptachlor epoxide	ug/kg	USEPA 1699	--	0.005	0.05	50-150	25	50-150	25	25	90
Hexachlorobenzene	ug/kg	USEPA 1699	--	0.011	0.05	50-150	25	50-150	25	25	90
Lindane	ug/kg	USEPA 1699	5	0.004	0.05	50-150	25	50-150	25	25	90
Methoxychlor	ug/kg	USEPA 1699	--	0.007	0.05	50-150	25	50-150	25	25	90
Mirex	ug/kg	USEPA 1699	--	0.005	0.05	50-150	25	50-150	25	25	90
Oxychlordane	ug/kg	USEPA 1699	--	0.012	0.05	50-150	25	50-150	25	25	90
trans-Nonachlor	ug/kg	USEPA 1699	--	0.005	0.05	50-150	25	50-150	25	25	90
Chlorinated Herbicides											

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2,4,5-T	ug/kg	USEPA 8151A	--	5.6	100	17-123	25	40-108	25	25	90
2,4-D	ug/kg	USEPA 8151A	--	6.9	100	21-126	25	53-130	25	25	90
2,4-DB	ug/kg	USEPA 8151A	--	17	100	13-133	25	28-119	25	25	90
Dalapon	ug/kg	USEPA 8151A	--	19	100	9.6-101	25	17-122	25	25	90
Dicamba	ug/kg	USEPA 8151A	--	9	100	11-107	25	48-107	25	25	90
Dichlorprop	ug/kg	USEPA 8151A	--	7.1	100	44-133	25	45-117	25	25	90
Dinoseb	ug/kg	USEPA 8151A	--	3.8	150	0.1-72	25	0.1-83	25	25	90
MCPA	ug/kg	USEPA 8151A	--	790	15000	23-123	25	33-107	25	25	90
MCPP (Mecoprop)	ug/kg	USEPA 8151A	--	680	15000	24-120	25	34-117	25	25	90
Silvex	ug/kg	USEPA 8151A	--	7.2	100	15-126	25	38-108	25	25	90
Organotins											
Tributyltin	ug/kg	Krone et al.	3080	1.5	3	34-142	50	33-147	20	25	90
PAHs											
2-Methylnaphthalene	ug/kg	USEPA 8270D	--	2.5	5	38-122	30	38-122	30	30	90
Acenaphthene	ug/kg	USEPA 8270D	--	1.25	2.5	40-122	30	40-122	30	30	90
Acenaphthylene	ug/kg	USEPA 8270D	--	1.25	2.5	32-132	30	32-132	30	30	90
Anthracene	ug/kg	USEPA 8270D	--	1.25	2.5	47-123	30	47-123	30	30	90
Benzo(a)anthracene	ug/kg	USEPA 8270D	--	1.25	2.5	49-126	30	49-126	30	30	90
Benzo(a)pyrene	ug/kg	USEPA 8270D	--	1.87	3.75	45-129	30	45-129	30	30	90
Benzo(b)fluoranthene	ug/kg	USEPA 8270D	--	1.87	3.75	45-132	30	45-132	30	30	90
Benzo(ghi)perylene	ug/kg	USEPA 8270D	--	1.25	2.5	43-134	30	43-134	30	30	90
Benzo(k)fluoranthene	ug/kg	USEPA 8270D	--	1.87	3.75	47-132	30	47-132	30	30	90
Chrysene	ug/kg	USEPA 8270D	--	1.25	2.5	50-124	30	50-124	30	30	90
Dibenzo(a,h)anthracene	ug/kg	USEPA 8270D	--	1.25	2.5	45-134	30	45-134	30	30	90
Fluoranthene	ug/kg	USEPA 8270D	--	1.25	2.5	50-127	30	50-127	30	30	90
Fluorene	ug/kg	USEPA 8270D	--	1.25	2.5	43-125	30	43-125	30	30	90
Indeno(1,2,3-cd)pyrene	ug/kg	USEPA 8270D	--	1.25	2.5	45-133	30	45-133	30	30	90
Naphthalene	ug/kg	USEPA 8270D	--	2.5	5	35-123	30	35-123	30	30	90
Phenanthrene	ug/kg	USEPA 8270D	--	1.25	2.5	50-121	30	50-121	30	30	90
Pyrene	ug/kg	USEPA 8270D	--	1.25	2.5	47-127	30	47-127	30	30	90
Total PAHs	ug/kg	USEPA 8270D/Calculation	23000[b]	--	--	--	--	--	--	--	90
cPAH TEQ	ug/kg	USEPA 8270D/Calculation	12/3950[b]	--	--	--	--	--	--	--	90
SVOCs											
1,2,4-Trichlorobenzene	ug/kg	USEPA 8270D	--	3.12	6.25	34-120	30	34-120	30	30	90
1,2-Dichlorobenzene	ug/kg	USEPA 8270D	--	3.12	6.25	33-120	30	33-120	30	30	90
1,2-Dinitrobenzene	ug/kg	USEPA 8270D	--	31.2	62.5	44-120	30	44-120	30	30	90

Table 3-1
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Siltronic Corporation
Portland, Oregon

Analyte	Units	Method	PH ROD Table 17 Sediment CUL	MDL	PQL	MS/MSD Accuracy (Percent)	MS/MSD RPD (Percent)	LCS/LCSD Accuracy (Percent)	LCS/LCSD Precision (RPD)	Laboratory Duplicate Precision (RPD)	Completeness (RPD)
1,3-Dichlorobenzene	ug/kg	USEPA 8270D	--	3.12	6.25	30-120	30	30-120	30	30	90
1,3-Dinitrobenzene	ug/kg	USEPA 8270D	--	31.2	62.5	42-127	30	42-127	30	30	90
1,4-Dichlorobenzene	ug/kg	USEPA 8270D	--	3.12	6.25	31-120	30	31-120	30	30	90
1,4-Dinitrobenzene	ug/kg	USEPA 8270D	--	31.2	62.5	37-132	30	37-132	30	30	90
1-Methylnaphthalene	ug/kg	USEPA 8270D	--	2.5	5	40-120	30	40-120	30	30	90
2,2'-oxybis(1-chloropropane)	ug/kg	USEPA 8270D	--	3.12	6.25	33-131	30	33-131	30	30	90
2,3,4,6-Tetrachlorophenol	ug/kg	USEPA 8270D	--	6.25	12.5	44-125	30	44-125	30	30	90
2,3,5,6-Tetrachlorophenol	ug/kg	USEPA 8270D	--	6.25	12.5	40-120	30	40-120	30	30	90
2,4,5-Trichlorophenol	ug/kg	USEPA 8270D	--	6.25	12.5	41-124	30	41-124	30	30	90
2,4,6-Trichlorophenol	ug/kg	USEPA 8270D	--	6.25	12.5	39-126	30	39-126	30	30	90
2,4-Dichlorophenol	ug/kg	USEPA 8270D	--	6.25	12.5	40-122	30	40-122	30	30	90
2,4-Dimethylphenol	ug/kg	USEPA 8270D	--	6.25	12.5	30-127	30	30-127	30	30	90
2,4-Dinitrophenol	ug/kg	USEPA 8270D	--	31.2	62.5	5-137	30	5-137	30	30	90
2,4-Dinitrotoluene	ug/kg	USEPA 8270D	--	12.5	25	48-126	30	48-126	30	30	90
2,6-Dinitrotoluene	ug/kg	USEPA 8270D	--	12.5	25	46-124	30	46-124	30	30	90
2-Chloronaphthalene	ug/kg	USEPA 8270D	--	1.25	2.5	41-120	30	41-120	30	30	90
2-Chlorophenol	ug/kg	USEPA 8270D	--	6.25	12.5	34-121	30	34-121	30	30	90
2-Methylphenol	ug/kg	USEPA 8270D	--	3.12	6.25	32-122	30	32-122	30	30	90
2-Nitroaniline	ug/kg	USEPA 8270D	--	25	50	44-127	30	44-127	30	30	90
2-Nitrophenol	ug/kg	USEPA 8270D	--	12.5	25	36-123	30	36-123	30	30	90
3- & 4-Methylphenol (m,p-Cresol)	ug/kg	USEPA 8270D	--	3.12	6.25	34-120	30	34-120	30	30	90
3,3-Dichlorobenzidine	ug/kg	USEPA 8270D	--	24.9	50.1	22-121	30	22-121	30	30	90
3-Nitroaniline	ug/kg	USEPA 8270D	--	25	50	33-120	30	33-120	30	30	90
4,6-Dinitro-2-methylphenol	ug/kg	USEPA 8270D	--	31.2	62.5	29-132	30	29-132	30	30	90
4-Bromophenylphenyl ether	ug/kg	USEPA 8270D	--	3.12	6.25	46-124	30	46-124	30	30	90
4-Chloro-3-methylphenol	ug/kg	USEPA 8270D	--	12.5	25	45-122	30	45-122	30	30	90
4-Chloroaniline	ug/kg	USEPA 8270D	--	3.12	6.25	16-120	30	16-120	30	30	90
4-Chlorophenylphenyl ether	ug/kg	USEPA 8270D	--	3.12	6.25	45-121	30	45-121	30	30	90
4-Nitroaniline	ug/kg	USEPA 8270D	--	25	50	35-120	30	35-120	30	30	90
4-Nitrophenol	ug/kg	USEPA 8270D	--	12.5	25	30-132	30	30-132	30	30	90
Aniline	ug/kg	USEPA 8270D	--	6.25	12.5	7-120	30	7-120	30	30	90
Azobenzene	ug/kg	USEPA 8270D	--	3.12	6.25	39-125	30	39-125	30	30	90
Benzoic acid	ug/kg	USEPA 8270D	--	157	312	5-140	30	5-140	30	30	90
Benzyl alcohol	ug/kg	USEPA 8270D	--	6.25	12.5	29-122	30	29-122	30	30	90
Bis(2-chloroethoxy)methane	ug/kg	USEPA 8270D	--	3.12	6.25	36-121	30	36-121	30	30	90
Bis(2-chloroethyl)ether	ug/kg	USEPA 8270D	--	3.12	6.25	31-120	30	31-120	30	30	90

Table 3-1
Sediment Analtyical Methods and Performance Criteria
Siltronic Corporation
Portland, Oregon

Analyte	Units	Method	PH ROD Table 17 Sediment CUL	MDL	PQL	MS/MSD Accuracy (Percent)	MS/MSD RPD (Percent)	LCS/LCSD Accuracy (Percent)	LCS/LCSD Precision (RPD)	Laboratory Duplicate Precision (RPD)	Completeness (RPD)
Bis(2-ethylhexyl)phthalate	ug/kg	USEPA 8270D	135	18.7	37.5	51-133	30	60-121	30	30	90
Butylbenzylphthalate	ug/kg	USEPA 8270D	--	12.5	25	48-132	30	48-132	30	30	90
Carbazole	ug/kg	USEPA 8270D	--	1.87	3.75	50-122	30	50-122	30	30	90
Di(2-ethylhexyl)adipate	ug/kg	USEPA 8270D	--	31.2	62.5	60-121	30	51-133	30	30	90
Dibenzofuran	ug/kg	USEPA 8270D	--	1.25	2.5	44-120	30	44-120	30	30	90
Diethyl phthalate	ug/kg	USEPA 8270D	--	12.5	25	50-124	30	50-124	30	30	90
Dimethyl phthalate	ug/kg	USEPA 8270D	--	12.5	25	48-124	30	48-124	30	30	90
Di-n-butyl phthalate	ug/kg	USEPA 8270D	--	12.5	25	51-128	30	51-128	30	30	90
Di-n-octyl phthalate	ug/kg	USEPA 8270D	--	12.5	25	44-140	30	44-140	30	30	90
Hexachlorobenzene	ug/kg	USEPA 8270D	--	1.25	2.5	44-122	30	44-122	30	30	90
Hexachlorobutadiene	ug/kg	USEPA 8270D	--	3.12	6.25	32-123	30	32-123	30	30	90
Hexachlorocyclopentadiene	ug/kg	USEPA 8270D	--	6.25	12.5	5-140	30	5-140	30	30	90
Hexachloroethane	ug/kg	USEPA 8270D	--	3.12	6.25	28-120	30	28-120	30	30	90
Isophorone	ug/kg	USEPA 8270D	--	3.12	6.25	30-122	30	30-122	30	30	90
Nitrobenzene	ug/kg	USEPA 8270D	--	12.5	25	34-122	30	34-122	30	30	90
N-Nitrosodimethylamine	ug/kg	USEPA 8270D	--	3.12	6.25	23-120	30	23-120	30	30	90
N-Nitrosodiphenylamine	ug/kg	USEPA 8270D	--	3.12	6.25	38-127	30	38-127	30	30	90
N-Nitrosodipropylamine	ug/kg	USEPA 8270D	--	3.12	6.25	36-120	30	36-120	30	30	90
Pentachlorophenol	ug/kg	USEPA 8270D	--	12.5	25	25-133	30	25-133	30	30	90
Phenol	ug/kg	USEPA 8270D	--	2.5	5	34-120	30	34-120	30	30	90
Pyridine	ug/kg	USEPA 8270D	--	6.25	12.5	5-120	30	5-120	30	30	90
PAH Homologs											
C1-Chrysenes/Benz(a)anthracenes	ug/kg	USEPA 8270D	--	--	12.5	--	--	--	--	30	90
C1-Fluoranthenes/Pyrenes	ug/kg	USEPA 8270D	--	--	12.5	--	--	--	--	30	90
C1-Fluorenes	ug/kg	USEPA 8270D	--	--	12.5	--	--	--	--	30	90
C1-Phenanthrenes/Anthracenes	ug/kg	USEPA 8270D	--	--	12.5	--	--	--	--	30	90
C2-Chrysenes/Benz(a)anthracenes	ug/kg	USEPA 8270D	--	--	12.5	--	--	--	--	30	90
C2-Fluorenes	ug/kg	USEPA 8270D	--	--	12.5	--	--	--	--	30	90
C2-Naphthalenes	ug/kg	USEPA 8270D	--	--	12.5	--	--	--	--	30	90
C2-Phenanthrenes/Anthracenes	ug/kg	USEPA 8270D	--	--	12.5	--	--	--	--	30	90
C3-Chrysenes/Benz(a)anthracenes	ug/kg	USEPA 8270D	--	--	12.5	--	--	--	--	30	90
C3-Fluorenes	ug/kg	USEPA 8270D	--	--	12.5	--	--	--	--	30	90
C3-Naphthalenes	ug/kg	USEPA 8270D	--	--	12.5	--	--	--	--	30	90
C3-Phenanthrenes/Anthracenes	ug/kg	USEPA 8270D	--	--	12.5	--	--	--	--	30	90
C4-Chrysenes/Benz(a)anthracenes	ug/kg	USEPA 8270D	--	--	25	--	--	--	--	30	90
C4-Naphthalenes	ug/kg	USEPA 8270D	--	--	12.5	--	--	--	--	30	90

Table 3-1
Sediment Analtyical Methods and Performance Criteria
Siltronic Corporation
Portland, Oregon

Analyte	Units	Method	PH ROD Table 17 Sediment CUL	MDL	PQL	MS/MSD Accuracy (Percent)	MS/MSD RPD (Percent)	LCS/LCSD Accuracy (Percent)	LCS/LCSD Precision (RPD)	Laboratory Duplicate Precision (RPD)	Completeness (RPD)
C4-Phenanthrenes/Anthracenes	ug/kg	USEPA 8270D	--	--	25	--	--	--	--	30	90
TPH											
Diesel Range Hydrocarbons	mg/kg	NWTPH-Dx	91	8.33	25	50-150	20	76-115	20	30	90
Lube Oil Range Hydrocarbons	mg/kg	NWTPH-Dx	--	16.7	50	--	--	--	--	30	90

NOTES:

Results reported by the laboratory on a dry-weight basis, and associated detection limits and/or quantitation limits are adjusted accordingly.

MS/MSD, LCS/LCSD and laboratory duplicate accuracy and/or precision criteria may be performance-based and updated by the laboratory.

% = percent.

-- = not applicable or no value available.

cPAHs = carcinogenic polycyclic aromatic hydrocarbons.

CUL = cleanup level.

LCS = laboratory control sample.

LCSD = laboratory control sample duplicate.

MDL = method detection limit.

mg/kg = milligrams per kilogram.

MS = matrix spike.

MSD = matrix spike duplicate.

ng/kg = nanograms per kilogram.

PAHs = polycyclic aromatic hydrocarbons.

PCB = polychlorinated biphenyls.

PH ROD = USEPA Portland Harbor Superfund Site Record of Decision (January 2017).

PQL = project quantitation limit.

RPD = relative percent difference.

SVOCs = semivolatile organic compounds.

TPH = total petroleum hydrocarbons.

ug/kg = micrograms per kilogram.

USEPA = U.S. Environmental Protection Agency.

[a] PCB congener results have sample-specific detection limits; typical detection limits range from 0.01 to 1.0 ng/kg and quantitation limits range from 10 to 40 ng/kg.

[b] The cleanup levels for PAHs are based on the Record of Decision and are currently being reviewed as part of the USEPA PAH Explanation of Significant Differences.

[b] PAH homolog batch precision is evaluated with USEPA Method 8270D SVOC LCS/LCSD.

Table 3-2
Aqueous Analtyical Methods and Performance Criteria
Siltronic Corporation
Portland, Oregon

Analyte	Units	Method	MDL	PQL	MS/MSD Accuracy (Percent)	MS/MSD RPD (Percent)	LCS/LCSD Accuracy (Percent)	LCS/LCSD Precision (RPD)	Laboratory Duplicate Precision (RPD)	Completeness (RPD)
Metals										
Arsenic	ug/L	USEPA 6020A	0.5	1	75-125	20	80-120	20	40	90
Barium	ug/L	USEPA 6020A	0.5	1	75-125	20	80-120	20	40	90
Cadmium	ug/L	USEPA 6020A	0.04	0.2	75-125	20	80-120	20	40	90
Chromium	ug/L	USEPA 6020A	0.5	1	75-125	20	80-120	20	40	90
Copper	ug/L	USEPA 6020A	0.5	1	75-125	20	80-120	20	40	90
Lead	ug/L	USEPA 6020A	0.1	0.2	75-125	20	80-120	20	40	90
Mercury	ug/L	USEPA 6020A	0.04	0.08	75-125	20	80-120	20	40	90
Selenium	ug/L	USEPA 6020A	0.5	1	75-125	20	80-120	20	40	90
Silver	ug/L	USEPA 6020A	0.1	0.2	75-125	20	80-120	20	40	90
Zinc	ug/L	USEPA 6020A	2	4	75-125	20	80-120	20	40	90
Cyanide										
Total Cyanide	ug/L	USEPA 335.4	5	5	90-110	10	90-110	10	10	90
Dioxins/Furans										
1,2,3,4,6,7,8-HpCDD	pg/L	USEPA 1613B	2.08	50	70-130	20	70-140	20	--	90
1,2,3,4,6,7,8-HpCDF	pg/L	USEPA 1613B	1.12	50	70-130	20	82-122	20	--	90
1,2,3,4,7,8,9-HpCDF	pg/L	USEPA 1613B	1.71	50	70-130	20	78-138	20	--	90
1,2,3,4,7,8-HxCDD	pg/L	USEPA 1613B	1.21	50	70-130	20	70-164	20	--	90
1,2,3,4,7,8-HxCDF	pg/L	USEPA 1613B	0.936	50	70-130	20	72-134	20	--	90
1,2,3,6,7,8-HxCDD	pg/L	USEPA 1613B	1.15	50	70-130	20	76-134	20	--	90
1,2,3,6,7,8-HxCDF	pg/L	USEPA 1613B	0.942	50	70-130	20	84-130	20	--	90
1,2,3,7,8,9-HxCDD	pg/L	USEPA 1613B	1.2	50	70-130	20	64-162	20	--	90
1,2,3,7,8,9-HxCDF	pg/L	USEPA 1613B	1.37	50	70-130	20	78-130	20	--	90
1,2,3,7,8-PeCDD	pg/L	USEPA 1613B	1.11	50	70-130	20	70-142	20	--	90
1,2,3,7,8-PeCDF	pg/L	USEPA 1613B	0.818	50	70-130	20	80-134	20	--	90
2,3,4,6,7,8-HxCDF	pg/L	USEPA 1613B	1.03	50	70-130	20	70-156	20	--	90
2,3,4,7,8-PeCDF	pg/L	USEPA 1613B	0.784	50	70-130	20	68-160	20	--	90
2,3,7,8-TCDD	pg/L	USEPA 1613B	1.31	10	70-130	20	67-158	20	--	90
2,3,7,8-TCDF	pg/L	USEPA 1613B	2.02	10	70-130	20	75-158	20	--	90
OCDD	pg/L	USEPA 1613B	2.28	100	70-130	20	78-144	20	--	90
OCDF	pg/L	USEPA 1613B	2.72	100	70-130	20	63-170	20	--	90
PCB Congeners										
Total PCBs	pg/L	USEPA 1668C/Calculation	--[a]	--[a]	50-150	35	60-135	30	--	90

Table 3-2
Aqueous Analtyical Methods and Performance Criteria
Siltronic Corporation
Portland, Oregon

Analyte	Units	Method	MDL	PQL	MS/MSD Accuracy (Percent)	MS/MSD RPD (Percent)	LCS/LCSD Accuracy (Percent)	LCS/LCSD Precision (RPD)	Laboratory Duplicate Precision (RPD)	Completeness (RPD)
Organochlorine Pesticides										
2,4'-DDD	ng/L	USEPA 1699	0.02	2	50-200	25	50-200	25	25	90
2,4'-DDE	ng/L	USEPA 1699	0.018	2	50-200	25	50-200	25	25	90
2,4'-DDT	ng/L	USEPA 1699	0.019	2	50-200	25	50-200	25	25	90
4,4'-DDD	ng/L	USEPA 1699	0.02	2	50-200	25	50-200	25	25	90
4,4'-DDE	ng/L	USEPA 1699	0.033	2	50-200	25	50-200	25	25	90
4,4'-DDT	ng/L	USEPA 1699	0.022	2	50-200	25	50-200	25	25	90
Total DDx	ng/L	USEPA 1699/Calculation	--	--	--	--	--	--	--	90
Aldrin	ng/L	USEPA 1699	0.028	2	50-200	25	50-200	25	25	90
alpha-BHC	ng/L	USEPA 1699	0.015	2	50-200	25	50-200	25	25	90
alpha-Chlordane	ng/L	USEPA 1699	0.019	2	50-200	25	50-200	25	25	90
beta-BHC	ng/L	USEPA 1699	0.029	2	50-200	25	50-200	25	25	90
beta-Chlordane	ng/L	USEPA 1699	0.018	2	50-200	25	50-200	25	25	90
Chlordane (Total)	ng/L	USEPA 1699/Calculation	--	--	--	--	--	--	--	90
cis-Nonachlor	ng/L	USEPA 1699	0.009	2	50-200	25	50-200	25	25	90
delta-BHC	ng/L	USEPA 1699	0.033	2	50-200	25	50-200	25	25	90
Dieldrin	ng/L	USEPA 1699	0.022	2	50-200	25	50-200	25	25	90
Endosulfan I	ng/L	USEPA 1699	0.041	2	50-200	25	50-200	25	25	90
Endosulfan II (beta)	ng/L	USEPA 1699	0.058	2	50-200	25	50-200	25	25	90
Endosulfan sulfate	ng/L	USEPA 1699	0.043	2	50-200	25	50-200	25	25	90
Endrin	ng/L	USEPA 1699	0.035	2	50-200	25	50-200	25	25	90
Endrin aldehyde	ng/L	USEPA 1699	0.051	2	50-200	25	50-200	25	25	90
Endrin ketone	ng/L	USEPA 1699	0.037	2	50-200	25	50-200	25	25	90
Heptachlor	ng/L	USEPA 1699	0.019	2	50-200	25	50-200	25	25	90
Heptachlor epoxide	ng/L	USEPA 1699	0.017	2	50-200	25	50-200	25	25	90
Hexachlorobenzene	ng/L	USEPA 1699	0.028	2	50-200	25	50-200	25	25	90
Lindane	ng/L	USEPA 1699	0.016	2	50-200	25	50-200	25	25	90
Methoxychlor	ng/L	USEPA 1699	0.025	2	50-200	25	50-200	25	25	90
Mirex	ng/L	USEPA 1699	0.026	2	50-200	25	50-200	25	25	90
Oxychlordane	ng/L	USEPA 1699	0.028	2	50-200	25	50-200	25	25	90
trans-Nonachlor	ng/L	USEPA 1699	0.008	2	50-200	25	50-200	25	25	90
Chlorinated Herbicides										

Table 3-2
Aqueous Analtyical Methods and Performance Criteria
Siltronic Corporation
Portland, Oregon

Analyte	Units	Method	MDL	PQL	MS/MSD Accuracy (Percent)	MS/MSD RPD (Percent)	LCS/LCSD Accuracy (Percent)	LCS/LCSD Precision (RPD)	Laboratory Duplicate Precision (RPD)	Completeness (RPD)
2,4,5-T	ug/L	USEPA 8151A	0.13	0.25	15-159	25	39-151	25	25	90
2,4-D	ug/L	USEPA 8151A	0.21	0.5	17-180	25	56-164	25	25	90
2,4-DB	ug/L	USEPA 8151A	1.3	2.5	0.1-201	25	27-161	25	25	90
Dalapon	ug/L	USEPA 8151A	0.15	0.5	14-172	25	40-139	25	25	90
Dicamba	ug/L	USEPA 8151A	0.4	0.75	44-134	25	46-140	25	25	90
Dichlorprop	ug/L	USEPA 8151A	0.49	1	36-161	25	43-158	25	25	90
Dinoseb	ug/L	USEPA 8151A	0.19	0.5	53-146	25	42-146	25	25	90
MCPA	ug/L	USEPA 8151A	45	100	13-179	25	28-144	25	25	90
MCPP (Mecoprop)	ug/L	USEPA 8151A	63	100	30-154	25	31-153	25	25	90
Silvex	ug/L	USEPA 8151A	0.11	0.25	39-142	25	46-142	25	25	90
Organotins										
Tributyltin	ug/L	Krone et al.	0.0014	0.003	37-127	26	50-120	20	25	90
PAHs										
2-Methylnaphthalene	ug/L	USEPA 8270D	0.02	0.04	40-121	30	40-121	30	30	90
Acenaphthene	ug/L	USEPA 8270D	0.01	0.02	47-122	30	47-122	30	30	90
Acenaphthylene	ug/L	USEPA 8270D	0.01	0.02	41-130	30	41-130	30	30	90
Anthracene	ug/L	USEPA 8270D	0.01	0.02	57-123	30	57-123	30	30	90
Benzo(a)anthracene	ug/L	USEPA 8270D	0.01	0.02	58-125	30	58-125	30	30	90
Benzo(a)pyrene	ug/L	USEPA 8270D	0.015	0.03	54-128	30	54-128	30	30	90
Benzo(b)fluoranthene	ug/L	USEPA 8270D	0.015	0.03	53-131	30	53-131	30	30	90
Benzo(ghi)perylene	ug/L	USEPA 8270D	0.01	0.02	50-134	30	50-134	30	30	90
Benzo(k)fluoranthene	ug/L	USEPA 8270D	0.015	0.03	57-129	30	57-129	30	30	90
Chrysene	ug/L	USEPA 8270D	0.01	0.02	59-123	30	59-123	30	30	90
Dibenzo(a,h)anthracene	ug/L	USEPA 8270D	0.01	0.02	51-134	30	51-134	30	30	90
Fluoranthene	ug/L	USEPA 8270D	0.01	0.02	57-128	30	57-128	30	30	90
Fluorene	ug/L	USEPA 8270D	0.01	0.02	52-124	30	52-124	30	30	90
Indeno(1,2,3-cd)pyrene	ug/L	USEPA 8270D	0.01	0.02	52-133	30	52-133	30	30	90
Naphthalene	ug/L	USEPA 8270D	0.02	0.04	40-121	30	40-121	30	30	90
Phenanthrene	ug/L	USEPA 8270D	0.01	0.02	59-120	30	59-120	30	30	90
Pyrene	ug/L	USEPA 8270D	0.01	0.02	57-126	30	57-126	30	30	90
Total PAHs	ug/L	USEPA 8270D/Calculation	--	--	--	--	--	--	--	90

Table 3-2
Aqueous Analtyical Methods and Performance Criteria
Siltronic Corporation
Portland, Oregon

Analyte	Units	Method	MDL	PQL	MS/MSD Accuracy (Percent)	MS/MSD RPD (Percent)	LCS/LCSD Accuracy (Percent)	LCS/LCSD Precision (RPD)	Laboratory Duplicate Precision (RPD)	Completeness (RPD)
cPAH TEQ	ug/L	USEPA 8270D/Calculation	--	--	--	--	--	--	--	90
SVOCs										
1,2,4-Trichlorobenzene	ug/L	USEPA 8270D	0.025	0.05	29-120	30	29-120	30	30	90
1,2-Dichlorobenzene	ug/L	USEPA 8270D	0.025	0.05	32-120	30	32-120	30	30	90
1,2-Dinitrobenzene	ug/L	USEPA 8270D	0.25	0.5	59-120	30	59-120	30	30	90
1,3-Dichlorobenzene	ug/L	USEPA 8270D	0.025	0.05	28-120	30	28-120	30	30	90
1,3-Dinitrobenzene	ug/L	USEPA 8270D	0.25	0.5	49-128	30	49-128	30	30	90
1,4-Dichlorobenzene	ug/L	USEPA 8270D	0.025	0.05	29-120	30	29-120	30	30	90
1,4-Dinitrobenzene	ug/L	USEPA 8270D	0.25	0.5	40-120	30	40-120	30	30	90
1-Methylnaphthalene	ug/L	USEPA 8270D	0.02	0.04	41-120	30	41-120	30	30	90
2,2'-oxybis(1-chloropropane)	ug/L	USEPA 8270D	0.025	0.05	37-130	30	37-130	30	30	90
2,3,4,6-Tetrachlorophenol	ug/L	USEPA 8270D	0.05	0.1	50-128	30	50-128	30	30	90
2,3,5,6-Tetrachlorophenol	ug/L	USEPA 8270D	0.05	0.1	50-121	30	50-121	30	30	90
2,4,5-Trichlorophenol	ug/L	USEPA 8270D	0.05	0.1	53-123	30	53-123	30	30	90
2,4,6-Trichlorophenol	ug/L	USEPA 8270D	0.05	0.1	50-125	30	50-125	30	30	90
2,4-Dichlorophenol	ug/L	USEPA 8270D	0.05	0.1	47-121	30	47-121	30	30	90
2,4-Dimethylphenol	ug/L	USEPA 8270D	0.05	0.1	31-124	30	31-124	30	30	90
2,4-Dinitrophenol	ug/L	USEPA 8270D	0.25	0.5	23-143	30	23-143	30	30	90
2,4-Dinitrotoluene	ug/L	USEPA 8270D	0.1	0.2	57-128	30	57-128	30	30	90
2,6-Dinitrotoluene	ug/L	USEPA 8270D	0.1	0.2	57-124	30	57-124	30	30	90
2-Chloronaphthalene	ug/L	USEPA 8270D	0.01	0.02	40-120	30	40-120	30	30	90
2-Chlorophenol	ug/L	USEPA 8270D	0.05	0.1	38-120	30	38-120	30	30	90
2-Methylphenol	ug/L	USEPA 8270D	0.025	0.05	30-120	30	30-120	30	30	90
2-Nitroaniline	ug/L	USEPA 8270D	0.2	0.4	54-127	30	54-127	30	30	90
2-Nitrophenol	ug/L	USEPA 8270D	0.1	0.2	47-123	30	47-123	30	30	90
3- & 4-Methylphenol (m,p-Cresol)	ug/L	USEPA 8270D	0.025	0.05	29-120	30	29-120	30	30	90
3,3-Dichlorobenzidine	ug/L	USEPA 8270D	0.5	1	27-129	30	27-129	30	30	90
3-Nitroaniline	ug/L	USEPA 8270D	0.2	0.4	41-128	30	41-128	30	30	90
4,6-Dinitro-2-methylphenol	ug/L	USEPA 8270D	0.25	0.5	44-137	30	44-137	30	30	90
4-Bromophenylphenyl ether	ug/L	USEPA 8270D	0.025	0.05	54-124	30	54-124	30	30	90
4-Chloro-3-methylphenol	ug/L	USEPA 8270D	0.1	0.2	52-120	30	52-120	30	30	90

Table 3-2
Aqueous Analtyical Methods and Performance Criteria
Siltronic Corporation
Portland, Oregon

Analyte	Units	Method	MDL	PQL	MS/MSD Accuracy (Percent)	MS/MSD RPD (Percent)	LCS/LCSD Accuracy (Percent)	LCS/LCSD Precision (RPD)	Laboratory Duplicate Precision (RPD)	Completeness (RPD)
4-Chloroaniline	ug/L	USEPA 8270D	0.025	0.05	33-120	30	33-120	30	30	90
4-Chlorophenylphenyl ether	ug/L	USEPA 8270D	0.025	0.05	53-121	30	53-121	30	30	90
4-Nitroaniline	ug/L	USEPA 8270D	0.2	0.4	35-120	30	35-120	30	30	90
4-Nitrophenol	ug/L	USEPA 8270D	0.1	0.2	5-120	30	5-120	30	30	90
Aniline	ug/L	USEPA 8270D	0.05	0.1	6-120	30	6-120	30	30	90
Azobenzene	ug/L	USEPA 8270D	0.025	0.05	61-120	30	61-120	30	30	90
Benzoic acid	ug/L	USEPA 8270D	1.25	2.5	5-120	30	5-120	30	30	90
Benzyl alcohol	ug/L	USEPA 8270D	0.1	0.2	31-120	30	31-120	30	30	90
Bis(2-chloroethoxy)methane	ug/L	USEPA 8270D	0.025	0.05	48-120	30	48-120	30	30	90
Bis(2-chloroethyl)ether	ug/L	USEPA 8270D	0.025	0.05	43-120	30	43-120	30	30	90
Bis(2-ethylhexyl)phthalate	ug/L	USEPA 8270D	0.25	0.5	55-135	30	40-125	30	30	90
Butylbenzylphthalate	ug/L	USEPA 8270D	0.2	0.4	53-134	30	53-134	30	30	90
Carbazole	ug/L	USEPA 8270D	0.015	0.03	60-122	30	60-122	30	30	90
Di(2-ethylhexyl)adipate	ug/L	USEPA 8270D	0.2	0.4	40-125	30	55-135	30	30	90
Dibenzofuran	ug/L	USEPA 8270D	0.01	0.02	53-120	30	53-120	30	30	90
Diethyl phthalate	ug/L	USEPA 8270D	0.2	0.4	55-125	30	55-125	30	30	90
Dimethyl phthalate	ug/L	USEPA 8270D	0.2	0.4	45-127	30	45-127	30	30	90
Di-n-butyl phthalate	ug/L	USEPA 8270D	0.2	0.4	59-127	30	59-127	30	30	90
Di-n-octyl phthalate	ug/L	USEPA 8270D	0.2	0.4	50-140	30	51-140	30	30	90
Hexachlorobenzene	ug/L	USEPA 8270D	0.01	0.02	52-125	30	52-125	30	30	90
Hexachlorobutadiene	ug/L	USEPA 8270D	0.025	0.05	22-124	30	22-124	30	30	90
Hexachlorocyclopentadiene	ug/L	USEPA 8270D	0.05	0.1	5-127	30	5-127	30	30	90
Hexachloroethane	ug/L	USEPA 8270D	0.025	0.05	21-120	30	21-120	30	30	90
Isophorone	ug/L	USEPA 8270D	0.025	0.05	42-124	30	42-124	30	30	90
Nitrobenzene	ug/L	USEPA 8270D	0.1	0.2	45-121	30	45-121	30	30	90
N-Nitrosodimethylamine	ug/L	USEPA 8270D	0.025	0.05	6-120	30	6-120	30	30	90
N-Nitrosodiphenylamine	ug/L	USEPA 8270D	0.025	0.05	49-120	30	51-123	30	30	90
N-Nitrosodipropylamine	ug/L	USEPA 8270D	0.025	0.05	51-123	30	49-120	30	30	90
Pentachlorophenol	ug/L	USEPA 8270D	0.1	0.2	35-138	30	35-138	30	30	90
Phenol	ug/L	USEPA 8270D	0.2	0.4	5-120	30	5-120	30	30	90
Pyridine	ug/L	USEPA 8270D	0.1	0.2	5-120	30	5-120	30	30	90

Table 3-2
Aqueous Analtyical Methods and Performance Criteria
Siltronic Corporation
Portland, Oregon

Analyte	Units	Method	MDL	PQL	MS/MSD Accuracy (Percent)	MS/MSD RPD (Percent)	LCS/LCSD Accuracy (Percent)	LCS/LCSD Precision (RPD)	Laboratory Duplicate Precision (RPD)	Completeness (RPD)
PAH Homologs										
C1-Chrysenes/Benz(a)anthracenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C1-Fluoranthenes/Pyrenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C1-Fluorenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C1-Phenanthrenes/Anthracenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C2-Chrysenes/Benz(a)anthracenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C2-Fluorenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C2-Naphthalenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C2-Phenanthrenes/Anthracenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C3-Chrysenes/Benz(a)anthracenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C3-Fluorenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C3-Naphthalenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C3-Phenanthrenes/Anthracenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C4-Chrysenes/Benz(a)anthracenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C4-Naphthalenes	ug/L	USEPA 8270D	--	0.1	--	--	--	--[b]	30	90
C4-Phenanthrenes/Anthracenes	ug/L	USEPA 8270D	--	0.2	--	--	--	--[b]	30	90
TPH										
Diesel Range Hydrocarbons	ug/L	NWTPH-Dx	100	200	50-150	50	58-115	20	30	90
Lube Oil Range Hydrocarbons	ug/L	NWTPH-Dx	200	400	--	--	--	--	30	90

NOTES:

Results reported by the laboratory on a dry-weight basis, and associated detection limits and/or quantitation limits are adjusted accordingly.

MS/MSD, LCS/LCSD and laboratory duplicate accuracy and/or precision criteria may be performance-based and updated by the laboratory.

-- = not applicable or no value available.

cPAHs = carcinogenic polycyclic aromatic hydrocarbons.

LCS = laboratory control sample.

LCSD = laboratory control sample duplicate.

MDL = method detection limit.

MS = matrix spike.

MSD = matrix spike duplicate.

Table 3-2
Aqueous Analtyical Methods and Performance Criteria
Siltronic Corporation
Portland, Oregon

Analyte	Units	Method	MDL	PQL	MS/MSD Accuracy (Percent)	MS/MSD RPD (Percent)	LCS/LCSD Accuracy (Percent)	LCS/LCSD Precision (RPD)	Laboratory Duplicate Precision (RPD)	Completeness (RPD)

ng/L = nanograms per liter.

PAHs = polycyclic aromatic hydrocarbons.

PCB = polychlorinated biphenyls.

pg/L = picograms per liter.

PQL = project quantitation limit.

RPD = relative percent difference.

SVOCs = semivolatile organic compounds.

TPH = total petroleum hydrocarbons.

ug/L = micrograms per liter.

USEPA = U.S. Environmental Protection Agency.

[a] PCB congener results have sample-specific detection limits; typical detection limits range from 0.822 to 4.33 pg/L and quantitation limits range from 111 to 667 pg/L.

[b] PAH homolog batch precision is evaluated with USEPA Method 8270D SVOC LCS/LCSD.

Table 4-1
Investigation-Derived Waste Analyses
Siltronic Corporation
Portland, Oregon

Analysis	Method
Ignitability	SW1010
Corrosivity	SW9045D/SW9010C
TCLP Metals[a]	USEPA 1311/6020A
TCLP Mercury	USEPA 1311/7470A
TCLP VOCs[b]	USEPA 1311/8260D
TCLP Organochlorine Pesticides[c]	USEPA 1311/8081B
TCLP SVOCs	USEPA 1311/8270D or 8270E
TCLP Chlorinated Herbicides	USEPA 1311/8151A
Dioxins/Furans	USEPA 1613B or 8290A
Tributyltin	Krone et. al
Diesel- and Residual-Range Hydrocarbons	NWTPH-Dx
PCB Aroclors	USEPA 8082
Total Cyanide	SW9012B/USEPA 335.4
Percent Moisture	ASTM D2216

NOTES:

NWTPH = northwest total petroleum hydrocarbon.

PCB = polychlorinated biphenyl.

SVOC = semivolatile organic compound.

USEPA = U.S. Environmental Protection Agency.

[a] Metals include arsenic, barium, cadmium, chromium, copper, nickel, lead, mercury, selenium, and silver.

tetrachloroethene, trichloroethene, and vinyl chloride.

[c] Includes total Chlordane and total Toxaphene.

Table 4-2
Sediment Containers, Preservatives, and Holding Times
Siltronic Corporation
Portland, Oregon

Analysis	Method	Container[a]	Preservative	Holding Time (0-6 °C)	Holding Time (-18 °C)
Organochlorine Pesticides	USEPA 1699	8 oz glass	Cold Storage	14 days	1 year
PCB Congeners	USEPA 1668C	8 oz amber glass	Cold Storage	1 year	1 year
Dioxins/Furans	USEPA 1613B		Cold Storage	1 year	1 year
Chlorinated Herbicides	USEPA 8151A	8 oz glass	Cold Storage	14 days	1 year
Tributyltin	Krone et. al		Cold Storage	14 days	6 months
SVOCs	USEPA 8270D	16 oz glass	Cold Storage	14 days	1 year
Alkylated PAH Homologs	USEPA 8270D modified		Cold Storage	14 days	1 year
Metals, including mercury	USEPA 6020A		Cold Storage	6 months/28 days[b]	2 years/28 days[b]
Total Cyanide	ASTM D7511		Cold Storage	14 days	6 months
Diesel- and Residual-Range Hydrocarbons	NWTPH-Dx		Cold Storage	14 days	1 year
Total Solids	PSEP 1986		Cold Storage	14 days	6 months
Total Organic Carbon	USEPA 9060A		Cold Storage	28 days	6 months
Grain Size	ASTM D422 or PSEP	16 oz glass	NA	6 months	Do not freeze

Table 4-2
Sediment Containers, Preservatives, and Holding Times
Siltronic Corporation
Portland, Oregon

NOTES:

ASTM = American Society for Testing and Materials.

°C = degrees Celsius.

NA = not applicable.

NWTPH = northwest total petroleum hydrocarbon.

oz = ounces.

PAH = polycyclic aromatic hydrocarbon.

PCB = polychlorinated biphenyl.

PSEP = Puget Sound Estuary Program.

SVOC = semivolatile organic compound.

USEPA = US Environmental Protection Agency.

[a] Additional containers may be required for sediment samples with high moisture content. Fill containers no more than 90% to allow for expansion during freezing.

[b] Holding time for mercury is 28 days. Holding time of remaining USEPA Method 6020B metals is 6 months at 0-6 °C and 2 years at -18°C.

Table 4-3
Aqueous Containers, Preservatives, and Holding Times
Siltronic Corporation
Portland, Oregon

Analysis	Method	Container[a]	Container Size	Preservative	Holding Time (0-6 °C)
Organochlorine Pesticides	USEPA 1699	Amber Glass	1 Liter	None	7 days
PCB Congeners	USEPA 1668C	Amber Glass	1 Liter	None	1 year
Dioxins/Furans	USEPA 1613B	Amber Glass	1 Liter	None	1 year
Chlorinated Herbicides	USEPA 8151A	Amber Glass	1 Liter	None	7 days
Tributyltin	Krone et. al	Amber Glass	1 Liter	None	7 days
SVOCs	USEPA 8270D	Amber Glass	1 Liter	None	7 days
Alkylated PAH Homologs	USEPA 8270D modified				7 days
Metals, including mercury	USEPA 6020A	Polyethylene	250 mL	HNO_3 pH <2	6 months/28 days[a]
Total Cyanide	USEPA 335.4	Polyethylene	125 mL	NaOH pH >12	14 days
Diesel- and Residual-Range Hydrocarbons	NWTPH-Dx	Amber Glass	1 Liter	HCl pH <2	14 days

Table 4-3
Aqueous Containers, Preservatives, and Holding Times
Siltronic Corporation
Portland, Oregon

NOTES:

°C = degrees Celsius.

HCl = hydrochloric acid.

HNO_3 = nitric acid.

mL = milliliter.

NWTPH = northwest total petroleum hydrocarbon.

PAH = polycyclic aromatic hydrocarbon.

PCB = polychlorinated biphenyl.

SVOC = semivolatile organic compound.

[a] Holding time for mercury is 28 days. Holding time of remaining USEPA Method 6020B metals is 6 months at 0-6 °C.

Table 4-4
Quality Control Sample Requirement Summary
Siltronic Corporation
Portland, Oregon

Quality Control Check Sample	Sample Matrix		Frequency
	Sediment	Aqueous	
Equipment Rinsate Blanks	No	Yes	One per every twenty samples (or fewer) per equipment
Field Duplicate Samples	Yes	No	One per every twenty samples (or fewer) per sample matrix
Temperature Blank	Yes	Yes	One per sample cooler
Matrix Spike/Matrix Spike Duplicate	Yes	Yes	Each analytical batch of samples for every 20 (or fewer) samples received
Surrogate Spiking	Yes	Yes	Added to all project and QC samples (for organic analyses only)
Method Blanks	Yes	Yes	Each analytical batch of samples for every 20 (or fewer) samples received
Laboratory Control Sample	Yes	Yes	Each analytical batch of samples for every 20 (or fewer) samples received
Laboratory Duplicate Sample	Yes	Yes	Each analytical batch of samples for every 20 (or fewer) samples received

APPENDIX B

HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

SILTRONIC CORPORATION
PORTLAND, OREGON

Prepared for
SILTRONIC CORPORATION
PORTLAND, OREGON
May 30, 2019
Project No. 8128.02.05

Prepared by
Maul Foster & Alongi, Inc.
2001 NW 19th Avenue, Suite 200, Portland OR 97209

MAUL
FOSTER
ALONGI

HEALTH AND SAFETY PLAN

SILTRONIC CORPORATION
PORTLAND, OREGON

The material and data in this plan were prepared under the supervision and direction of the undersigned.

MAUL FOSTER & ALONGI, INC.

Phil Wiescher, PhD
Senior Environmental Scientist

Courtney Savoie

Courtney Savoie, RG
Project Geologist

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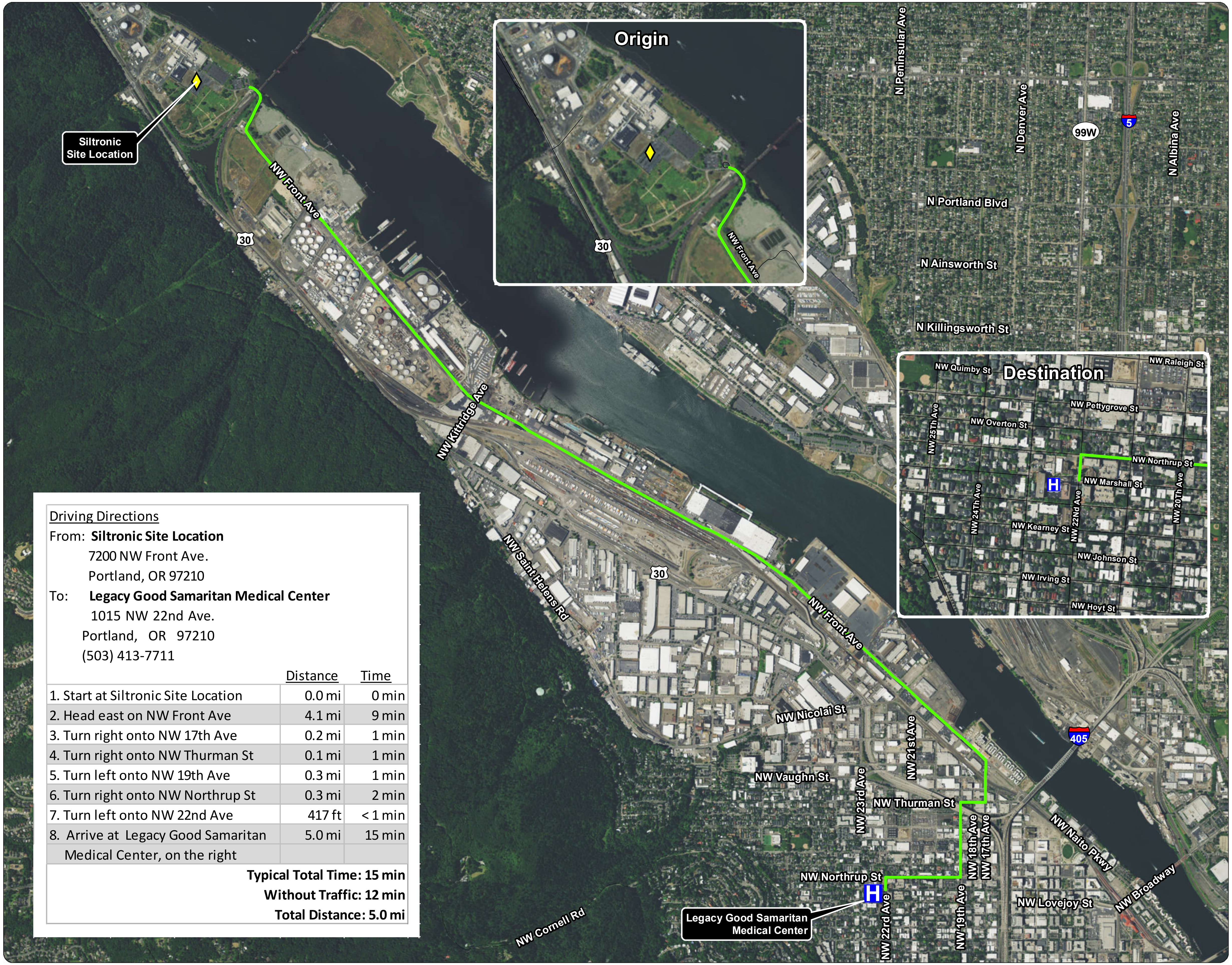
Approved By: K. Gallagher
Produced By: abrasch
Project: 8128.01.22-05

Figure
Hospital Access Route

Siltronic Corporation
Portland, Oregon



__Driving Directions__

From: **Siltronic Site Location**
7200 NW Front Ave.
Portland, OR 97210

To: **Legacy Good Samaritan Medical Center**
1015 NW 22nd Ave.
Portland, OR 97210
(503) 413-7711

	Distance	Time
1. Start at Siltronic Site Location	0.0 mi	0 min
2. Head east on NW Front Ave	4.1 mi	9 min
3. Turn right onto NW 17th Ave	0.2 mi	1 min
4. Turn right onto NW Thurman St	0.1 mi	1 min
5. Turn left onto NW 19th Ave	0.3 mi	1 min
6. Turn right onto NW Northrup St	0.3 mi	2 min
7. Turn left onto NW 22nd Ave	417 ft	< 1 min
8. Arrive at Legacy Good Samaritan Medical Center, on the right	5.0 mi	15 min

Typical Total Time: 15 min
Without Traffic: 12 min
Total Distance: 5.0 mi

Legend

◆	Site Location
H	Legacy Good Samaritan Medical Center
—	Hospital Access Route

0 1,000 2,000
Feet

Sources: Basemap obtained from Esri ArcGIS Online; Legacy Good Samaritan Medical Center location obtained from Google Maps.

MAUL FOSTER ALONGI
p. 971 544 2139 | www.maulfoster.com

1 NEAREST HOSPITAL/EMERGENCY MEDICAL CENTER

1.1 Nearest Hospital

Legacy Good Samaritan Hospital & Medical Center

1015 NW 22nd Avenue, Portland, Oregon 97210

Phone: (503) 413-7711

Distance: 5.0 miles

Travel Time: approximately 12 minutes without traffic

1.2 Route to Hospital from Site

See figure on first page of this document.

1.2.1 Driving Directions to Hospital from Site

1. Head east on Northwest Front Avenue (4.1 miles).
2. Turn right onto Northwest 17th Avenue (0.2 miles).
3. Continue on Northwest Thurman Street (0.1 miles).
4. Turn left on Northwest 19th Street (0.3 miles).
5. Bear right onto Northwest Northrup Street (0.3 miles).
6. Turn left onto Northwest 22nd Avenue (417 feet).
7. Arrive at Legacy Good Samaritan Hospital and Medical Center.

1.3 Emergency Phone Numbers

Siltronic maintains its own Emergency Response Team (ERT). The ERT is available 24 hours, seven days a week and is trained to respond to various types of emergencies, including, but not limited to, medical emergencies, spill response, and natural disasters. Should an emergency arise, Maul Foster & Alongi, Inc. (MFA) employees working at the Site (7200 NW Front Avenue, Portland, Oregon) are asked to contact the ERT instead of dialing 911. If necessary, the ERT team can contact 911 and guide them to the appropriate location at the Site. A radio capable of contacting the ERT can be obtained at the FAB-2 security desk when signing in at the start of a shift. The ERT team can also be reached by dialing 611 from any on-site landline or by dialing (503) 219-4300 from a mobile phone.

Ambulance, Police, Fire	**Dial 911**
Siltronic **Emergency Response Team**	Phone: **(503) 219-4300** From a Plant Phone: **611** Radio: **Channel 1**
Ted Wall Principal in Charge	Phone: **(503) 501-5210** Cell: **(503) 939-4849**
Michael Murray Project Manager	Phone: **(971) 713-3579** Cell: **(503) 310-0435**
Phil Wiescher Project Manager	Phone: **(360) 594-6267** Cell: **(503) 407-1036**
Courtney Savoie Field Personnel	Phone: **(503) 501-5220** Cell: **(503) 358-5950**
Emily Curtis Health and Safety Coordinator	Phone: **(503) 501-5233** Cell: **(503) 410-1524**
Bill Beadie Principal Industrial Hygienist	Phone: **(360) 947-2200** Cell: **(503) 740-6847**
Myron Burr **Siltronic—Primary Site Contact**	Phone: **(503) 219-7832** Cell: **(503) 807-9512** Blackberry: **(503) 807-9512**

2 PLAN SUMMARY

This health and safety plan (HASP) was developed to describe the procedures and practices necessary for protecting the health and safety of MFA employees conducting activities consistent with the sediment sampling work plan (Work Plan), to which this HASP is an appendix. For purposes of this HASP, the Site describes the study area in the Work Plan. Other employers, including contractors and subcontractors, are expected to develop and implement their own HASPs to manage the health and safety of their personnel.

MFA personnel conducting activities at the Site are responsible for understanding and adhering to this HASP. Before fieldwork begins, a site safety officer (SSO) who is familiar with health and safety procedures and with the Site will be designated by the on-site personnel. Safety deficiencies should be immediately communicated to the SSO and, if necessary, to MFA's health and safety coordinator (HSC).

All contractors and subcontractors have the primary responsibility for the safety of their own personnel on the Site. All personnel on the Site have "stop work" authority if they observe conditions that they believe create an imminent danger.

If MFA employees work on the Site for more than a year, this HASP will be reviewed at least annually. The plan will be updated as necessary to ensure that it reflects the known hazards, conditions, and requirements associated with the Site.

MFA personnel who will be working on the Site are required to read and understand this HASP. MFA personnel entering the work area must sign the Personnel Acknowledgment Sheet (Section 16), certifying that they have read and that they understand this HASP and agree to abide by it.

3 KEY PROJECT PERSONNEL

Name	Responsibility
Ted Wall	Project Director
Michael Murray	Project Manager
Phil Wiescher	Project Manager
Courtney Savoie	Lead Field Personnel
Bill Beadie	Principal Industrial Hygienist
Emily Curtis	Health and Safety Coordinator

4 SITE DESCRIPTION AND BACKGROUND

4.1 Type of Site

The Site is located within the Portland Harbor Superfund Site. Current operations within the Portland Harbor include bulk fuel storage, barge building, ship repair, automobile scrapping, recycling, steel manufacturing, cement manufacturing, transformer reconditioning, operation and repair of electrical transformers (including electrical substations), and many smaller industrial operations.

4.2 Building/Structures

No significant water features are present in the area proposed in the investigation. The railroad bridge is present at approximately river mile 6.9.

4.3 Topography

Not applicable–the Site is located in the water, off of the shoreline.

4.4 General Geologic/Hydrologic Setting

The Site is located along the Willamette River between river miles 6.5 and 6.9.

4.5 Site Status

The Site is located in the Portland Harbor Superfund Site. Contaminants and/or chemicals of interest associated with properties adjacent to the Site include:

- Manufactured gas plant waste, such as semi-volatile organic compounds that include naphthalene and benzo(a)pyrene
- Petroleum hydrocarbons
- Chlorinated volatile organic compounds
- Benzene, toluene, ethylbenzene, and total xylenes
- Metals, such as lead and arsenic
- Cyanide
- Pesticides and herbicides
- Dioxins/furans
- Polychlorinated biphenyls

4.6 General Site History

In 1978, Siltronic purchased the land adjacent to the Site for the purpose of silicon wafer manufacturing and continues to operate today.

5 HAZARD EVALUATION

5.1 Site Tasks and Operations

MFA has completed job hazard analyses (JHAs) for specific tasks that likely could be completed on the Site, depending on the scope of work. These tasks are provided in Appendix A. The following list generally summarizes planned tasks and operations:

- General work near heavy equipment
- Collecting sediment samples
- Working over water from boats and/or docks

The control measures that field personnel must use to eliminate or minimize these hazards, such as air monitoring, personal protective equipment (PPE), and decontamination procedures, are detailed in the JHAs and in subsequent sections of this plan.

5.2 Chemical Hazard Evaluation

Chemicals of potential concern (COPCs) on the Site are summarized in Appendix B. Action levels and associated controls are specified in Appendix C.

5.3 Physical Hazards

The specific physical hazards and associated controls for work on the Site are described in Appendix A, JHAs.

6 HEALTH AND SAFETY TRAINING

MFA personnel working on site and who could be exposed to COPCs will have completed training consistent with the Hazardous Waste Operations and Emergency Response requirements in 29 Code of Federal Regulations (CFR) 1910.120(e). The training will include:

- Identity of site safety and health personnel
- Safety and health hazards identified on the Site
- Proper use of required PPE
- Safe work practices required on the Site, e.g., fall protection, confined space entry procedures, hot work permits, general safety rules
- Safe use of engineering controls and equipment on the Site
- Medical surveillance requirements, including the recognition of signs and symptoms that might indicate overexposure to hazards
- The site emergency response plan/spill containment plan

The HSC will oversee training for site personnel. Training records, including an outline, sign-offs, and competency records, will be maintained by the HSC.

7 SAFETY EQUIPMENT

7.1 Personal Protective Equipment

PPE must be worn by individuals on the Site to protect against physical hazards. PPE required on the Site is modified Level D, which consists of:

- United States Coast Guard–approved personal floatation device, such as a life jacket
- Type 1 hard hat
- High-visibility vest
- Work boots
- Safety glasses with side shields
- Nitrile gloves or equivalent when handling known or potentially impacted media
- Hearing protection (during high-noise tasks)
- Work gloves (if handling materials that that might have sharp edges, protrusions, or splinters)

Additional PPE may be necessary for specific tasks with additional hazards. The SSO will be responsible for designating additional PPE for specific tasks. Depending on the activity, additional PPE may include:

- Chemical-resistant clothing, e.g., Tyvek® coveralls
- Chemical-resistant boots
- Chemical-resistant goggles
- Chemical-resistant gloves
- Faceshield
- Respiratory protection

Additional PPE may be required if workers discover unexpected contamination. Characteristics of unexpected contamination could include unusual odors, discolored media, a visible sheen, etc. The SSO and, if necessary, the HSC will be contacted as soon as possible after the discovery of unexpected contamination, and the SSO and/or the HSC will determine the need for additional controls and/or training.

PPE used at the Site must meet the requirements of recognized consensus standards (e.g., American National Standards Institute, National Institute for Occupational Safety and Health [NIOSH]), and respiratory protection shall comply with the requirements set forth in 29 CFR 1910.134.

Project personnel are not permitted to reduce the level of specified PPE without approval from the SSO or the HSC.

7.2 Safety Equipment

The SSO will be responsible for ensuring that the following safety equipment is available on site and is properly inspected and maintained:

- Soap and water for decontamination
- Caution tape, traffic cones, and/or barriers

- First-aid kit
- Fire extinguisher
- Fluids for hydration, e.g., drinking water or sports drink

7.3 Air Monitoring Equipment

The following air monitoring equipment will be available to identify site conditions that may require additional controls:

- Photoionization detection (PID) instrument

See Appendix C for specified action levels and follow-up actions.

7.4 Communications Equipment

MFA personnel should have a mobile phone or a radio available in case of emergency.

8 DECONTAMINATION PROCEDURES

8.1 Partial Decontamination Procedure

MFA employees will implement the following partial decontamination procedures when exiting the sampling vessel but remaining on the Site:

- Wash and rinse boots and outer gloves (if worn) in containers in the contamination-reduction zone.
- Inspect Tyvek® suit (if worn) for stains, rips, or tears. If suit is contaminated and is to be used again, full decontamination will be performed as described in Section 8.2. If the suit is damaged, it should not be reused.
- Remove outer gloves (if worn). Inspect and discard in a container labeled for disposable items if ripped or damaged.
- Remove respirator, if worn, and clean with premoistened alcohol wipes. Discard used cartridges at the frequency dictated by the SSO.
- Wash hands and face with soap and water.

8.2 Full Decontamination Procedures

MFA employees will follow the full decontamination procedures listed below when exiting the exclusion zone and leaving the Site, e.g., at the end of the work shift.

- Wash and rinse boots and outer gloves (if worn) in containers in the contamination-reduction zone.
- Remove outer gloves and Tyvek® suit (if worn) and deposit in a container labeled for disposable items.
- Remove respirator (if worn) and discard used cartridges at the frequency dictated by the SSO.
- Wash and rinse respirator (if worn) in a "respirators only" decontamination container.
- Remove work boots and put on street shoes. Place work boots in a plastic bag or container for later reuse.
- Remove inner gloves and deposit in a container labeled for disposable items.
- Wash hands and face with soap and water.
- Shower as soon after the work shift as practicable.

9 MEDICAL SURVEILLANCE

MFA will ensure that its employees who meet the following criteria are enrolled in a medical surveillance program consistent with 29 CFR 1910.120(f):

- The employees are, or may be, exposed to hazardous substances or health hazards at or above established permissible exposure limits for 30 or more days per year.
- The employees are required to wear a respirator for 30 or more days per year.

MFA employees who exhibit signs or symptoms consistent with overexposure to site contaminants will be offered medical surveillance consistent with Oregon Administrative Rule 1910.120(f)(iii).

MFA will ensure that its employees who are authorized to wear respirators are medically evaluated consistent with the respiratory protection standard (29 CFR 1910.134). The HSC or administrative designee (e.g., human resources manager) will maintain medical evaluation records.

10 AIR MONITORING

Based on site conditions, air monitoring is not anticipated; however, air monitoring equipment will be available in case workers encounter conditions that indicate the presence of unexpected contamination, such as unusual odors, discolored media, or a visible sheen. If such conditions are discovered, workers will exit the area and contact the SSO and, as needed, the HSC. If necessary, MFA will use the air monitoring equipment to evaluate the conditions and determine if additional controls and/or training are required. Action levels and follow-up actions are provided in Appendix C.

Air monitoring, if conducted, must be performed by individuals familiar with the calibration, use, and care of the required instruments. Measurements shall be documented, and the records should include the following information:

- The name of the person conducting the measurements
- The identity of workers, if any, who have exposure indicated by measurement result
- Information about the instrument, e.g., type, make, model, serial number
- The location of the measurement
- The measurement date and start/stop time
- Conditions represented by the measurement, including applicable activities, work practices, weather conditions, site conditions, and controls in place
- Measurement results
- Other relevant observations or notes

10.1 Air Monitoring Action Levels

If air monitoring is conducted, the results will be compared to the action levels provided in Appendix C. The air monitoring action levels are established to comply with Occupational Safety and Health Administration Permissible Exposure Levels, American Conference of Governmental Industrial Hygienists threshold limit values, and NIOSH recommendations for the chemicals that may be encountered on the Site. The action levels are also adjusted for the relative response of common PID instruments to motor-fuel vapors.

10.2 Explosion Hazard Action Levels

MFA employees working on site will take measurements when working near known or suspected sources of explosive gases or vapors. The instrument alarm should be set to sound at 10 percent of the lower explosive limit. When measurements exceed this level, MFA employees on site will:

1. Extinguish ignition sources and shut down powered equipment in the work area.
2. Move personnel at least 100 feet away from the work area.
3. Contact the SSO and the HSC.
4. At the instruction of the HSC and after waiting 15 minutes for explosive gases to dissipate, the SSO may use the combustible gas meter to approach the worksite to measure combustible gases in the work area. The SSO shall not enter (or allow any personnel to enter) any area where the combustible gas meter readings exceed the explosivity action level, nor shall the SSO approach if there is a potential for fire or explosion.

5. The SSO may authorize personnel to reenter the work area after the source of the combustible gases has been identified and controlled.

10.3 Instrument Calibrations

Instruments shall be calibrated consistent with manufacturers' recommendations. Calibrations shall be coordinated by the SSO. Calibration and monitoring records shall be maintained by the SSO and/or the project manager.

11 SITE CONTROL MEASURES

Access to the Site will be controlled as part of the site preparation. Control measures may include fencing, gates, and signs limiting access to everyone except authorized personnel.

MFA requires the "buddy system" if personnel conduct operations that may involve exposure to site hazards. The buddy system may involve working with non-MFA personnel.

12 EMERGENCY RESPONSE / SPILL CONTAINMENT / CONFINED SPACE

MFA employees on site will follow the emergency response, spill response, and confined space procedures described in the MFA Health and Safety Manual. Incidents will be documented on the incident report form included with Appendix D.

13 PRE-ENTRY BRIEFING

MFA employees on site will conduct pre-entry briefings, e.g., tailgate meetings, before starting work on the Site and/or as the scope of work changes throughout the project to ensure that employees are familiar with the HASP and that the plan is being followed. Attendance and discussion topics will be documented on sign-in sheets, which will be maintained by the SSO. A tailgate safety meeting checklist is provided in Appendix E.

14 PERIODIC EVALUATION

The project manager or designee will evaluate the effectiveness of this HASP. As part of the evaluation, the project manager or designee will track ongoing health and safety feedback from field personnel working on the project. This feedback will be reviewed and incorporated into either immediate or annual updates of the HASP. HASPs will be reviewed and updated at least annually. Updating the plan as necessary ensures that it reflects the known hazards, conditions, and requirements associated with the Site. MFA will maintain periodic evaluation records and will track all HASP revisions.

15 SAFE WORK PRACTICES

The following safe work practices are provided to supplement the other information included with this HASP:

1. Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in areas with potentially contaminated materials.
2. Field personnel will, whenever practicable, remain upwind of drilling rigs, open excavations, and other site-disturbing activities.
3. Subsurface work shall not be performed at any location until the area has been confirmed by a utility-locator firm to be free of underground utilities or other obstructions.

16 ACKNOWLEDGMENT

MFA cannot guarantee the health or safety of any person entering the Site. Because of the potentially hazardous nature of visits to active sites, it is not possible to discover, evaluate, and provide protection against all possible hazards that may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but not eliminate, the potential for injury and illness at the Site. The health and safety guidelines in this plan were prepared specifically for the Site and should not be used on any other site without prior evaluation by trained health and safety personnel.

MFA personnel who will work at the Site are to read, understand, and agree to comply with the specific practices and guidelines described in this HASP regarding field safety and health hazards.

This HASP has been developed for the exclusive use of MFA personnel. MFA may make this plan available for review by contracted or subcontracted personnel for information only. This plan does not cover the activities performed by employees of any other employer on the Site. All contracted or subcontracted personnel are responsible for implementing their own health and safety program, including generating and using their own plan.

I have read and I understand this HASP and all attachments, and agree to comply with the requirements described herein:

Name	Title	Date

APPENDIX A

JOB HAZARD ANALYSES

Job Hazard Analysis (JHA)

Task/Operation: Sediment Sampling

Project Number:
8128.02.05

Location/Site where Task/Operation Performed:
Willamette River Mile 6.5 to 6.9
Siltronic Property, Portland, Oregon

Date Prepared:
4/19/19

Employee Preparing this JHA:
Carolyn Wise

Date Reviewed:
5/17/19

Employee Reviewing and Certifying this JHA:
Phil Wiescher

Job/Task Description

Employees will conduct work such as sediment sampling from a boat.

Physical Hazards

Physical Hazard/Risk	**Source of Hazard/Risk**	**Hazard/Risk Mitigation**
Eye injury	Construction debris (e.g., soil) coming into contact with eyes.	Wear eye protection with side shields.
Injuries caused by improper lifting	Equipment, core sampler, sample coolers.	Use proper bending/lifting techniques by bending and lifting with legs and not with back. Do not twist at the waist when turning the core sampler. Use buddy system for heavy objects.
Accidents with equipment/tools	Sample collection equipment/tools.	Verify you have the appropriate equipment/tools for tasks. Use equipment/tools only as intended by the manufacturer. Stow all tools in vehicle properly; use appropriate cases and bags. Secure equipment in boat with netting or straps—do not leave loose.

Biological/Chemical Hazards

Biological/Chemical Risk	**Source of Hazard/Risk**	**Hazard/Risk Mitigation**
Chemical	Personnel performing tasks may come into direct contact with contaminated materials in the soil.	If necessary, see Chemical Hazards Summary Table for applicable chemical hazards.

Additional Control Measures and Guidance

Engineering Controls: No engineering controls specified.

General Safe-Work Practices and Guidance:

- Triple-rinse sampling equipment using distilled or deionized water and alconox for first rinse, and distilled water for second and third rinses.
- Always clean materials between locations at the site to avoid cross-contamination.
- Do not take equipment from the site without first properly decontaminating said equipment.
- Sampling in boat—see JHA for working over water from boats.

Personal Protective Equipment: Hard hat, work boots, high-visibility vest, United States Coast Guard–approved personal floatation device such as a life jacket, safety glasses with side shields, nitrile gloves, and hearing protection if sampling using a drill-rig or around heavy equipment.

Job Hazard Analysis (JHA)

Task/Operation: Working Near Heavy Equipment

Project Number: 8128.02.05	**Location/Site Where Task/Operation Performed:** Willamette River Mile 6.5 to 6.9 Siltronic Property, Portland, Oregon
Date Prepared: 4/19/19	**Employee Preparing this JHA:** Carolyn Wise
Date Reviewed: 5/17/19	**Employee Reviewing and Certifying this JHA:** Phil Wiescher

Job/Task Description

Employees will conduct work, such as sediment sampling, using a Vibracore sampler. This will require working in close proximity to physical hazards associated with the drilling equipment.

Physical Hazards

Hazard/Risk	**Source of Hazard/Risk**	**Hazard/Risk Mitigation**
Heat/cold/sunburn	Weather.	Wear sunscreen on exposed skin. Stop work and move to a shaded area to drink water if there are symptoms of heat stress. During cold conditions, wear adequate clothing to reduce the potential for hypothermia.
Bodily harm or death	Heavy equipment operating on site creates a potential for site workers to be struck, crushed, or impacted by moving parts.	Stay a safe distance from equipment and maintain eye contact with equipment operators. Wear a safety vest for enhanced visibility.
Eye injury	Construction debris (e.g., soil) coming into contact with eyes.	Wear eye protection with side shields.
Head injury	Heavy equipment and/or tools impacting the head.	Wear a hard hat.
Penetration of feet	Sharp objects that could be stepped on; large objects falling on feet.	Wear steel-toe boots with steel shank.
Hearing loss	Noise generated by heavy equipment/machinery.	Wear hearing protection such as ear plugs or ear muffs.
Hand injury	Pinch points.	Wear protective gloves whenever possible. Avoid placing hands near operating equipment.

Biological and Chemical Hazards

Hazard/Risk	**Source of Hazard/Risk**	**Hazard/Risk Mitigation**
Site contaminants	Field personnel will be performing tasks that may cause them to come into direct contact with contaminated materials in sediment.	Always handle materials with nitrile gloves. If necessary, see Chemical Hazards Summary Table for applicable chemical hazards.

Additional Control Measures and Guidance

Engineering Controls: No engineering controls specified.

Task/Operation: Working Near Heavy Equipment
General Safe-Work Practices and Guidance: Personnel should stay upwind and out of the impact area of the heavy equipment, if feasible. Work conducted in the impact area must be coordinated with the equipment operator using pre-established methods of communication, such as direct eye contact, hand signals, and/or verbal communication.
Personal Protective Equipment: Hard hat, steel-toe work boots, high-visibility safety vest or outer garment, United States Coast Guard–approved personal floatation device such as a life jacket, safety glasses with side shields, nitrile gloves, and hearing protection, i.e., ear plugs or ear muffs.

Job Hazard Analysis (JHA)

Task/Operation: Working over Water from Boats and Docks

Project Number: 8128.02.05	**Location/Site where Task/Operation Performed:** Willamette River Mile 6.5 to 6.9 Siltronic Property, Portland, Oregon

Date Prepared: 4/19/19	**Employee Preparing this JHA:** Carolyn Wise
Date Reviewed: 5/17/19	**Employee Reviewing and Certifying this JHA:** Phil Wiescher

Job/Task Description

Employees will conduct work such as sediment sampling from a boat. This will require occasional work in close proximity to water.

Physical Hazards

Hazard/Risk	Source of Hazard/Risk	Hazard/Risk Mitigation
Drowning	Entering body of water where work is being conducted.	Wear a personal floatation device.

Biological and Chemical Hazards

Hazard/Risk	Source of Hazard/Risk	Hazard/Risk Mitigation
None	None specific to this JHA. Chemical hazards related to the site are described in the Chemical Hazards Summary Table.	None.

Additional Control Measures and Guidance

Engineering Controls: No engineering controls specified.

General Safe-Work Practices and Guidance: Personnel should stay upwind and out of the impact area of the heavy equipment, if feasible. Work conducted in the impact area must be coordinated with the equipment operator using pre-established methods of communication, such as direct eye contact, hand signals, and/or verbal communication.

Personal Protective Equipment: United States Coast Guard–approved personal floatation device such as a life jacket.

APPENDIX B

CHEMICALS OF POTENTIAL CONCERN

Table
Chemical Hazards
Siltronic Corporation
Portland, Oregon

	OSHA PEL (TWA)	ACGIH TLV (TWA)	NIOSH IDLH[a]	LEL (%)	IP (eV)	Other Hazard
TPH						
Diesel-Range Organics (TPH-D)	NA	100 mg/m^3	NA	NA	NA	E, F, P
PAHs						
Anthracene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3	0.6	NA	F, P
Acenaphthene	NE	NE	NE	0.6	NA	F, P
Acenaphthylene	NE	NE	NE	NA	NA	F, P
Benzo(a)anthracene	NE	NE	NE	NA	NA	C, P
Benzo(a)pyrene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3	NA	NA	C, P
Benzo(b)fluoranthene	NE	NE	NE	NA	NA	C, P
Benzo(g,h,i)perylene	NE	NE	NE	NA	NA	P
Benzo(k)fluoranthene	NE	NE	NE	NA	NA	C, P
Chrysene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3	NA	7.59	C, P
Dibenz(a,h)anthracene	NE	NE	NE	NA	NA	C, P
Fluoranthene	NE	NE	NE	NA	NA	SC, P
Fluorene	NE	NE	NE	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NE	NE	NE	NA	NA	SC
Naphthalene	10 ppm	10 ppm	250 ppm	0.9	8.12	SC, E, F, P
Phenanthrene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3	NA	NA	NA
Pyrene	0.2 mg/m^3	0.2 mg/m^3	80 mg/m^3	NA	NA	P
1-Methylnaphthalene	NE	0.5 ppm	NE	NA	NA	SC, E, F, P
2-Methylnaphthalene	NE	0.5 ppm	NE	NA	NA	SC, E, F, P
Remaining PAH constituents	NA	NA	NA	NA	NA	NA
Metals						
Arsenic	0.01 mg/m^3	0.01 mg/m^3	5 mg/m^3	NA	NA	C, P
Barium	0.5 mg/m^3	0.5 mg/m^3	NE	NA	NA	R, P
Beryllium	0.002 mg/m^3	0.025 mg/m^3	4 mg/m^3	NA	NA	C
Cadmium	0.0050 mg/m^3	0.002 mg/m^3	9 mg/m^3	NA	NA	C
Chromium	1 mg/m^3	0.5 mg/m^3	250 mg/m^3	NA	NA	R, P
Chromium (VI)	0.001 mg/m^3	0.05 mg/m^3	15 mg/m^3	NA	NA	R, C
Copper	1 mg/m^3	0.2 mg/m^3	100 mg/m^3	NA	NA	NA
Lead	0.05 mg/m^3	0.05 mg/m^3	100 mg/m^3	NA	NA	C, P
Manganese	5 mg/m^3	0.02 mg/m^3	500 mg/m^3	NA	NA	NA
Mercury	0.1 mg/m^3 (Ce)	0.01 mg/m^3	2 mg/m^3	NA	NA	R, P
Nickel	0.1 mg/m^3	0.1 mg/m^3	10 mg/m^3	NA	NA	C
Selenium	0.2 mg/m^3	0.2 mg/m^3	1 mg/m^3	NA	NA	R, P
Silver	0.01 mg/m^3	0.1 mg/m^3	10 mg/m^3	NA	NA	R, P
Zinc	10 mg/m^3	2 mg/m^3	500 mg/m^3	NA	NA	NA
Additional						
Cyanide	5 mg/m^3	NE	25 mg/m^3	NA	NA	NA
Methane	NE	NE	NE	5	None	F, P

Table
Chemical Hazards
Siltronic Corporation
Portland, Oregon

NOTES:
ACGIH = American Conference of Governmental Industrial Hygienists®.
C = carcinogen.
Ce = ceiling concentration.
E = explosive.
F = flammable.
IDLH = immediately dangerous to life and health.
IP (eV) = ionization potential.
LEL = lower explosive limit.
mg/m^3 = milligrams per cubic meter.
NA = not available.
NE = not established.
NIOSH = National Institute for Occupational Safety and Health.
OSHA = Occupational Safety and Health Administration.
P = poison.
PAH = polycyclic aromatic hydrocarbon.
PEL = permissible exposure level.
ppm = parts per million.
R = reactive.
SC = suspected carcinogen.
TLV = threshold limit value.
TPH = total petroleum hydrocarbon.
TWA = time-weighted average.
[a]IDLH values taken from http://www.cdc.gov/niosh/idlh/intridl4.html.

APPENDIX C

AIR MONITORING ACTION LEVELS

Air Monitoring Procedures and Toxicity Action Levels

Instrument	Action Level	Initial Action	Follow-up Action
PID[a]	Detection of 10 ppm (above ambient) in breathing zone.	Upgrade to Level C and continue to monitor breathing zone. **If 50 or more ppm, leave exclusion zone**. Return only if levels decrease to below 50 ppm.	Ventilate area; always work upwind.

NOTES:

HASP = health and safety plan.

PID = photoionization detector.

ppm = parts per million.

[a] Some PIDs do not work in high (e.g., greater than 90 percent) humidity or rainy weather. Under these atmospheric conditions, only PIDs certified for use in high humidity should be used.

APPENDIX D

INCIDENT REPORT FORM

MAUL FOSTER & ALONGI, INC.
HEALTH & SAFETY INCIDENT REPORT

THIS REPORT MUST BE COMPLETED IN FULL AND SUBMITTED WITHIN 24 HOURS TO THE MFA HEALTH AND SAFETY COORDINATOR

Project Name: ______________________________

Project Number: ______________________________

Date of Incident: ______________________________

Time of Incident: ______________________________

Location: ______________________________

Type of Incident (Check all applicable items)

- ☐ **Illness**
- ☐ **Injury**
- ☐ **Property Damage**
- ☐ **Health & Safety Infraction**
- ☐ **Fire, Explosion, Flash**
- ☐ **Unexpected Exposure**
- ☐ **Vehicular Accident**
- ☐ **Electric Shock**
- ☐ **Near Miss**
- ☐ **Other (describe):** ______________________________

DESCRIPTION OF INCIDENT

(Describe what happened and the possible cause of the incident. Identify individual(s) involved, witnesses, and their affiliations. Describe emergency or corrective action taken. Attach additional sheets, drawings, or photographs as needed.)

INCIDENT REPORTER

______________________	______________________	______________________
PRINT NAME	SIGNATURE	DATE

Site Safety Officer must deliver this report to the Health & Safety Coordinator within 24 hours. Reviewed by:

______________________	______________________	______________________
PRINT NAME MFA Health & Safety Coordinator	SIGNATURE MFA Health & Safety Coordinator	DATE

APPENDIX E

TAILGATE SAFETY MEETING CHECKLIST

Tailgate Safety Meeting Checklist

MAUL FOSTER ALONGI

Client Name:	
Project No.:	
Communicated By:	
Date:	

Yes	**NA**	**Information Reviewed**
☐	☐	Emergency Procedures and Site Evacuation Routes
☐	☐	Route to Hospital
☐	☐	HASP Review and Location
☐	☐	Key Project Personnel
☐	☐	Emergency Phone Numbers
☐	☐	Stop-Work Authority
☐	☐	General Site Description/History and Chemical Hazards
☐	☐	For Active Sites—Site Activities and Vehicular/Equipment Traffic
☐	☐	Site-Specific Physical Hazards
☐	☐	Required Personal Protective Equipment
☐	☐	Available Safety Equipment and Location
☐	☐	Daily Scope of Work (Reference JHAs as applicable)
☐	☐	Decontamination Procedures
☐	☐	Identify Work Zones, Exclusion Zones, and Decontamination Zones
☐	☐	Hazardous Atmospheres
☐	☐	Air Monitoring Equipment and Procedures
☐	☐	Identify Potential Site-Specific Slip, Trip, and Fall Hazards
☐	☐	Dust and Vapor Control
☐	☐	Confined Space(s)
☐	☐	Open Pits and Excavation
☐	☐	Extreme Temperatures
☐	☐	Incident Reporting
☐	☐	Other: ____

Suggestions to Improve HS Practices

Attendees

Name	Signature	Company
1)		
2)		
3)		
4)		
5)		
6)		
7)		
8)		

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APPENDIX C

APPENDIX B-1 EXCERPTED FROM SUBSURFACE FSP: PROCEDURES FOR NAPL IN SEDIMENT

APPENDIX B-1

Hydrocarbon Field Screening by Sheen Test and Field Description Key for Potential NAPL in Sediments

Appendix B-1

Standard Operating Procedure

Hydrocarbon Field Screening by Sheen Test

1.0 Purpose and Applicability

The Standard Operating Procedure (SOP) for sheen test describes a procedure to visually estimate areas of possible hydrocarbon impacts in soil or sediment. In addition, screening results can be used to aid in the selection of soil/sediment samples for chemical analysis. The field screening method includes a visual examination and water jar screening test.

Visual screening consists of inspecting the soil/sediment for stains, nonaqueous-phase liquids (NAPL), and/or sheens indicative of residual hydrocarbons. Visual screening is most effective at detecting heavy hydrocarbons, such as creosote, free-phase NAPL or high hydrocarbon concentrations. Water sheen screening from a representative soil/sediment sample is a more sensitive method at detecting the presence of hydrocarbons.

2.0 Responsibilities

The project manager is responsible for ensuring that a properly designed sampling program is prepared prior to any sample collection. The field sampling coordinator will have the responsibility to oversee and ensure that all sampling is performed in accordance with the project-specific sampling program and this SOP. In addition, the field sampling coordinator must ensure that all field workers are fully apprised of this SOP.

3.0 Health and Safety

This section presents the potential hazards associated with this technique. The site-specific Health & Safety Plan (HASP) will take precedence over this document. Note that sample collection usually requires Level D personal protection unless there is a potential for airborne or dermal exposures to site contaminants.

Health and safety hazards include but are not limited to the following:

- Dermal exposure to potentially contaminated media: proper personal protective equipment (PPE) is used to mitigate dermal contact including the impact of splashes of water or media to skin and/or eyes;
- Inhalation exposure when handling impacted media: respiratory protection should follow the procedures outlined in the project Site-Specific HASP; and
- Broken glass, in the event that a glass jar is used: use care when handling glassware.

4.0 Supporting Materials

The following materials must be on hand in sufficient quantity to ensure that proper screening procedures may be followed:

- Approximately one cubic-inch of media to be screened;
- 4 of 8 oz. wide-mouth, clear glass jar;
- Stirring devise (i.e. spoon);
- Squirt bottle; and
- Supply of distilled water.

5.0 Methods and Procedures

The strategy used to collect soil/sediment samples in the field for sheen testing will depend on the nature/grain size of the material and the type of hydrocarbon. Discrete samples may be collected from specific depths where NAPL is likely to occur. When lithology is course-grained material over fine-grained material, then a sample should be collected just above this interface where NAPL may be pooling above the "aquitard". Similarly, where fine-grained material overlies a coarse-grained layer with suspected impacts, the sample should be collected just below the contact. When lithology is fine-grained, then a sample should be collected near the contact with the coarse-grained layer. Alternatively, when lithology is finely bedded (< 1-inch thick), then homogenized samples may be collected over a larger depth interval to gain an "average" observation.

If the sample is being collected from inside a sediment core tube, the tube should be cut open longitudinally along the length of the core tube to prevent additional smearing. Make sure the interior of the sediment is exposed as a "fresh surface". Be sure to discard any material along the inside side-walls of the core tube; this is called the "smear zone". The smear zone may mask the true stratigraphy of a subsurface core sample. Then, use a spoon to scrap material across the "fresh" surface of the depth interval of interest, and place into sample jars for further observation. Once the sample volume is collected (approximately 1 oz or more depending upon grain size) the sample is examined and tested as described below.

Visual Examination

In the field, observe sediment core tubes or soil samples for evidence of NAPL. Look at the material and note color and type/nature of occurrence. Observe the exterior and interio sidewalls of the sampling container for signs of staining. If wet, observe the nature of liquid. Among gravels, observe the surface of the gravel for signs of sheen and/or NAPL.

Water Sheen Test

Water sheen screening involves placing soil/sediment in a clear glass jar or a black plastic pan partially filled with water, and observing the water surface for signs of a sheen. The volume of soil/sediment required for observation is approximately one cubic inch, or 10 mls, or about one tablespoon of media. For practical application in the field or lab, place about one cubic inch of soil/sediment (roughly 1 oz) in a 4 to 8 oz jar filled ¼-full with water. For larger volumes, use about 2 oz of material in an 8 oz wide-mouth glass jar filled ¼-full with water. Even larger volumes are needed for gravel. A plastic baggy may be substitute for a glass jar if field conditions require. Crush the material in the jar using a stirring devise (i.e., spoon), and shake the sealed jar vigorously for 30 seconds and allow the material to settle. Observe the water surface and sidewalls of the jar for signs of sheen, LNAPL, and DNAPL. Quantify the amount of sheen and blebs in the water surface using the following sheen classification:

No Sheen	No visible sheen on water surface
Slight Sheen	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly
Moderate Sheen	Light to heavy sheen, may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas without sheen on water surface
Heavy Sheen	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen; visible droplets of immiscible liquids (i.e. NAPL)

Quantify the spatial coverage of sheen and size/diameter NAPL blebs if observed. The color is often described as rainbow or metallic for sheens and dark brown to black for blebs, droplets, and staining. Observe the sidewalls of the jar and estimate the thickness of LNAPL on the water surface and the thickness of DNAPL accumulated at the bottom of the jar. Record visual signs of staining on jar sidewalls and stirring devise.

Field screening results will be recorded on the field logs forms or in a field notebook. Field screening results are site-specific and location-specific. Factors that may affect the performance of this method include: operator experience (experimentation may be required before routine screening is started) ambient air temperature, soil type, soil moisture, organic content, and type of hydrocarbon. Headspace screening may be collected to help correlate results and observations.

6.0 Quality Assurance/Quality Control

Not applicable.

7.0 Documentation

Documentation may consist of all or part of the following:

- Field sampling forms;
- Field log book; and
- Chain-of-custody forms.

Field records should contain sufficient detail to provide a clear understanding of how and where samples were collected. All documentation shall be placed in the project files and retained following completion of the project.

Appendix B-1

Field Description Key for Potential NAPL in Sediment

The intent of this field description key is to provide field personnel with guidelines for logging and observing sediment conditions associated with potential presence of Non-Aqueous Phase Liquid (NAPL) in a consistent and factual manner.

VISUAL DESCRIPTORS

The range of conditions that could exist in sediments include:

- **NAPL** (Non-Aqueous Phase Liquid) – a separate phase liquid that may be lighter than water (LNAPL) or denser than water (DNAPL). NAPL can have varying consistency (viscosity) and can range from non-viscous to highly viscous (taffy-like). NAPL observations should be accompanied by applicable olfactory with smell (see descriptors below) and other visual observations (e.g., color and viscosity). The visual appearance of NAPL should be noted using descriptors below as appropriate. If NAPL is identified, then a sheen or shake test should be completed as described in this SOP in the Hydrocarbon Field Screening by Sheen Test portion.
    - **Free Product –** the entirety of the pore space for a sample interval is saturated with NAPL. Care should be taken to ensure that the saturation described is not related to water in the sample. Depending on the viscosity, NAPL saturated materials may freely drain from a soil sample and should be documented accordingly.
    - **Present–** In some cases, NAPL may be present in the pore spaces, or some of the pore spaces, but not coating the soil grains. The NAPL occurrence may be greater than blebs but not freely draining (saturated) and not hydraulically continuous. In these cases, the appearance/abundance of the NAPL should be noted.
    - **Blebs or Globules–** discrete, multi-shaped NAPL in or on the soil matrix. Include additional descriptors to the extent practicable such as the approximate size (typically ranging in size from 0.01 to 0.05 inches in diameter) and quantity (number of blebs or qualitative estimate) to the extent practical.
    - **Coated –** soil grains are coated with NAPL – there is not sufficient NAPL present to saturate the pore spaces. Use modifiers such as light, moderate or heavy to indicate the degree of coating.
    - **Semi-solid NAPL–** NAPL that is present as a super viscous liquid and appears in a solid or semi-solid phase. The magnitude of the observed solid NAPL should be described (discrete granules, tarry balls, taffy-like, or a solid layer).
- **Sheen –** iridescent sheen. The sheen characteristics need to be described in the field log, including the color, and iridescent sheens need to be distinguished from bacterial sheens which tend to break up at angles on the water surface; whereas a non-bacterial sheen will be continuous and will not break up. Sheens can be described as:
    - Discontinuous sheen (i.e., spotty, streaks, florets) within a section of core and does not fill sediment pore spaces.

  - Continuous sheen (i.e., covering an area greater than 1 square inch) within a section of core but does not fill pore spaces. Describe percent cover.
- **Stained** – visible, unnatural discoloration of the soil, with no visible NAPL.

Other Visual Impacts and Descriptors

In many cases, observed NAPL may be associated with a particular stratigraphic layer (e.g, sand lamination, woody debris layer, gravel lense), gas bubble, or void; NAPL distribution in relation to stratigraphy must be described. What does the material look like immediately above and below the area with suspected NAPL (e.g, clay). Impacts should be described using other visual descriptors as well, as applicable. Descriptors may include, but not be limited to, color, consistency, thickness, viscosity, water content, associated stratigraphy, presence shell or wood fragments or other debris, does NAPL flow out of the core tube, does it appear more or less viscous than water, results of jar sheen test, etc. Also note the staining of sampling equipment, and interior and exterior side-walls of the sampling tube, especially if entrainment of NAPL up the side-walls is suspected as an artifact of sample collection.

OLFACTORY DESCRIPTORS

Field personnel will not conduct olfactory testing as part of sample processing, because vapor inhalation is a potential health and safety risk. However, if incidental odors are noted by field personnel during regular sample processing activities, field personnel will record this observation in the field forms. General descriptors that could be used are the following:

- Note odors similar to mothballs, driveway sealer, highway paving oil, sewage or other odors that are acrid, burnt, or sulfur-like, etc.
- Other odors that are not believed to be natural should also be identified with descriptors such as organic, ammonia, sweet, chemical etc., as applicable.
- Use modifiers such as strong, moderate or slight to indicate intensity of the observed odor.
- In instances where multiple odors are present, a combination of descriptors should be used to clearly identify where these co-mingled impacts are present.

However, olfactory descriptions are more subjective than visual inspections. Visual inspection may be aided by a PID, ultraviolet (UV) fluorescence examination, shake test, or similar device, to monitor and record organic odors and suspected NAPL in the field. One may also consider collecting a sample of the suspected NAPL to assess physical characteristics and potential mobility.

Last revised by AGF and Geosyntec on 1/18/18
Saved in Seattle server in P:\Projects\Portland Pre-Design PNG0767A\600 Deliverables (AECOM&Geosyntec)\ FSP Subsurface Core\Appendices

APPENDIX D

BORING LOG FORM

MAUL FOSTER ALONGI

Boring/Well No.: ____________

Site: ____________________

Location: ____________________

Project #: ____________________

Boring Log Form

Drill Rig		MFA Staff:		Hole Dia:		Total Depth:	
Drilling Co.:			Water Level:		WLE Note:		
Start Date:		End Date:		Water Level:		WLE Note:	
Notes:							

Completion		Sample				Soil Type:					Color:	
		Top:		Time:	Depth:	Top:		Fines:			Moisture:	
		Length:				Bottom:		Sand:			PID:	
		Type:		Sample ID		Soil Class:		Gravel:			Line Type:	
		% Recov:				Trace:					Impacts:	
						Notes:						
		Top:		Time:	Depth:	Soil Type:					Color:	
		Length:				Top:		Fines:			Moisture:	
		Type:		Sample ID		Bottom:		Sand:			PID:	
		% Recov:				Soil Class:		Gravel:			Line Type:	
						Trace:					Impacts:	
						Notes:						
		Top:		Time:	Depth:	Soil Type:					Color:	
		Length:				Top:		Fines:			Moisture:	
		Type:		Sample ID		Bottom:		Sand:			PID:	
		% Recov:				Soil Class:		Gravel:			Line Type:	
						Trace:					Impacts:	
						Notes:						
		Top:		Time:	Depth:	Soil Type:					Color:	
		Length:				Top:		Fines:			Moisture:	
		Type:		Sample ID		Bottom:		Sand:			PID:	
		% Recov:				Soil Class:		Gravel:			Line Type:	
						Trace:					Impacts:	
						Notes:						
		Top:		Time:	Depth:	Soil Type:					Color:	
		Length:				Top:		Fines:			Moisture:	
		Type:		Sample ID		Bottom:		Sand:			PID:	
		% Recov:				Soil Class:		Gravel:			Line Type:	
						Trace:					Impacts:	
						Notes:						
		Top:		Time:	Depth:	Soil Type:					Color:	
		Length:				Top:		Fines:			Moisture:	
		Type:		Sample ID		Bottom:		Sand:			PID:	
		% Recov:				Soil Class:		Gravel:			Line Type:	
						Trace:					Impacts:	
						Notes:						
		Top:		Time:	Depth:	Soil Type:					Color:	
		Length:				Top:		Fines:			Moisture:	
		Type:		Sample ID		Bottom:		Sand:			PID:	
		% Recov:				Soil Class:		Gravel:			Line Type:	
						Trace:					Impacts:	
						Notes:						
Borehole Notes:												

ATTACHMENT B

LABORATORY ANALYTICAL REPORTS

ATTACHMENT C

DATA VALIDATION MEMORANDA

DATA VALIDATION REPORT

Validated by: Eric Middleditch and Bill Fear, AlterEcho
Report Date: Revised December 23, 2019
Project/Site: Siltronic Sediment Sampling
Laboratory No: A9J0277, WO15627, B9S5599, 570-9778-1

This report presents the validation of the data obtained during the field activities for the above referenced work assignment. The purpose of this review is to provide a Level 2A technical validation and quality control review of the following samples and rinsate blank collected on October 7, 2019 and submitted to APEX Laboratories, LLC. Portland, OR.

Field Sample Numbers	Laboratory ID	Analyses/Methods
SED05-SB-2	A9J0277-01 15627001 KZY764 570-9778-1	Diesel and Oil Hydrocarbons by NWTPH-Dx Semivolatiles and PAHs by GC/MS SW8270D Alkylated PAH Homologs by 8270D (Modified) Total metals and mercury (ICP-MS) by SW6020A Cyanide - Total (solid) by ASTM D7511 Total Organic Carbon (solid) by EPA 9060A Mod Total Solid Determination by PSEP-TS Grain Size by ASTM D 422M/PSET Parameters Percent Dry Weight by SW8000C Chlorinated Herbicides by 8151A Percent Solids by EPA 160.3M Dioxins and Furans by Method 1613B PCB Congeners by Method 1668C Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified) Organotins (Tributyltin) by GC/MS SIM
SED05-SB-5	A9J0277-03 15627002 KZY765 570-9778-2	
SED05-SB-7	A9J0277-04 15627003 KZY766 570-9778-3	
SED05-SB-RB	A9J0277-05 15627004 KZY767 570-9778-4	Diesel and Oil Hydrocarbons by NWTPH-Dx Semivolatiles and PAHs by GC/MS SW8270D Total metals and mercury (ICP-MS) by SW6020A Cyanide – Total (aqueous) by EPA 335.4 Total Organic Carbon by SM5310C Chlorinated Herbicides by 8151A Dioxins and Furans by Method 1613B PCB Congeners by Method 1668C Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified) Organotins (Tributyltin) by GC/MS SIM

The data submitted by the laboratory has been reviewed and verified for compliance with the Sediment Sampling Work Plan Willamette River Mile 6.55 to 6.9 West Siltronic Corporation Portland, Oregon prepared by Maul Foster & Alongi, Inc. (MFA) (May 2019) and the analytical procedures listed in the Test Methods for Evaluating Solid Wastes, SW-846, 3rd Edition and other referenced analytical methods. Data validation/data quality review was conducted in accordance with the current or most applicable versions of the National Functional Guidelines (NFG) for Superfund Organics Method Data Review (January 2017), the NFG for Superfund Inorganics Method Data Review (January 2017), and the NFG for High Resolution Superfund Methods Data Review (April 2016), along with the Region 10 Data Validation and Review Guidelines for Polychlorinated Dibenzo-p-Dioxin and Polychlorinated Dibenzofuran Data (PCDD/PCDF) Using Method 1613B, and SW846 Method 8290A, May 2014, modified for the method criteria. Laboratory QC limits/acceptance limits were used to evaluate the data unless where noted. Based on discussions with the data users, AlterEcho did not verify the toxic equivalencies (TEQs) listed for Dioxins and Furans in the laboratory reports since these factors will not be used for data reporting. Also, AlterEcho did not verify the Total PCB Congener concentrations listed in the laboratory reports since the data user plans to recalculate the Total PCB Congener concentrations using the validated data.

The herbicide samples were subcontracted to Weck Laboratories, Inc. and reported in the Apex Laboratories report. The Dioxins and Furans and PCB Congener samples were subcontracted to Cape Fear Analytical, LLC (Work Order WO15627) while the Organotins samples were subcontracted to Eurofins Calscience (Work Order 570-9778-1). The samples were subcontracted to Bureau Veritas Laboratories (formerly Maxxam Analytics International (Data Package B9S5599) for Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified). Samples were shipped and received under proper custody and preservation.

A Stage 2A Manual Validation as defined in the Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use, EPA-540-R-08-005, January 2009 USEPA, was performed on the samples. The data were evaluated based on the following parameters:

- Chain-of-Custody
- Case Narrative
- Field and Sample ID's
- Holding Time, including sample receipt, Preservation and Cooler Temperature
- Laboratory Blanks (method blank; reagent/preparation blanks)
- Field Blanks
- Laboratory Control Samples
- Matrix Spike/Matrix Spike Duplicates
- Post Digestion Spikes
- Laboratory Duplicates
- Field Duplicates
- Serial Dilution Samples (Metals)
- Surrogate (DMC) Recovery (Organics)
- Labeled Compounds and Clean-Up Standards (Dioxins/Furans, PCB Congeners, and Organochlorine Pesticides and Toxaphene)
- Sample Results

Data Completeness (Chain-of-Custody, Case Narrative, Field and Sample IDs)

The Level 2A data package was reviewed and included chain-of-custody (COC) forms, a case narrative, identification of field and sample numbers, sample results, laboratory quality control results, and sample receipt information. Raw data and instrument performance and calibration data are not evaluated for Level 2A data validation.

The COC forms were properly filled out including signatures, date and time of sampling, sampling identification, analyses requested, and custody transfers between different parties were signed and dated. The samples collected were appropriately identified and analyzed as per the COC.

Case narratives or a list of laboratory flags (Notes and Definitions) were provided and QC anomalies and QC outliers were noted.

Holding Times, Preservation and Cooler Temperature

The samples were received by the laboratory in good condition and within the recommended temperature range of 4 ± 2°C or just below, but not frozen.

Analytical holding times were assessed to determine whether the method holding time requirements were met by the laboratory. The holding times were met as all samples were prepared and/or analyzed within the method suggested holding times except as noted below.

Alkylated PAH Homologs by 8270D (Modified)

Upon arrival at the laboratory, the alkylated PAH homologs volume was frozen to a temperature of -18°C rather than being stored at a temperature of 4 ± 2°C because it was unknown whether the alkylated PAH homologs analysis would be needed. The eventual extraction of the alkylated PAH homologs analysis for samples SED05-SB-2, SED05-SB-5, SED05-SB-7 and SED05-SB-RB was performed 31 days after sample collection which was within the one year holding time for frozen samples as indicated by Table 4-2 of the Sediment Sampling Work Plan. No qualification of the results was required because the extraction was performed within the extended, one year holding time.

Organotins (Tributyltin) by GC/MS SIM

The extraction of the equipment rinse blank sample was performed eight days after sample collection. Since the seven day extraction holding time was exceeded, the following not detected result has been qualified as at an estimated reporting limit (UJ).

- Tributyltin for sample SED05-SB-RB

Laboratory Blanks (method blank; reagent/preparation blank)

The method blanks and preparation blanks were prepared and analyzed as appropriate and at the required frequency. No contaminants were found in the laboratory method blanks and preparation blanks associated with these sample analyses with the exceptions noted below.

Semivolatile Organic Compounds
Naphthalene was detected in the method blank for QC Batch 9101003. However, the associated sample result was non-detected and therefore data are not qualified.

Chlorinated Herbicides
There were detections of 2,4,5-TP (Silvex); dicamba; dichloroprop; pentachlorophenol, and picloram in the method blank associated with batch W9J0915. Qualification was not appropriate because these analytes were not detected in the associated samples.

Dioxin/Furan
Numerous Dioxin/Furans were detected in the method blanks for QC Prep Batch 42063 and 42119. The majority of these blank results were reported as Estimated Maximum Possible Concentrations (EMPCs). The following results less than five times the method blank concentration are qualified as Non-Detected (U) at the sample concentration due to method blank contamination.

- 1,2,3,7,8-PeCDD and 1,2,3,4,7,8-HxCDD in sample SED05-SB-2
- 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, and 1,2,3,7,8,9-HxCDF in sample SED05-SB-5
- 1,2,3,7,8-PeCDD and 1,2,3,4,7,8-HxCDD in sample SED05-SB-7

PCB Congeners
Several PCB congeners were detected in the method blank for QC Prep Batch 42073. The following sample results are less than five times the method blank concentration and are qualified as Non-Detects (U) at the sample concentration due to method blank contamination.

- 11-DiCB, 18/30-TrCB, 20/28-TrCB, 21/33-TrCB, 22-TrCB, 31-TrCB, 44/47/65-TeCB, 49/69-TeCB, 52-TeCB, 61/66/70/76-TeCB, 66-TeCB, 86/87/97/109/119/125-PeCB, 90/101/113-PeCB, 95-PeCB, 105-PeCB, 110/115-PeCB, 118-PeCB, 129/138/163-HxCB, 132-HxCB, 135/151-HxCB, 147/149-HxCB, 153/168-HxCB, 156/157-HxCB, 174-HpCB, 180/193-HpCB, and 187-HpCB in sample SED05-SB-RB

Numerous PCB congeners were detected in the method blank for QC Prep Batch 42154. However, no data were qualified as all associated sediment sample results were greater than five times the blank values or were not detected.

Note: Several of the sample results in the bullet items above were qualified as Estimated Maximum Possible Concentrations (EMPCs) by the laboratory. Since these results were qualified as not detected (U) due to method blank contamination, no additional action was required.

Field Blanks

Sample SED05-SB-RB was an equipment rinsate blank collected with these samples. No sample results were qualified for rinsate blank contamination because the associated sample results were greater than the reporting limit and 5 times the blank value or were non-detected.

Laboratory Control Samples

At least one laboratory control sample (LCS) analysis was analyzed per QC batch and for each analysis. A laboratory control sample duplicate (LCSD) was also analyzed with several methods if laboratory duplicates or matrix spikes were not performed. Accuracy and precision were evaluated using these analyses.

All LCS and LCSD recoveries were within the laboratory QC limits and all precision criteria were met as the RPDs were within laboratory QC limits with the exceptions noted below.

Semivolatile Organic Compounds
The RPD between LCS and LCSD recoveries for 1,2,4-trichlorobenzene; 1,2-dichlorobenzene; 1,3-dichlorobenzene; 1,4-dichlorobenzene; hexachlorobutadiene; hexachlorocyclopentadiene, and hexachloroethane in analytical batch 9101003 were above the control limit of less than 30%. Qualification was not appropriate because these compounds were not detected in the affected sample.

The LCS recoveries of carbazole, 4-nitroaniline, and 3,3'-dichlorobenzidine in analytical batch 9101307 were above the control limits. Qualification was not appropriate because these compounds were not detected in the affected samples.

The laboratory indicated that due to erratic or low blank spike recoveries, results for 3,3'-dichlorobenzidine are considered Estimated Values. However, the LCS/LCSD recoveries of 3,3'-dichlorobenzidine were within the control limits for analytical batch

9101003 or above the control limits in analytical batch 9101307. Qualification was not taken because this compound was not detected in any of the samples.

Chlorinated Herbicides
The LCS/LCSD RPDs for 2,4-DB and 4-nitrophenol in analytical batch W9J0721 were greater than the QC limit of 25%. However, qualification was not needed as the analytes were not detected in the samples.

Organochlorine pesticides
The LCS recoveries Endosulfan II (13%) and Endosulfan sulfate (15%), were below the QC limits in the LCS associated with batch 6385055. The following analytes have been qualified as estimated (UJ) due to the low LCS recoveries.

- Endosulfan II and Endosulfan sulfate in samples SED05-SB-2, SED05-SB-5, and SED05-SB-7

Note that these results were also qualified as EMPCs in sample SED05-SB-2.

The LCS recovery for Mirex (174%) was flagged as greater than the QC limits in the LCS associated with batch 6385055. However, qualification for high bias was not required as the analyte was not detected in the samples. Note that it appears that the incorrect QC limits of 50-200% were reported on the laboratory Quality Assurance Report.

Matrix Spike/Matrix Spike Duplicates (MS/MSD)

MS/MSD analyses were not requested on a sample from this SDG. However, the laboratory did perform a MS or MS/MSD on sample SED05-SB-2 for a few analyses. All MS/MSD recoveries were within the laboratory QC limits and all precision criteria were met as the RPDs were within laboratory QC limits with the exceptions noted below.

Chlorinated Herbicides
A MS/MSD was performed on sample SED05-SB-2 in analytical batch W9J0815. The RPD between MS and MSD recoveries of several analytes were above the control limit of 25%. Qualification was not appropriate because the affected analytes were not detected in the unspiked parent sample.

Organochlorine pesticides
The laboratory indicated that the recoveries for o,p-DDD, p,p-DDD, p,p-DDE, o,p-DDT, and p,p-DDT were not calculated (applicable) due to the high native concentrations of these analytes in the unspiked parent sample. No data validation qualifiers are added to the data.

The laboratory also indicated that the recoveries for Aldrin and o,p-DDE were not calculated due to matrix interferences. These two analytes were reported and qualified as EMPCs at elevated detection limits. No additional qualifiers were added to the data.

The laboratory also provided MS and/or MSD analyses that were performed on unknown samples from other SDGs or work orders for several analyses. Typically, sample data are not qualified using MS/MSD results from unknown samples or samples from other SDGs. Additionally, for organic analyses only the unspiked parent sample is usually qualified for the MS/MSD results unless a systematic issue is noted. Therefore, these MS/MSD analyses were not evaluated and no data in this SDG were qualified using only the matrix spike results from unknown non-site samples or site samples from other SDGs. Refer to the LCS/LCSD for precision and accuracy data.

Post Digestion Spikes (Metals)

A post digestion spike (PDS) was not provided or required.

Laboratory Duplicates

Duplicate analyses were not requested on the samples from this sample delivery group. The laboratory analyzed a laboratory duplicate on sample SED05-SB-2 for several analyses. All laboratory duplicate criteria were met with the exceptions noted below.

Semivolatile Organic Compounds

A laboratory duplicate was performed on sample SED05-SB-2. The laboratory noted that the RPD for fluorene could not be calculated. Qualification was not appropriate because this compound was not detected in the parent sample and the concentration detected in the laboratory duplicate was below the reporting limit.

Organochlorine pesticides

Duplicate RPDs exceeded 25% for o,p-DDT and p,p-DDT for the laboratory duplicate on sample SED05-SB-2. As a result of the exceeded precision criteria, the following detected results were qualified as estimated (J):

- o,p-DDT and p,p-DDT in sample SED05-SB-2

The laboratory also provided duplicate analyses that were performed on unknown samples from other SDGs or work orders. Other duplicate results were not evaluated as they were performed on unknown or non-site samples.

Field Duplicates

A field duplicate was not collected with these samples.

Serial Dilution Samples (Metals)

A serial dilution was not provided for the total and dissolved metals for the level 2A review.

Surrogate (DMC) Recovery (Organics)

Surrogate compounds were appropriately added to all samples and QC samples for the organic analyses. The surrogate percent recoveries were within laboratory QC limits for all analyses.

Semivolatile Organic Compounds
The surrogates 2-Fluorobiphenyl and 2-Fluorophenol were recovered below the control limits in sample SED05-SB-RB. The following results have been qualified as estimated (UJ) due to low surrogate recovery anomalies.

- All SVOC results in sample SED05-SB-RB

Labeled Compounds and Clean-Up Standards (Dioxins/Furans, PCB Congeners, and Organochlorine Pesticides)

The recoveries of the labeled compounds and clean-up standards met the method or laboratory criteria.

Sample Results

Raw data and sample quantitation were not evaluated for this 2A review. The results and reporting limits or detection limits were correctly reported with the correct units and appeared to be adjusted for sample size and dilution.

According to the case narrative or lab notes, various analyses for these samples were diluted due to high target concentrations, high non target matrix interference, or sample matrix. The non-detected results for these analyses are at elevated detection limits due to the dilutions performed on these samples. Additionally, the reporting limits for several individual analytes were raised to account for interference from co-eluting analytes present in the sample or dilution. These analytes are reported as not-detected at the raised detection limit/reporting limit.

Diesel Range Organics
The laboratory indicated that the oil results for samples SED05-SB-2, SED05-SB-5, and SED05-SB-7 are elevated due to the presence of individual analyte peaks in the quantitation range that are not representative of the fuel pattern reported. No qualification is required.

Dioxin/Furan
The results for OCDD in samples SED05-SB-5 and SED05-SB-7 were flagged for exceeding the instrument linear calibration range. These two results are considered estimated quantities and are qualified as estimated (J).

The following total dioxin and furan results were flagged (K) by the laboratory indicating the result was impacted by an EMPC. Results also below the PQL were flagged as (JK). These total results are considered estimated quantities and are qualified as an estimated value (JK).

- Total TeCDD, Total PeCDD, Total TeCDF, and Total PeCDF in sample SED05-SB-2
- Total TeCDD, Total PeCDD, Total TeCDF, Total PeCDF, and Total HxCDF in sample SED05-SB-5
- Total TeCDD, Total HxCDD Total TeCDF, and Total PeCDF in sample SED05-SB-7

The above total results were greater than the results for the individual dioxin/furan congeners or were impacted by both EMPCs and confirmed homologues and the results were qualified as estimated (JK) rather than as not detected.

A few total dioxin and furan results indicated above were also flagged as “Q” by the laboratory indicating that quantitative interference resulted in an estimated value. No additional qualification was required.

Confirmatory runs for 2,3,7,8-TCDF were analyzed for these samples and the detected results for 2,3,7,8-TCDF greater than the PQLs were confirmed by the second analysis. The results for 2,3,7,8-TCDF from both analyses were reported on the EDD. The confirmation results which should be reported were reported from the November 5, 2019 analysis.

PCB Congeners
Several PCB Congener results were reported as EMPCs and were qualified with the laboratory “K” flag denoting an EMPC value. Results which were also below the PQL

were reported by the laboratory as estimated (JK) values. The following EMPCs that were not previously qualified as non-detected due to method blank contamination are qualified as estimated non-detects (UJK) at the reported concentration in accordance with EPA Region 10 PCDD/PCDF DV guidelines and NFG use of regional guidance and/or professional judgment in evaluating these results.

- 1-MoCB, 10-DiCB, 35-TrCB, 54-TeCB, 96-PeCB, 126-PeCB, and 145-HxCB in sample SED05-SB-2
- 35-TrCB, 60-TeCB, 79-TeCB, 121-PeCB, 123-PeCB, 181-HpCB, and 182-HpCB in sample SED05-SB-5
- 57-TeCB and 121-PeCB in sample SED05-SB-7
- 99-PeCB in sample SED05-SB-RB

Note: The final Total PCB Congeners values should be adjusted based on blank contamination and EMPC actions noted in the previous sections.

Organochlorine pesticides
The laboratory indicated that several results were an EMPC / NDR as the peak detected does not meet ratio criteria and has resulted in an elevated detection limit. Results were reported as non-detected. The following results were qualified as estimated detection limit (UJK) to be consistent with the qualification of EMPCs:

- a-Chlordane, Aldrin, Endosulfan II, Endosulfan sulfate, and o,p-DDE in sample SED05-SB-2
- a-Chlordane, Aldrin, Dieldrin, Endrin, and o,p-DDE in sample SED05-SB-5
- a-Chlordane, Aldrin, Endrin, and o,p-DDE in sample SED05-SB-7
- Endosulfan II in sample SED05-SB-RB

Grain Size by ASTM D 422M/PSET Parameters
The laboratory note/narrative for samples SED05-SB-2 and SED05-SB-5 indicated that the No. 4 sieve (gravel) and No. 10 sieve (coarse sand) grain size fractions contained an abundance of organic material while the note/narrative for sample SED05-SB-7 indicated that the No. 4 sieve (gravel) grain size fraction consists entirely of organic material and the No. 10 sieve (coarse sand) grain size fraction contains abundant organic material.

Overall Assessment

The analytical data are acceptable and usable as reported with the minor qualifications noted above. Some results were qualified due to low surrogate and LCS recoveries or duplicate precision. Results for Dioxin/Furans, Organochlorine Pesticides and PCB Congeners were qualified as not detected due to blank contamination or as EMPCs.

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following validation qualifiers and associated definitions are provided for use by the data validator to summarize the data quality.

Data Qualifier	Description
Standard Data Qualifiers	
U	The analyte was analyzed for, but was not detected at or above the associated value.
UJ	The analyte was not detected. The reported sample quantitation limit is considered estimated for QC reasons.
J	The analyte was detected. The reported numerical value is considered estimated for QC reasons.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
R	The sample result is rejected as unusable due to serious deficiencies in one or more QC criteria. The analyte may or may not be present in the sample.
K	Estimated Maximum Possible Concentration (EMPC)

DATA VALIDATION REPORT

Validated by: Eric Middleditch and Bill Fear, AlterEcho
Report Date: Revised December 23, 2019
Project/Site: Siltronic Sediment Sampling
Laboratory No: A9J0321, WO15638, B9S7115, 570-9906-1

This report presents the validation of the data obtained during the field activities for the above referenced work assignment. The purpose of this review is to provide a Level 2A technical validation and quality control review of the following samples and rinsate blank collected on October 8, 2019 and October 9, 2019 and submitted to APEX Laboratories, LLC. Portland, OR.

Field Sample Numbers	Laboratory ID	Analyses/Methods
SED-06-SB-2.0	A9J0321-01 15638001 LAG964 570-9906-1	Diesel and Oil Hydrocarbons by NWTPH-Dx Semivolatiles and PAHs by GC/MS SW8270D Alkylated PAH Homologs by 8270D (Modified) Total metals and mercury (ICP-MS) by SW6020A Cyanide - Total (solid) by ASTM D7511 Total Organic Carbon (solid) by EPA 9060A Mod Total Solid Determination by PSEP-TS Grain Size by ASTM D 422M/PSET Parameters Percent Dry Weight by SW8000C Chlorinated Herbicides by 8151A Percent Solids by EPA 160.3M Dioxins and Furans by Method 1613B PCB Congeners by Method 1668C Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified) Organotins (Tributyltin) by GC/MS SIM
SED-06-SB-5.5	A9J0321-03 15638002 LAG965 570-9906-2	
SED-06-SB-8.5	A9J0321-05 15638003 LAG966 570-9906-3	
SED-04-SB-2.0	A9J0321-07 15638005 LAG968 570-9906-5	
SED-04-SB-4.75	A9J0321-08 15638006 LAG969 570-9906-6	
SED-04-SB-7.75	A9J0321-11 15638007 LAG970 570-9906-7	

Field Sample Numbers	Laboratory ID	Analyses/Methods
SED-07-SB-2.0	A9J0321-12 15638008 LAG971 570-9906-8	Diesel and Oil Hydrocarbons by NWTPH-Dx Semivolatiles and PAHs by GC/MS SW8270D Alkylated PAH Homologs by 8270D (Modified) Total metals and mercury (ICP-MS) by SW6020A Cyanide - Total (solid) by ASTM D7511 Total Organic Carbon (solid) by EPA 9060A Mod Total Solid Determination by PSEP-TS Grain Size by ASTM D 422M/PSET Parameters Percent Dry Weight by SW8000C Chlorinated Herbicides by 8151A Percent Solids by EPA 160.3M Dioxins and Furans by Method 1613B PCB Congeners by Method 1668C Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified) Organotins (Tributyltin) by GC/MS SIM
SED-07-SB-4.35	A9J0321-13 15638009 LAG972 570-9906-9	
SED-07-SB-6.35	A9J0321-14 15638010 LAG973 570-9906-10	
SED-01-SB-2.0	A9J0321-15 15638011 LAG974 570-9906-11	
SED-01-SB-5.5	A9J0321-17 15638012 LAG975 570-9906-12	
SED-02-SB-2.0	A9J0321-19 15638013 LAG976 570-9906-13	
SED-01-SB-8.65	A9J0321-20 15638014 LAG977 570-9906-14	
SED-02-SB-5.0	A9J0321-21 15638015 LAG978 570-9906-15	
SED-02-SB-8.25	A9J0321-24 15638016 LAG979 570-9906-16	

Field Sample Numbers	Laboratory ID	Analyses/Methods
SED-SB-RB	A9J0321-06 15638004 LAG967 570-9906-4	Diesel and Oil Hydrocarbons by NWTPH-Dx Semivolatiles and PAHs by GC/MS SW8270D Total metals and mercury (ICP-MS) by SW6020A Cyanide – Total (aqueous) by EPA 335.4 Total Organic Carbon by SM5310C Chlorinated Herbicides by 8151A Dioxins and Furans by Method 1613B PCB Congeners by Method 1668C Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified) Organotins (Tributyltin) by GC/MS SIM

The data submitted by the laboratory has been reviewed and verified for compliance with the Sediment Sampling Work Plan Willamette River Mile 6.55 to 6.9 West Siltronic Corporation Portland, Oregon prepared by Maul Foster & Alongi, Inc. (MFA) (May 2019) and the analytical procedures listed in the Test Methods for Evaluating Solid Wastes, SW-846, 3rd Edition and other referenced analytical methods. Data validation/data quality review was conducted in accordance with the current or most applicable versions of the National Functional Guidelines (NFG) for Superfund Organics Method Data Review (January 2017), the NFG for Superfund Inorganics Method Data Review (January 2017), and the NFG for High Resolution Superfund Methods Data Review (April 2016), along with the Region 10 Data Validation and Review Guidelines for Polychlorinated Dibenzo-p-Dioxin and Polychlorinated Dibenzofuran Data (PCDD/PCDF) Using Method 1613B, and SW846 Method 8290A, May 2014, modified for the method criteria. Laboratory QC limits/acceptance limits were used to evaluate the data unless where noted. Based on discussions with the data users, AlterEcho did not verify the toxic equivalencies (TEQs) listed for Dioxins and Furans in the laboratory reports since these factors will not be used for data reporting. Also, AlterEcho did not verify the Total PCB Congener concentrations listed in the laboratory reports since the data user plans to recalculate the Total PCB Congener concentrations using the validated data.

The herbicide samples were subcontracted to Weck Laboratories, Inc. and reported in the Apex Laboratories report. The Dioxins and Furans and PCB Congener samples were subcontracted to Cape Fear Analytical, LLC (Work Order WO15638) while the Organotins samples were subcontracted to Eurofins Calscience (Work Order 570-9906-1). The samples were subcontracted to Bureau Veritas Laboratories (formerly Maxxam Analytics International (Data Package B9S7115) for Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified). Samples were shipped and received under proper custody and preservation.

A Stage 2A Manual Validation as defined in the Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use, EPA-540-R-08-005, January 2009 USEPA, was performed on the samples. The data were evaluated based on the following parameters:

- Chain-of-Custody
- Case Narrative
- Field and Sample ID's
- Holding Time, including sample receipt, Preservation and Cooler Temperature
- Laboratory Blanks (method blank; reagent/preparation blanks)
- Field Blanks
- Laboratory Control Samples
- Matrix Spike/Matrix Spike Duplicates
- Post Digestion Spikes
- Laboratory Duplicates
- Field Duplicates
- Serial Dilution Samples (Metals)
- Surrogate (DMC) Recovery (Organics)
- Labeled Compounds and Clean-Up Standards (Dioxins/Furans, PCB Congeners, and Organochlorine Pesticides and Toxaphene)
- Sample Results

Data Completeness (Chain-of-Custody, Case Narrative, Field and Sample IDs)

The Level 2A data package was reviewed and included chain-of-custody (COC) forms, a case narrative, identification of field and sample numbers, sample results, laboratory quality control results, and sample receipt information. Raw data and instrument performance and calibration data are not evaluated for Level 2A data validation.

The COC forms were properly filled out including signatures, date and time of sampling, sampling identification, analyses requested, and custody transfers between different parties were signed and dated. The samples collected were appropriately identified and analyzed as per the COC.

Case narratives or a list of laboratory flags (Notes and Definitions) were provided and QC anomalies and QC outliers were noted.

Holding Times, Preservation and Cooler Temperature

The samples were received by the laboratory in good condition and within the recommended temperature range of 4 ± 2°C or just below, but not frozen.

Analytical holding times were assessed to determine whether the method holding time requirements were met by the laboratory. The holding times were met as all samples were prepared and/or analyzed within the method suggested holding times, including the analysis described below.

Alkylated PAH Homologs by 8270D (Modified)

Upon arrival at the laboratory, the alkylated PAH homologs volume was frozen to a temperature of -18°C rather than being stored at a temperature of 4 ± 2°C because it was unknown whether the alkylated PAH homologs analysis would be needed. The eventual extraction of the alkylated PAH homologs analysis was performed within the one year holding time for frozen samples as indicated by Table 4-2 of the Sediment Sampling Work Plan. No qualification of the results was required because the extraction was performed within the extended, one year holding time.

Laboratory Blanks (method blank; reagent/preparation blank)

The method blanks and preparation blanks were prepared and analyzed as appropriate and at the required frequency. No contaminants were found in the laboratory method blanks and preparation blanks associated with these sample analyses with the exceptions noted below.

Semivolatile Organic Compounds
Naphthalene was detected in the method blank for QC Batch 9101003. However, the associated sample result was non-detected and therefore data are not qualified.

Chlorinated Herbicides
Dichloroprop; Dicamba; Picloram; Pentachlorophenol and 2,4,5-TP (Silvex) were detected in the initial analysis of the method blank for QC Batch W9J0915. Dichloroprop; Dicamba; Picloram; Pentachlorophenol; MCPP; 2,4,5-TP (Silvex); 2,4,5-T; MCPA and 2,4-D were detected in the reanalysis of this method blank. However, the associated sample results were all non-detected and therefore data are not qualified.

Dioxin/Furan
Numerous Dioxin/Furans were detected in the method blanks for QC Prep Batch 42063 and 42203. The majority of these blank results were reported as Estimated Maximum Possible Concentrations (EMPCs). The following results less than five times the method blank concentration are qualified as Non-Detected (U) at the sample concentration due to method blank contamination.

- 1,2,3,4,7,8-HxCDD in samples SED-04-SB-2.0, SED-06-SB-2.0, and SED-07-SB-6.35
- 2,3,7,8-TCDF in samples SED-04-SB-7.75, SED-07-SB-2.0, SED-07-SB-4.35, and SED-07-SB-6.35
- 1,2,3,7,8-PeCDF in samples SED-04-SB-7.75 and SED-07-SB-2.0
- 1,2,3,4,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, Total TCDF, Total PeCDF, Total HxCDF, and Total HpCDF in sample SED-04-SB-7.75
- 1,2,3,7,8,9-HxCDF in samples SED-04-SB-4.75 and SED-07-SB-6.35

PCB Congeners
Various PCB congeners were detected in the method blanks for QC Prep Batches 42073, 42173, 42292, and 42197. The following sample results are less than five times the method blank concentration (adjusted for sample size) and are qualified as Non-Detects (U) at the sample concentration due to method blank contamination.

- 11-DiCB, 18/30-TrCB, 20/28-TrCB, 21/33-TrCB, 31-TrCB, 44/47/65-TeCB, 49/69-TeCB, 52-TeCB, 61/66/70/76-TeCB, 66-TeCB, 86/87/97/109/119/125-PeCB, 90/101/113-PeCB, 95-PeCB, 105-PeCB, 110/115-PeCB, 118-PeCB, 129/138/163-HxCB, 132-HxCB, 135/151-HxCB, 147/149-HxCB, 153/168-HxCB, 156/157-HxCB, 174-HpCB, 180/193-HpCB, 183/185-HpCB, 187-HpCB, and 194-OcCB in sample SED-SB-RB (associated with MB - 42073)
- 11-DiCB in sample SED-07-SB-6.35 (associated with MB - 42173)
- 20-TrCB, 21/33-TrCB, 31-TrCB, 52-TeCB, 61/66/70/76-TeCB, 66-TeCB,

86/87/97/109/119/125-PeCB, 90/101/113-PeCB, 95-PeCB, 105-PeCB, 110/115-PeCB, 118-PeCB, 129/138/163-HxCB, 147/149-HxCB, 153/168-HxCB, 180/193-HpCB, and 187-HpCB in sample SED-04-SB-7.75 (associated with MB - 42292)

Note that the blank action level for sample SED-04-SB-7.75 is adjusted for the 1.24 gram sample size.

Note: Several of the sample results in the bullet items above were qualified as Estimated Maximum Possible Concentrations (EMPCs) by the laboratory. Since these results were qualified as not detected (U) due to method blank contamination, no additional action was required.

Field Blanks

Sample SED-SB-RB was an equipment rinsate blank collected with these samples. No sample results were qualified for rinsate blank contamination because the associated sample results were greater than the reporting limit and 5 times the blank value or were non-detected.

Laboratory Control Samples

At least one laboratory control sample (LCS) analysis was analyzed per QC batch and for each analysis. A laboratory control sample duplicate (LCSD) was also analyzed with several methods if laboratory duplicates or matrix spikes were not performed. Accuracy and precision were evaluated using these analyses.

All LCS and LCSD recoveries were within the laboratory QC limits and all precision criteria were met as the RPDs were within laboratory QC limits with the exceptions noted below.

Semivolatile Organic Compounds

The RPD between LCS and LCSD recoveries for 1,2,4-trichlorobenzene; 1,2-dichlorobenzene; 1,3-dichlorobenzene; 1,4-dichlorobenzene; hexachlorobutadiene; hexachlorocyclopentadiene and hexachloroethane in analytical batch 9101003 were above the control limit of less than 30%. Qualification was not appropriate because these compounds were not detected in the affected sample.

The LCS recoveries of carbazole; 4-nitroaniline and 3,3'-dichlorobenzidine in analytical batch 9101307 were above the control limits. The following detections were qualified as estimated and biased high (J+) due to LCS recovery anomalies.

- Carbazole detections in samples SED-01-SB-5.5, SED-01-SB-8.65, SED-02-SB-8.25, and SED-06-SB-2.0

Note that the qualification was not appropriate for the 4-nitroaniline and 3,3'-dichlorobenzidine non-detections associated with this elevated LCS recovery.

The laboratory indicated that due to erratic or low blank spike recoveries, results for 3,3'-dichlorobenzidine are considered Estimated Values. However, the LCS/LCSD recoveries of 3,3'-dichlorobenzidine were within the control limits for analytical batch 9101003 or above the control limits in analytical batch 9101307. Qualification was not appropriate because this compound was not detected in any of the samples.

Organochlorine pesticides
The LCS recoveries for Endosulfan II (13%) and Endosulfan sulfate (15%) were below the QC limits in the LCS associated with batch 6385055. The following analytes have been qualified as estimated (UJ) due to the low LCS recoveries.

- Endosulfan II and Endosulfan sulfate all sediment samples

The LCS recovery for Mirex (174%) was flagged as greater than the QC limits in the LCS associated with batch 6385055. However, qualification for high bias was not required as the analyte was not detected in the samples. Note that it appears that the incorrect QC limits of 50-200% were reported on the laboratory Quality Assurance Report.

Matrix Spike/Matrix Spike Duplicates (MS/MSD)

MS/MSD analyses were not requested on a sample from this SDG. However, the laboratory did perform a MS or MS/MSD on samples from this SDG for various analyses. All MS/MSD recoveries were within the laboratory QC limits and all precision criteria were met as the RPDs were within laboratory QC limits with the exceptions noted below.

Cyanide - Total (solid) by ASTM D7511
The MS and MSD recoveries of total cyanide in the MS/MSD performed on sample SED-02-SB-8.25 were outside the control limits. Qualification was not required because the concentration of total cyanide detected in the unspiked parent sample was greater than four times the spiked concentration.

Dioxin/Furan
The MS and/or MSD recoveries and MS/MSD RPDs for sample SED-06-SB-2.0 exceeded the QC limits (70-130%/20%) for several of the Dioxin/Furans. Additionally, the MSD recovery for 1,2,3,7,8,9-HxCDD (68.9%) was less than the QC limits. The

following detected results were qualified as estimated (J) due to the MS/MSD precision and accuracy anomalies.

- 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, OCDD, 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, and OCDF in sample SED-06-SB-2.0

Note that the result for 1,2,3,7,8,9-HxCDD is also qualified as an EMPC.

PCB Congeners

The MS and/or MSD recoveries for 19-TrCB, 156-HxCB, and 167-HxCB and the RPDs for 105-PeCB, 118-PeCB, 156-HxCB, and 167-HxCB were outside the QC limit (50-150%/35%) for sample SED-06-SB-2.0. The following detected results were qualified as estimated (J) due to the MS/MSD precision and accuracy anomalies.

- 19-TrCB , 105-PeCB, 118-PeCB, 156/157-HxCB, and 167-HxCB in sample SED-06-SB-2.0

Several additional MS or MSD recoveries flagged by the laboratory as not meeting the QC limits were not applicable due to the high native concentrations of these analytes in the unspiked parent sample. No data additional validation qualifiers are added to the data.

The laboratory also provided MS and/or MSD analyses that were performed on unknown samples from other SDGs or work orders for several analyses. Typically, sample data are not qualified using MS/MSD results from unknown samples or samples from other SDGs. Additionally, for organic analyses only the unspiked parent sample is usually qualified for the MS/MSD results unless a systematic issue is noted. Therefore, these MS/MSD analyses were not evaluated and no data in this SDG were qualified using only the matrix spike results from unknown non-site samples or site samples from other SDGs. Refer to the LCS/LCSD for precision and accuracy data.

Post Digestion Spikes (Metals)

A post digestion spike (PDS) was not provided or required.

Laboratory Duplicates

Duplicate analyses were not requested on the samples from this sample delivery group. The laboratory analyzed a laboratory duplicate on sample SED-01-SB-2.0 and SED-06-

SB-2.0 for several analyses. All laboratory duplicate criteria were met with the exception noted below.

Total Organic Carbon (solid) by EPA 9060A Mod
The RPD between parent and duplicate results at 36% for the laboratory duplicate performed on sample SED-06-SB-2.0 in analytical batch 9101348 was above the control limits of 20%. The following results have been qualified as estimated (J) for laboratory duplicate precision anomalies.

- Total organic carbon for all sediment samples

The laboratory also provided duplicate analyses that were performed on unknown samples from other SDGs or work orders. Other duplicate results were not evaluated as they were performed on unknown or non-site samples.

Field Duplicates

A field duplicate was not collected with these samples.

Serial Dilution Samples (Metals)

A serial dilution was not provided for the total and dissolved metals for the level 2A review.

Surrogate (DMC) Recovery (Organics)

Surrogate compounds were appropriately added to all samples and QC samples for the organic analyses. The surrogate percent recoveries were within laboratory QC limits for all analyses.

Labeled Compounds and Clean-Up Standards (Dioxins/Furans, PCB Congeners, and Organochlorine Pesticides)

The recoveries of the labeled compounds and clean-up standards met the method or laboratory criteria with the exceptions noted below.

Dioxin/Furan
The recoveries for the labeled compound 13C-1,2,3,7,8,9-HxCDF were less than the QC limits (29-147%) for samples SED-06-SB-2.0, SED-01-SB-2.0, SED-01-SB-5.5, SED-

02-SB-2.0, SED-02-SB-5.0, and SED-02-SB-8.25 and the MS/MSD on sample SED-06-SB-2.0. As a result of the low recoveries, the following detected results were qualified as estimated (J-).

- 1,2,3,7,8,9-HxCDF and Total HxCDF in samples SED-06-SB-2.0, SED-01-SB-2.0, SED-01-SB-5.5, SED-02-SB-2.0, SED-02-SB-5.0, and SED-02-SB-8.25

The results for Total HxCDF in samples SED-01-SB-2.0, SED-02-SB-2.0, and SED-02-SB-5.0 have a final qualifier of “JK” as the concentration is also effected by EMPCs.

PCB Congeners
The recoveries for the labeled compounds 13C-126-PeCB for samples SED-01-SB-8.65 and SED-04-SB-4.75 and for 13C-77-TeCB and 13C-81-TeCB for sample SED-02-SB-8.25 exceeded the QC limits (10-145%). As a result of the elevated recoveries, the following detected results were qualified as estimated with high bias (J+) and non-detected results were qualified as estimated (UJ).

- 126-PeCB in samples SED-01-SB-8.65 and SED-04-SB-4.75
- All TeCB (40 to 81) congeners in sample SED-02-SB-8.25

Note that 58-TeCB in sample SED-02-SB-8.25 was qualified as an EMPC and has a final qualifier of “UJK”.

The laboratory noted that a few surrogate (labeled compound) ion ratios were outside the theoretical limits due to required dilution levels for samples SED-06-SB-2.0, SED-07-SB-2.0, SED-07-SB-4.35, SED-07-SB-6.35 and SED-01-SB-2.0 and one surrogate ion ratio was outside the theoretical limits for samples SED-04-SB-4.75 and SED-02-SB-2.0. The labeled compounds were not identified and no data were qualified.

Organochlorine pesticides
The recoveries for the labeled compounds C13-hexachlorobenzene in samples SED-06-SB-8.5, SED-04-SB-2.0, SED-04-SB-4.75, SED-07-SB-6.35, SED-01-SB-5.5, SED-02-SB-2.0, SED-01-SB-8.65, SED-02-SB-5.0, SED-02-SB-8.25; and 13C-Methoxyclor in samples SED-01-SB-5.5 and SED-01-SB-8.65; and 13C-pp-DDD and 13C-pp-DDT in sample SED-01-SB-8.65 were greater than the QC limits. As a result of the elevated labeled compound recoveries, the following detected results were qualified as estimated with high bias (J+) and non-detected results as (UJ):

- Hexachlorobenzene in samples SED-06-SB-8.5, SED-04-SB-2.0, SED-04-SB-4.75, SED-07-SB-6.35, SED-01-SB-5.5, SED-02-SB-2.0, SED-01-SB-8.65, SED-02-SB-5.0, and SED-02-SB-8.25
- Methoxyclor in samples SED-01-SB-5.5 and SED-01-SB-8.65
- p,p-DDT in sample SED-01-SB-8.65

- p,p-DDD, o,p-DDD, and o,p-DDT in sample SED-01-SB-8.65

The recoveries for C13-hexachlorobenzene in samples SED-06-SB-2.0 and SED-01-SB-2.0 and for 13C-pp-DDD in samples SED-01-SB-5.5 and SED-02-SB-8.25 were not applicable as the recoveries were reported from a 50 times dilution and the labeled compound is considered diluted below the calibration range

Sample Results

Raw data and sample quantitation were not evaluated for this 2A review. The results and reporting limits or detection limits were correctly reported with the correct units and appeared to be adjusted for sample size and dilution.

According to the case narrative or lab notes, various analyses for these samples were diluted or re-extracted with reduced sample size due to high target concentrations, high non target matrix interference, sample matrix, or due to the appearance of the final extract. The non-detected results for these analyses are at elevated detection limits due to the dilutions performed on these samples. Additionally, the reporting limits for several individual analytes were raised to account for interference from co-eluting analytes present in the sample or dilution. These analytes are reported as not-detected at the raised detection limit/reporting limit.

Diesel Range Organics

The laboratory indicated that the detected oil results for several samples are elevated due to the presence of individual analyte peaks in the quantitation range that are not representative of the fuel pattern reported. No qualification is required.

Semivolatile Organic Compounds

The laboratory indicated that the benzo(k)fluoranthene results associated with samples SED-01-SB-2.0, SED-01-SB-5.5, SED-01-SB-8.65, SED-02-SB-2.0, SED-02-SB-5.0, SED-02-SB-8.25, SED-04-SB-2.0, SED-04-SB-4.75 and SED-06-SB-2.0 are estimated because the peak separation for structural isomers is insufficient for accurate quantification. The affected results have been qualified as estimated (J).

Dioxin/Furan

The results for OCDD in samples SED-01-SB-2.0 and SED-02-SB-5.0 were flagged for exceeding the instrument linear calibration range. These two results are considered estimated quantities and are qualified as estimated (J).

Several dioxin and furan results were reported as EMPCs and were qualified with the laboratory “K” flag denoting an EMPC value. All but one of the results were also below the PQL and were reported by the laboratory as estimated (JK) values. The following

EMPCs not previously qualified as non-detected due to method blank contamination were qualified as estimated non-detects (UJK or UK) at the reported concentration in accordance with EPA Region 10 PCDD/PCDF DV guidelines and NFG use of regional guidance and/or professional judgment in evaluating these results.

- 1,2,3,4,7,8-HxCDD in sample SED-01-SB-5.5
- 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, and 1,2,3,7,8,9-HxCDF in sample SED-01-SB-8.65
- 2,3,7,8-TCDD in sample SED-02-SB-8.25
- 2,3,7,8-TCDD and 1,2,3,7,8,9-HxCDD in sample SED-04-SB-2.0
- 2,3,4,7,8-PeCDF in sample SED-04-SB-4.75
- 1,2,3,7,8,9-HxCDD in sample SED-06-SB-2.0
- 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, and 1,2,3,7,8,9-HxCDD in sample SED-06-SB-5.5
- 1,2,3,7,8-PeCDD in samples SED-06-SB-8.5 and SED-07-SB-4.35
- 1,2,3,7,8-PeCDD and 1,2,3,4,7,8,9-HpCDF in sample SED-07-SB-2.0

The following total dioxin and furan results were flagged (K) by the laboratory indicating the result was impacted by an EMPC. Results also below the PQL were flagged as (JK). These total results are considered estimated quantities and are qualified as an estimated value (JK).

- Total TeCDD, Total PeCDD, Total HxCDD, Total TeCDF, and Total PeCDF in samples SED-06-SB-2.0, SED-06-SB-5.5
- Total TeCDD, Total PeCDD, Total TeCDF, and Total HxCDF in sample SED-06-SB-8.5
- Total TeCDD, Total PeCDD, Total HxCDD, Total TeCDF, Total PeCDF, and Total HxCDF in samples SED-04-SB-2.0, SED-01-SB-2.0, SED-01-SB-8.65
- Total TeCDD, Total HxCDD, Total TeCDF, Total PeCDF, and Total HxCDF in sample SED-04-SB-4.75
- Total TeCDD and Total PeCDD samples SED-04-SB-7.75
- Total TeCDD, Total PeCDD, Total TeCDF, Total PeCDF, and Total HpCDF in sample SED-07-SB-2.0
- Total TeCDD, Total PeCDD, Total TeCDF, Total PeCDF, Total HxCDF and Total HpCDF in sample SED-07-SB-4.35
- Total TeCDD, Total PeCDD, Total TeCDF, Total PeCDF, and Total HxCDF in samples SED-07-SB-6.35, SED-02-SB-2.0, SED-02-SB-5.0
- Total TeCDD, Total PeCDD, Total HxCDD, Total TeCDF, Total PeCDF, and Total HpCDF in sample SED-01-SB-5.5
- Total TeCDD, Total PeCDD, Total TeCDF, and Total PeCDF in sample SED-02-SB-8.25

The above total results were greater than the results for the individual dioxin/furan congeners or were impacted by both EMPCs and confirmed homologues and the results were qualified as estimated (JK) rather than as not detected.

Various dioxin and furan and their associated labeled compounds were flagged as “Q” by the laboratory indicating that quantitative interference resulted in an estimated value. The following results that were not already qualified due to low labeled compound recoveries or as an EMPC are qualified as estimated (J).

- 2,3,7,8-TCDD in samples SED-01-SB-2.0, SED-01-SB-5.5, SED-02-SB-2.0, SED-02-SB-5.0, and SED-06-SB-2.0
- 1,2,3,7,8,9-HxCDF in samples SED-04-SB-2.0 and SED-06-SB-5.5
- Total HxCDF in sample SED-06-SB-5.5
- Total PeCDF in sample SED-06-SB-8.5
- Total PeCDD in sample SED-04-SB-4.75

Confirmatory runs for 2,3,7,8-TCDF were analyzed for these samples and the detected results for 2,3,7,8-TCDF greater than the PQLs were confirmed by the second analysis. The results for 2,3,7,8-TCDF from both analyses were reported on the EDD. The confirmation results which should be reported were reported from the November 8, 2019 analysis.

PCB Congeners
Several PCB Congener results were reported as EMPCs and were qualified with the laboratory “K” flag denoting an EMPC value. All but four of the results were also below the PQL and were reported by the laboratory as estimated (JK) values. The following EMPCs that were not previously qualified as non-detected due to method blank contamination are qualified as estimated non-detects (UK or UJK) at the reported concentration in accordance with EPA Region 10 PCDD/PCDF DV guidelines and NFG use of regional guidance and/or professional judgment in evaluating these results.

- 34-TrCB, 79-TeCB, 89-PeCB, 93/100-PeCB, 94-PeCB, 144-HxCB, 146-HxCB, 155-HxCB, 165-HxCB, 169-HxCB, 184-HpCB, and 188-HpCB in sample SED-01-SB-2.0
- 2-MoCB, 3-MoCB, 8-DiCB, 15-DiCB, 16-TrCB, 26/29-TrCB, 32-TrCB, 41-TeCB, 43-TeCB, 46-TeCB, 63-TeCB, 72-TeCB, 96-PeCB, 123-PeCB, 126-PeCB, 144-HxCB, 182-HpCB, and 188-HpCB in sample SED-01-SB-5.5
- 1-MoCB, 3-MoCB, 11-DiCB, 26/29-TrCB, 42-TeCB, 77-TeCB, 84-PeCB, 88/91-PeCB, 103-PeCB, 114-PeCB, and 167-HxCB in sample SED-01-SB-8.65
- 10-DiCB, 27-TrCB, 35-TrCB, 55-TeCB, 148-HxCB, 169-HxCB, 182-HpCB, and 188-HpCB in sample SED-02-SB-2.0

- 11-DiCB, 12/13-DiCB, 35-TrCB, 54-TeCB, 111-PeCB, and 188-HpCB in sample SED-02-SB-5.0
- 3-MoCB, 11-DiCB, 58-TeCB, 144-HxCB, 150-HxCB, 152-HxCB, 184-HpCB, and 186-HpCB in sample SED-02-SB-8.25
- 4-DiCB, 6-DiCB, 11-DiCB, 12/13-DiCB, 55-TeCB, 79-TeCB, 93/100-PeCB, 103-PeCB, 148-HxCB, and 150-HxCB in sample SED-04-SB-2.0
- 1-MoCB, 6-DiCB, 8-DiCB, 15-DiCB, 34-TrCB, 35-TrCB, 57-TeCB, 58-TeCB, 93/100-PeCB, 122-PeCB, 123-PeCB, and 182-HpCB in sample SED-04-SB-4.75
- 18/30-TrCB, 48-TeCB, 49/69-TeCB, 56-TeCB, 99-PeCB, and 135/151-HxCB in sample SED-04-SB-7.75
- 23-TrCB, 32-TrCB, 57-TeCB, 81-TeCB, and 188-HpCB in sample SED-06-SB-2.0
- 2-MoCB, 4-DiCB, 25-TrCB, 35-TrCB, 41-TeCB, 55-TeCB, 57-TeCB, 58-TeCB, 61/70/74/76-TeCB, 68-TeCB, 89-PeCB, 94-PeCB, 122-PeCB, and 182-HpCB in sample SED-06-SB-5.5
- 35-TrCB, 41-TeCB, 57-TeCB, 114-PeCB, 122-PeCB, 152-HxCB, and 169-HxCB in sample SED-06-SB-8.5
- 6-DiCB, 19-TrCB, 34-TrCB, 55-TeCB, 58-TeCB, 182-HpCB, and 189-HpCB in sample SED-07-SB-2.0
- 7-DiCB, 12/13-DiCB, 57-TeCB, 152-HxCB, and 182-HpCB in sample SED-07-SB-4.35
- 2-MoCB, 54-TeCB, 152-HxCB, 155-HxCB, 197/200-OcCB, and 207-NoCB HpCB in sample SED-07-SB-6.35
- 85/116/117-PeCB and 99-PeCB in sample SED-SB-RB

Note: The final Total PCB Congeners values should be adjusted based on blank contamination and EMPC actions noted in the previous sections.

Various PCBs and associated labeled compounds were flagged as “Q” by the laboratory indicating that quantitative interference resulted in an estimated value. The following results that were not already qualified due to labeled compound recoveries or as an EMPC are qualified as estimated (J or UJ).

- 8-DiCB and 54-TeCB in samples SED-01-SB-2.0 and SED-07-SB-4.35
- 54-TeCB in sample SED-01-SB-5.5
- 8-DiCB and 201-OcCB in sample SED-01-SB-8.65
- 32-TrCB and 144-HxCB in sample SED-02-SB-2.0
- 8-DiCB in sample SED-02-SB-5.0
- 8-DiCB, 32-TrCB, and 111-PeCB in sample SED-02-SB-8.25
- 12-DiCB in sample SED-06-SB-2.0

Organochlorine pesticides

The results for p,p-DDT in samples SED-01-SB-2.0 and SED-02-SB-2.0 were flagged for exceeding the instrument linear calibration range. These two results are considered estimated quantities and are qualified as estimated (J).

The laboratory indicated that several results were an EMPC / NDR as the peak detected does not meet ratio criteria and has resulted in an elevated detection limit. Results were reported as non-detected. The following results were qualified as estimated detection limit (UJK) to be consistent with the qualification of EMPCs:

- a-Chlordane, Aldrin and o,p-DDE in sample SED-06-SB-2.0
- Aldrin and o,p-DDE in sample SED-06-SB-5.5
- a-Chlordane, Aldrin, o,p-DDE, and Endrin, in samples SED-06-SB-8.5, SED-04-SB-2.0, SED-07-SB-4.35, SED-07-SB-6.35, SED-02-SB-5.0
- a-Chlordane, Aldrin, and Endrin in sample SED-04-SB-4.75
- Endrin in sample SED-04-SB-7.75
- Aldrin, o,p-DDE, and Endrin in sample SED-07-SB-2.0
- Aldrin and Endrin in sample SED-01-SB-2.0
- a-Chlordane, Aldrin, Endrin, cis-Nonachlor, and trans-Nonachlor in sample SED-01-SB-5.5
- a-Chlordane, Aldrin, o,p-DDE, Endrin aldehyde , and Methoxychlor in sample SED-02-SB-2.0
- Aldrin and g-Chlordane in sample SED-01-SB-8.65
- a-Chlordane, Aldrin, o,p-DDE, Dieldrin, cis-Nonachlor, and trans-Nonachlor in sample SED-02-SB-8.25
- Endosulfan II in sample SED-SB-RB

Grain Size by ASTM D 422M/PSET Parameters

The laboratory note/narrative for most samples indicated that the No. 4 sieve (gravel) and No. 10 sieve (coarse sand) grain size fractions contained organic materials. See the grain size case narratives included at the end of the Apex Laboratories report.

Overall Assessment

The analytical data are acceptable and usable as reported with the minor qualifications noted above. A few results were qualified due to LCS accuracy issues, laboratory duplicate precision issues or labeled compound recoveries. Results for Dioxin/Furans, Organochlorine Pesticides and PCB Congeners were qualified as not detected due to blank contamination or as EMPCs.

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following validation qualifiers and associated definitions are provided for use by the data validator to summarize the data quality.

Data Qualifier	Description
Standard Data Qualifiers	
U	The analyte was analyzed for, but was not detected at or above the associated value.
UJ	The analyte was not detected. The reported sample quantitation limit is considered estimated for QC reasons.
J	The analyte was detected. The reported numerical value is considered estimated for QC reasons.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
R	The sample result is rejected as unusable due to serious deficiencies in one or more QC criteria. The analyte may or may not be present in the sample.
K	Estimated Maximum Possible Concentration (EMPC)

DATA VALIDATION REPORT

Validated by: Eric Middleditch and Bill Fear, AlterEcho
Report Date: December 18, 2019
Project/Site: Siltronic Sediment Sampling
Laboratory No: A9J0371, WO15645, B9S8891, 570-10380-1

This report presents the validation of the data obtained during the field activities for the above referenced work assignment. The purpose of this review is to provide a Level 2A technical validation and quality control review of the following samples and rinsate blank collected on October 9, 2019 and submitted to APEX Laboratories, LLC. Portland, OR.

Field Sample Numbers	Laboratory ID	Analyses/Methods
SED-03-SB-2.0	A9J0371-01 15645001 LAR801 570-10380-1	Diesel and Oil Hydrocarbons by NWTPH-Dx Semivolatiles and PAHs by GC/MS SW8270D Alkylated PAH Homologs by 8270D (Modified) Total metals and mercury (ICP-MS) by SW6020A Cyanide - Total (solid) by ASTM D7511 Total Organic Carbon (solid) by EPA 9060A Mod Total Solid Determination by PSEP-TS Grain Size by ASTM D 422M/PSET Parameters Percent Dry Weight by SW8000C Chlorinated Herbicides by 8151A Percent Solids by EPA 160.3M Dioxins and Furans by Method 1613B PCB Congeners by Method 1668C Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified) Organotins (Tributyltin) by GC/MS SIM
SED-03-SB-5.0	A9J0371-03 15645002 LAR802 570-10380-2	
SED-03-SB-8.45	A9J0371-05 15645003 LAR803 570-10380-3	
SED-08-SB-2.0	A9J0371-06 15645004 LAR804 570-10380-4	
SED-08-SB-3.25	A9J0371-07 15645005 LAR805 570-10380-5	
SED-09-SB-2.0	A9J0371-08 15645006 LAR806 570-10380-6	
SED-09-SB-4.85	A9J0371-10 15645007 LAR807 570-10380-7	

Field Sample Numbers	Laboratory ID	Analyses/Methods
SED-09-SB-6.85	A9J0371-11 15645008 LAR808 570-10380-8	Diesel and Oil Hydrocarbons by NWTPH-Dx Semivolatiles and PAHs by GC/MS SW8270D Alkylated PAH Homologs by 8270D (Modified) Total metals and mercury (ICP-MS) by SW6020A Cyanide - Total (solid) by ASTM D7511 Total Organic Carbon (solid) by EPA 9060A Mod Total Solid Determination by PSEP-TS Grain Size by ASTM D 422M/PSET Parameters Percent Dry Weight by SW8000C Chlorinated Herbicides by 8151A Percent Solids by EPA 160.3M Dioxins and Furans by Method 1613B PCB Congeners by Method 1668C Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified) Organotins (Tributyltin) by GC/MS SIM
SED-10-SB-2.0	A9J0371-12 15645009 LAR809 570-10380-9	
SED-10-SB-5.2	A9J0371-14 15645010 LAR810 570-10380-10	
SED-10-SB-7.2	A9J0371-15 15645011 LAR811 570-10380-11	
SED-01-SS-1.0	A9J0371-17 15645013 LAR813 570-10380-13	
SED-02-SS-1.0	A9J0371-18 15645016 LAR814 570-10380-14	
SED-03-SS-1.0	A9J0371-19 15645017 LAR815 570-10380-15	
SED-04-SS-1.0	A9J0371-20 15645018 LAR816 570-10380-16	
SED-04-SS-1.0-DUP	A9J0371-21 15645019 LAR817 570-10380-17	

Field Sample Numbers	Laboratory ID	Analyses/Methods
SED-SB-RB	A9J0371-16 15645012 LAR812 570-10380-12	Diesel and Oil Hydrocarbons by NWTPH-Dx Semivolatiles and PAHs by GC/MS SW8270D Total metals and mercury (ICP-MS) by SW6020A Cyanide – Total (aqueous) by EPA 335.4 Total Organic Carbon by SM5310C Chlorinated Herbicides by 8151A Dioxins and Furans by Method 1613B PCB Congeners by Method 1668C Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified) Organotins (Tributyltin) by GC/MS SIM

The data submitted by the laboratory has been reviewed and verified for compliance with the Sediment Sampling Work Plan Willamette River Mile 6.55 to 6.9 West Siltronic Corporation Portland, Oregon prepared by Maul Foster & Alongi, Inc. (MFA) (May 2019) and the analytical procedures listed in the Test Methods for Evaluating Solid Wastes, SW-846, 3rd Edition and other referenced analytical methods. Data validation/data quality review was conducted in accordance with the current or most applicable versions of the National Functional Guidelines (NFG) for Superfund Organics Method Data Review (January 2017), the NFG for Superfund Inorganics Method Data Review (January 2017), and the NFG for High Resolution Superfund Methods Data Review (April 2016), along with the Region 10 Data Validation and Review Guidelines for Polychlorinated Dibenzo-p-Dioxin and Polychlorinated Dibenzofuran Data (PCDD/PCDF) Using Method 1613B, and SW846 Method 8290A, May 2014, modified for the method criteria. Laboratory QC limits/acceptance limits were used to evaluate the data unless where noted. Based on discussions with the data users, AlterEcho did not verify the toxic equivalencies (TEQs) listed for Dioxins and Furans in the laboratory reports since these factors will not be used for data reporting. Also, AlterEcho did not verify the Total PCB Congener concentrations listed in the laboratory reports since the data user plans to recalculate the Total PCB Congener concentrations using the validated data.

The herbicide samples were subcontracted to Weck Laboratories, Inc. and reported in the Apex Laboratories report. The Dioxins and Furans and PCB Congener samples were subcontracted to Cape Fear Analytical, LLC (Work Order WO15645) while the Organotins samples were subcontracted to Eurofins Calscience (Work Order 570-10380-1). The samples were subcontracted to Bureau Veritas Laboratories (formerly Maxxam Analytics International (Data Package B9S8891) for Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified). Samples were shipped and received under proper custody and preservation.

A Stage 2A Manual Validation as defined in the Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use, EPA-540-R-08-005, January 2009 USEPA, was performed on the samples. The data were evaluated based on the following parameters:

- Chain-of-Custody
- Case Narrative
- Field and Sample ID's
- Holding Time, including sample receipt, Preservation and Cooler Temperature
- Laboratory Blanks (method blank; reagent/preparation blanks)
- Field Blanks
- Laboratory Control Samples
- Matrix Spike/Matrix Spike Duplicates
- Post Digestion Spikes
- Laboratory Duplicates
- Field Duplicates
- Serial Dilution Samples (Metals)
- Surrogate (DMC) Recovery (Organics)
- Labeled Compounds and Clean-Up Standards (Dioxins/Furans, PCB Congeners, and Organochlorine Pesticides and Toxaphene)
- Sample Results

Data Completeness (Chain-of-Custody, Case Narrative, Field and Sample IDs)

The Level 2A data package was reviewed and included chain-of-custody (COC) forms, a case narrative, identification of field and sample numbers, sample results, laboratory quality control results, and sample receipt information. Raw data and instrument performance and calibration data are not evaluated for Level 2A data validation.

The COC forms were properly filled out including signatures, date and time of sampling, sampling identification, analyses requested, and custody transfers between different parties were signed and dated. The samples collected were appropriately identified and analyzed as per the COC.

Case narratives or a list of laboratory flags (Notes and Definitions) were provided and QC anomalies and QC outliers were noted.

Holding Times, Preservation and Cooler Temperature

The samples were received by the laboratory in good condition and within the recommended temperature range of 4 ± 2°C or just below, but not frozen.

Analytical holding times were assessed to determine whether the method holding time requirements were met by the laboratory. The holding times were met as all samples were prepared and/or analyzed within the method suggested holding times with the exceptions noted below.

Organotins (Tributyltin) by GC/MS SIM
The extraction of aqueous sample SED-SB-RB was performed nine days after sample collection. Since the seven day extraction holding time was exceeded, the following not detected result was qualified at an estimated reporting limit (UJ).

- Tributyltin in sample SED-SB-RB

Organochlorine Pesticides
The samples were collected on October 9, 2019 but were not extracted until October 31, 2019 which exceeds the 14-day holding time by 8 days. As a result of exceeded holding times, the following non-detected results were qualified as estimated with low bias (J- or UJ):

- All Organochlorine Pesticides in all sediment samples

Note that a few detected results actually have a final qualifier of “J” as the results were also qualified with high bias. See the Labeled Compounds section for details. Various other results were also Estimated Maximum Possible Concentrations (EMPCs) and have a final qualifier of “UJK”

Alkylated PAH Homologs by 8270D (Modified)
Upon arrival at the laboratory, the alkylated PAH homologs volume was frozen to a temperature of -18°C rather than being stored at a temperature of 4 ± 2°C because it was unknown whether the alkylated PAH homologs analysis would be needed. The eventual extraction of the alkylated PAH homologs analysis was performed within the one year holding time for frozen samples as indicated by Table 4-2 of the Sediment Sampling Work Plan. No qualification of the results was required because the extraction was performed within the extended, one year holding time.

Laboratory Blanks (method blank; reagent/preparation blank)

The method blanks and preparation blanks were prepared and analyzed as appropriate and at the required frequency. No contaminants were found in the laboratory method blanks and preparation blanks associated with these sample analyses with the exceptions noted below.

Semivolatile Organic Compounds
Naphthalene was detected in the method blank for QC Batch 9101003. However, the associated sample result was non-detected and therefore data are not qualified.

Chlorinated Herbicides
Dichloroprop; Dicamba; Picloram; Pentachlorophenol and 2,4,5-TP (Silvex) were detected in the initial analysis of the method blank for QC Batch W9J0915. Dichloroprop; Dicamba; Picloram; Pentachlorophenol; MCPP; 2,4,5-TP (Silvex); 2,4,5-T; MCPA and 2,4-D were detected in the reanalysis of this method blank. However, the associated sample results were all non-detected and therefore data are not qualified.

Dioxin/Furan
Various Dioxin/Furans were detected in the method blanks for QC Prep Batch 42129 and 42241. The majority of these blank results were reported as EMPCs. The following results less than five times the method blank concentration are qualified as Non-Detected (U) at the sample concentration due to method blank contamination.

- 2,3,7,8-TCDF in samples SED-09-SB-6.85 and SED-10-SB-7.2
- 1,2,3,7,8-PeCDF and 1,2,3,4,7,8-HxCDF in sample SED-09-SB-6.85
- 1,2,3,6,7,8-HxCDF and Total TeCDD in sample SED-10-SB-7.2

PCB Congeners
Various PCB congeners were detected in the method blanks for QC Prep Batches 42225, 42244, and 42292. The following sample results are less than five times the method blank concentration (adjusted for sample size) and are qualified as Non-Detects (U) at the sample concentration due to method blank contamination.

- 52-TeCB, 61/66/70/76-TeCB, 110/115-PeCB, 129/138/163-HxCB, 147/149-HxCB, 153/168-HxCB, 170-HpCB, 174-HpCB, 180/197-HpCB, 194-OcCB, 206-NoCB, 208-NoCB, and 209-DeCB in sample SED-SB-RB

Note: Several of the sample results in the bullet items above were qualified as EMPCs by the laboratory. Since these results were qualified as not detected (U) due to method blank contamination, no additional action was required.

Field Blanks

Sample SED-SB-RB was an equipment rinsate blank collected with these samples. Low level positive equipment rinsate blank results did not impact any detected sediment sample results.

Laboratory Control Samples

At least one laboratory control sample (LCS) analysis was analyzed per QC batch and for each analysis. A laboratory control sample duplicate (LCSD) was also analyzed with several methods if laboratory duplicates or matrix spikes were not performed. Accuracy and precision were evaluated using these analyses.

All LCS and LCSD recoveries were within the laboratory QC limits and all precision criteria were met as the RPDs were within laboratory QC limits with the exceptions noted below.
Semivolatile Organic Compounds
The LCS recoveries of 4-nitroaniline; 3,3'-dichlorobenzidine and carbazole in analytical batch 9101307. Qualification for high bias was not required as these compounds were not detected in the associated samples.

The RPD between LCS and LCSD recoveries for several compounds in analytical batch 9101003 were above the control limit of less than 30%. Qualification was not appropriate because these compounds were not detected in the affected sample.

The laboratory indicated that due to erratic or low blank spike recoveries, results for 3,3'-dichlorobenzidine are considered Estimated Values. However, the LCS/LCSD recoveries of 3,3'-dichlorobenzidine were within the control limits. Qualification was not appropriate.

Chlorinated Herbicides
Several analytes were recovered above the control limits in the LCS performed in analytical batch W9J0978. Qualification was not appropriate because the LCS recoveries were above the control limits while the affected compounds were not detected in the associated samples.

Matrix Spike/Matrix Spike Duplicates (MS/MSD)

MS/MSD analyses were not requested on a sample from this SDG. However, the laboratory did perform a MS or MS/MSD on several of the samples for various analyses. All MS/MSD recoveries were within the laboratory QC limits and all precision criteria were met as the RPDs were within laboratory QC limits with the exceptions noted below.

Semivolatile Organic Compounds
The MS/MSD RPDs for sample SED-01-SS-1.0 were outside the QC limits for several of the SVOCs. The following detections have been qualified as estimated (J) for MS/MSD precision anomalies in the unspiked parent sample.

- Acenaphthene; anthracene; benz(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; chrysene; fluoranthene; indeno(1,2,3-cd)pyrene; phenanthrene and pyrene in sample SED-01-SS-1.0

The MS/MSD recoveries were not applicable as the QC samples were analyzed at 100 times dilution and the results are below the linear calibration or the unspiked sample results were significantly above the spiking levels.

Alkylated PAH Homologs
The recoveries of several alkylated PAH homologs were outside the control limits for the MS performed on sample SED-04-SS-1.0 in analytical batch 9110570. Qualification was not appropriate because the concentrations of the affected analytes in the unspiked parent sample are much greater than four times the spiked concentration. These recoveries are not applicable.

Total metals and mercury
A MS/MSD was performed on sample SED-01-SS-1.0 in analytical batch 9101147 and the MS and/or MSD recoveries of several analytes were outside the control limits of 75-125%. The following detections have been qualified as estimated (J+) and biased high in due to MS/MSD recovery anomalies.

- Barium, chromium, copper, and zinc in samples SED-10-SB-2.0; SED-10-SB-5.2; SED-10-SB-7.2; SED-01-SS-1.0; SED-02-SS-1.0; SED-03-SS-1.0; SED-04-SS-1.0 and SED-04-SS-1.0-DUP

Cyanide - Total (solid)

A MS/MSD was performed on sample SED-01-SS-1.0 in analytical batch 9101028 and the MSD recovery for total cyanide (50%) was below the control limits of 64-136%. The following detected results have been qualified as estimated (J-) and biased low for the low MSD recovery:

- Total cyanide all sediment samples

Chlorinated Herbicides

A MS/MSD was performed on sample SED-01-SS-1.0 in analytical batch W9J0978. The MSD recovery of dichloroprop was below the control limits. The following result has been qualified as not detected at an estimated reporting limit (UJ) due to the low MSD recovery.

- Dichloroprop in sample SED-01-SS-1.0

Dioxin/Furan

The MS and/or MSD recoveries and MS/MSD RPDs for sample SED-01-SS-1.0 were outside the QC limits (70-130%/20%) for several of the Dioxin/Furans. The following detected results were qualified as estimated (J) due to the MS/MSD precision and accuracy anomalies.

- 1,2,3,4,6,7,8-HpCDD, 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, and 1,2,3,4,6,7,8-HpCDF in sample SED-01-SS-1.0

MS/MSD recoveries for OCDD were not applicable due to the high native concentrations of this analyte in the unspiked parent sample. No data additional validation qualifiers are added to the data.

PCB Congeners

The MS and/or MSD recoveries for 4-DiCB, 15-DiCB, 206-NoCB, and 209-DeCB were outside the QC limit (50-150%/35%) for sample SED-01-SS-1.0. The following detected results were qualified as estimated (J) due to the MS/MSD precision and accuracy anomalies.

- 4-DiCB, 15-DiCB, 206-NoCB, and 209-DeCB in sample SED-01-SS-1.0

MS/MSD recoveries for 105-PeCB and 118-PeCB were not applicable due to the high native concentrations of the analytes in the unspiked parent sample. No data additional validation qualifiers are added to the data.

Organochlorine pesticides

The MSD recovery for Endosulfan sulfate and the MS/MSD RPDs for beta-BHC, a-Chlordane, and Endosulfan sulfate exceeded the QC limit for sample SED-01-SS-1.0. However, no qualification is required as these compounds were not detected in the sample.

The laboratory indicated that the recoveries for o,p-DDD, p,p-DDD, p,p-DDE, o,p-DDT, and p,p-DDT were not calculated (applicable) due to the high native concentrations of these analytes in the unspiked parent sample. No data validation qualifiers are added to the data.

The laboratory also indicated that the recoveries for Aldrin and o,p-DDE were not calculated due to matrix interferences. These two analytes were reported and qualified as EMPCs at elevated detection limits. No additional qualifiers were added to the data.

The laboratory also provided MS and/or MSD analyses that were performed on unknown samples from other SDGs or work orders for several analyses. Typically, sample data are not qualified using MS/MSD results from unknown samples or samples from other SDGs. Additionally, for organic analyses only the unspiked parent sample is usually qualified for the MS/MSD results unless a systematic issue is noted. Therefore, these MS/MSD analyses were not evaluated and no data in this SDG were qualified using only the matrix spike results from unknown non-site samples or site samples from other SDGs. Refer to the LCS/LCSD for precision and accuracy data.

Post Digestion Spikes (Metals)

A post digestion spike (PDS) was not provided or required.

Laboratory Duplicates

Duplicate analyses were not requested on the samples from this sample delivery group. The laboratory analyzed a laboratory duplicate on various samples for several analyses. All laboratory duplicate criteria were met with the exceptions noted below.

Diesel and Oil Hydrocarbons by NWTPH-Dx

The RPD between parent and laboratory duplicate results for Oil at 69% was outside the control limits of 30% for sample SED-03-SB-5.0. Due to the laboratory duplicate precision anomaly the following result has been qualified as estimated (J).

- Oil for sample SED-03-SB-5.0

Semivolatile Organic Compounds
The RPD between parent and laboratory duplicate results could not be calculated for a few compounds in sample SED-03-SB-8.45. Qualification was not appropriate because either the analyte was not detected in one of the analyses and the concentration of the parent or the laboratory duplicate were below the reporting limits.

Organochlorine pesticides
The duplicate RPDs for o,p-DDD (28%), p,p-DDD (36%), and p,p-DDT (194%) exceeded the QC limits of 25 for sample SED-01-SS-1.0. As a result of exceeded precision, the following detected results were qualified as estimated (J):

- o,p-DDD, p,p-DDD, and p,p-DDT in sample SED-01-SS-1.0

These results are also qualified for holding times and are qualified as (J-).

The laboratory also provided duplicate analyses that were performed on unknown samples from other SDGs or work orders. Other duplicate results were not evaluated as they were performed on unknown or non-site samples.

Field Duplicates

Sample SED-04-SS-1.0-DUP is a field duplicate of sample SED-04-SS-1.0. All field duplicate precision criteria were met as the RPDs for results greater than the reporting limit were less than 50% or the difference between the sample and field duplicate results was less than the reporting limits with the exceptions noted below:

Diesel and Oil Range Organics
The RPD between parent and field duplicate results for diesel exceeded the QC limit of 50% and the detected concentrations were greater than the reporting limit. The following results have been qualified as estimated (J) for field duplicate precision anomalies.

- Diesel for samples SED-04-SS-1.0 and SED-04-SS-1.0-DUP

Organochlorine pesticides
The duplicate RPDs for o,p-DDD and p,p-DDD exceeded the QC limit of 50% and the difference between the results for p,p-DDT was greater than the reporting limit for the

field duplicate pair. As a result of exceeded precision, the following detected results were qualified as estimated (J):

- o,p-DDD, p,p-DDD, and p,p-DDT in samples SED-04-SS-1.0 and SED-04-SS-1.0-DUP

These results are also qualified for holding times and are qualified as (J-).

Serial Dilution Samples (Metals)

A serial dilution was not provided for the total and dissolved metals for the level 2A review.

Surrogate (DMC) Recovery (Organics)

Surrogate compounds were appropriately added to all samples and QC samples for the organic analyses. The surrogate percent recoveries were within laboratory QC limits for all analyses.

Semivolatile Organic Compounds
The surrogates p-terphenyl-d14 and/or 2,4,6-tribromophenol were recovered outside the control limits in samples SED-03-SB-8.45 and SED-01-SS-1.0. Qualification was not appropriate due to the large dilutions required to analyze these samples.

Labeled Compounds and Clean-Up Standards (Dioxins/Furans, PCB Congeners, and Organochlorine Pesticides)

The recoveries of the labeled compounds and clean-up standards met the method or laboratory criteria with the exceptions noted below.

Dioxin/Furan
The recoveries for the labeled compound 13C-1,2,3,7,8,9-HxCDF were less than the QC limits (29-147%) for samples SED-03-SB-2.0 and SED-10-SB-5.2. As a result of the low recoveries, the following detected results were qualified as estimated (J-).

- 1,2,3,7,8,9-HxCDF and Total HxCDF in samples SED-03-SB-2.0 and SED-10-SB-5.2

The results for Total HxCDF have a final qualifier of “JK” as the concentration is also effected by EMPCs.

PCB Congeners

The recoveries for the labeled compounds 13C-126-PeCB for samples SED-02-SS-1.0, SED-03-SB-5.0, SED-10-SB-5.2, and SED-10-SB-7.2; 13C-205-OcCB for sample SED-09-SB-2.0 and SED-10-SB-2.0; and 13C-209-DeCB for sample SED-10-SB-7.2 exceeded the QC limits (10-145%). As a result of the elevated recoveries, the following detected results were qualified as estimated with high bias (J+) and non-detected results were qualified as estimated (UJ).

- 126-PeCB in samples SED-02-SS-1.0, SED-03-SB-5.0, SED-10-SB-5.2, and SED-10-SB-7.2
- All OcCB congeners except for 202-OcCB in samples SED-09-SB-2.0 and SED-10-SB-2.0
- 209-DeCB in sample SED-10-SB-7.2

The laboratory noted that some samples had surrogate (labeled compound) ion ratios outside the theoretical limits due matrix interferences. The labeled compounds were not identified and no data were qualified.

Organochlorine pesticides

The recoveries for the labeled compounds C13-hexachlorobenzene in samples SED-03-SB-2.0, SED-03-SB-8.45, SED-04-SS-01, and SED-04-SS-01_DUP; 13C-Methoxyclor in sample SED-03-SB-8.45; and 13C-pp-DDD in sample SED-09-SB-2.0 were greater than the QC limits. As a result of the elevated labeled compound recoveries, the following detected results were qualified as estimated with high bias (J+) and non-detected results as (UJ):

- Hexachlorobenzene in samples SED-03-SB-2.0, SED-03-SB-8.45, SED-04-SS-01, and SED-04-SS-01_DUP
- Methoxyclor in sample SED-03-SB-8.45
- p,p-DDD, o,p-DDD, and o,p-DDT in sample SED-09-SB-2.0

Note that the detected results actually have a final qualifier of “J” as the results were also qualified with low bias for exceeded holding times.

The recoveries for the labeled compounds 13C6-beta BHC in sample SED-09-SB-2.0 and 13C12-Endrin ketone in sample SED-10-SB-5.2 were less than the QC limits. As a result of the low labeled compound recoveries, the following non-detected results were qualified as estimated (UJ):

- beta BHC, delta-BHC, and Aldrin in sample SED-09-SB-2.0
- Endrin ketone, Endrin aldehyde, Endosulfan sulfate, Mirex in sample SED-10-SB-5.2

Sample Results

Raw data and sample quantitation were not evaluated for this 2A review. The results and reporting limits or detection limits were correctly reported with the correct units and appeared to be adjusted for sample size and dilution.

According to the case narrative or lab notes, various analyses for these samples were diluted or re-extracted with reduced sample size due to high target concentrations, high non target matrix interference, sample matrix, or due to the appearance of the final extract. The non-detected results for these analyses are at elevated detection limits due to the dilutions performed on these samples. Additionally, the reporting limits for several individual analytes were raised to account for interference from co-eluting analytes present in the sample or dilution. These analytes are reported as not-detected at the raised detection limit/reporting limit.

Diesel and Oil Range Organics

The laboratory noted that the diesel and oil results for sample SED-09-SB-2.0 are estimated due to overlap from the other analyte. An estimated (J) qualifier has been applied to the following results.

- Diesel and oil results for sample SED-09-SB-2.0

The laboratory indicated that the oil results for several samples are elevated due to the presence of individual analyte peaks in the quantitation range that are not representative of the fuel pattern reported. Additionally, the laboratory noted that the chromatographic pattern does not resemble the fuel standard used for quantitation. The diesel result represents carbon range C12 to C24, and the oil result represents >C24 to C40 for samples SED-04-SS-1.0 and SED-04-SS-1.0-DUP. No qualification is required.

Semivolatile Organic Compounds

The laboratory noted that the benzo(k)fluoranthene results for almost all the samples are estimated because peak separation for structural isomers is insufficient for accurate quantification. The following results were qualified as estimated (J):

- Benzo(k)fluoranthene in samples SED-01-SS-1.0; SED-02-SS-1.0; SED-03-SB-2.0; SED-03-SB-5.0; SED-03-SB-8.45; SED-03-SS-1.0; SED-04-SS-1.0; SED-04-SS-1.0-DUP; SED-08-SB-2.0; SED-08-SB-3.25; SED-09-SB-4.85; SED-09-SB-6.85; SED-10-SB-2.0; SED-10-SB-5.2 and SED-10-SB-7.2.

Dioxin/Furan

The results for Total TeCDF in samples SED-09-SB-2.0 and SED-10-SB-2.0 were flagged for exceeding the instrument linear calibration range. The results considered estimated quantities are qualified as estimated (J). These results were also impacted by EMPCs and have a “JK” final qualifier.

Several dioxin and furan results were reported as EMPCs and were qualified with the laboratory “K” flag denoting an EMPC value. All but three of the results were also below the PQL and were reported by the laboratory as estimated (JK) values. The following EMPCs not previously qualified as non-detected due to method blank contamination were qualified as estimated non-detects (UJK or UK) at the reported concentration in accordance with EPA Region 10 PCDD/PCDF DV guidelines and NFG use of regional guidance and/or professional judgment in evaluating these results.

- 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,7,8,9-HxCDD in sample SED-01-SS-1.0
- 1,2,3,4,7,8-HxCDD in sample SED-03-SB-2.0
- 2,3,7,8-TCDD in sample SED-03-SB-5.0
- 2,3,7,8-TCDF and 1,2,3,6,7,8-HxCDF in sample SED-03-SB-8.45
- 1,2,3,6,7,8-HxCDF in sample SED-03-SS-1.0
- 1,2,3,7,8-PeCDD and 1,2,3,7,8,9-HxCDD in sample SED-04-SS-1.0
- 2,3,7,8-TCDD and 1,2,3,7,8-PeCDD in sample SED-04-SS-1.0-DUP
- 1,2,3,4,7,8-HxCDD and 1,2,3,7,8,9-HxCDD in sample SED-08-SB-2.0
- 2,3,4,6,7,8-HxCDF and 1,2,3,7,8,9-HxCDF in sample SED-08-SB-3.25
- 2,3,4,7,8-PeCDF and 1,2,3,4,6,7,8-HpCDF in sample SED-09-SB-6.85
- 2,3,7,8-TCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, and 1,2,3,7,8,9-HxCDD in sample SED-10-SB-5.2
- 1,2,3,6,7,8-HxCDD and 1,2,3,7,8,9-HxCDF in sample SED-10-SB-7.2

The following total dioxin and furan results were flagged (K) by the laboratory indicating the result was impacted by an EMPC. Results also below the PQL were flagged as (JK). These total results are considered estimated quantities and are qualified as an estimated value (JK).

- Total TeCDD, Total PeCDD, Total HxCDD, Total TeCDF, Total PeCDF, and Total HxCDF in samples SED-03-SS-2.0, SED-09-SS-2.0, and SED-04-SS-1.0
- Total TeCDD, Total PeCDD, Total TeCDF, Total PeCDF, and Total HxCDF in sample SED-03-SS-5.0
- Total PeCDD, Total HxCDD, Total TeCDF, Total PeCDF, and Total HxCDF in samples SED-03-SS-1.0 and SED-03-SS-8.45
- Total TeCDD, Total HxCDD, Total TeCDF, and Total PeCDF in sample SED-08-SS-2.0
- Total TeCDD, Total HxCDD, Total TeCDF, and Total HxCDF in sample SED-08-SS-3.25
- Total TeCDF, Total PeCDF, and Total HpCDF in sample SED-09-SS-4.85

- Total TeCDD, Total TeCDF, Total PeCDF, Total HxCDF, and Total HpCDF in sample SED-09-SS-6.85
- Total TeCDD, Total HxCDD, Total TeCDF, Total PeCDF, and Total HxCDF in sample SED-10-SS-2.0
- Total TeCDD, Total PeCDD, Total HxCDD, Total TeCDF, and Total HxCDF in sample SED-10-SS-5.2
- Total HxCDD, Total TeCDF, Total PeCDF, and Total HxCDF in sample SED-10-SS-7.2
- Total TeCDD, Total PeCDD, Total HxCDD, Total TeCDF, Total PeCDF, and Total HpCDF in sample SED-01-SS-1.0
- Total TeCDD, Total PeCDD, Total PeCDF, Total HxCDF, and Total HpCDF in sample SED-02-SS-1.0
- Total TeCDD, Total PeCDD, Total HxCDD, Total TeCDF, and Total PeCDF in sample SED-04-SS-1.0-DUP

The above total results were greater than the results for the individual dioxin/furan congeners or were impacted by both EMPCs and confirmed homologues and the results were qualified as estimated (JK) rather than as not detected.

The above results for Total TeCDF and Total PeCDF in sample SED-03-SS-8.45 were also flagged “P” by the laboratory. According to the case narrative diphenyl ether (DPE) interferences were detected in the samples and where a totals peak could be completely attributed to the DPE, the concentration was removed from the total homolog sum. However, if the concentration could not be completely attributed to the DPE, or where the DPE co-eluted with a 2378-substituted furan peak, by professional judgment the peak may be left in the report. In both cases, the concentration is flagged with a P and should be considered an estimate.

Various dioxins and furans and their associated labeled compounds were flagged as “Q” by the laboratory indicating that quantitative interference resulted in an estimated value. The following results that were not already qualified due to low labeled compound recoveries or as an EMPC are qualified as estimated (J or UJ).

- 1,2,3,7,8,9-HxCDF in samples SED-01-SS-1.0, SED-03-SB-5.0, SED-03-SB-8.45, SED-03-SS-1.0, SED-04-SS-1.0, SED-04-SS-1.0-DUP, SED-09-SB-2.0, and SED-09-SB-6.85
- Total PeCDD in samples SED-08-SB-3.25, SED-09-SB-4.85, SED-09-SB-6.85, SED-10-SB-2.0, and SED-10-SB-7.2
- Total PeCDF in samples SED-08-SB-3.25 and SED-10-SB-5.2
- Total HxCDF in samples SED-01-SS-1.0 and SED-04-SS-1.0-DUP

Confirmatory runs for 2,3,7,8-TCDF were analyzed for these samples and the detected results for 2,3,7,8-TCDF greater than the PQLs were confirmed by the second analysis. The results for 2,3,7,8-TCDF from both analyses were reported on the EDD. The confirmation results which should be reported were reported from the November 5 and 6, 2019 analysis.

PCB Congeners

Several PCB Congener results were reported as EMPCs and were qualified with the laboratory “K” flag denoting an EMPC value. All but three of the results were also below the PQL and were reported by the laboratory as estimated (JK) values. The following EMPCs that were not previously qualified as non-detected due to method blank contamination are qualified as estimated non-detects (UK or UJK) at the reported concentration in accordance with EPA Region 10 PCDD/PCDF DV guidelines and NFG use of regional guidance and/or professional judgment in evaluating these results.

- 1-MoCB, 3-MoCB, 19-TrCB, 54-TeCB, 72-TeCB, 93/100-PeCB, 98/102-PeCB122-PeCB, 123-PeCB, 148-HxCB, 150-HxCB, 182-HpCB, and 205-OcCB in sample SED-01-SS-1.0
- 6-DiCB, 35-TrCB, 41-TeCB, 54-TeCB, 58-TeCB, 94-PeCB, 122-PeCB, 154-HxCB, and 189-HpCB in sample SED-02-SS-1.0
- 9-DiCB, 93/100-PeCB, 120-PeCB, 126-PeCB, and 148-HxCB in sample SED-03-SB-2.0
- 41-TeCB, 54-TeCB, 83-PeCB, 93/100-PeCB, 111-PeCB, 123-PeCB, 142-HxCB, 145-HxCB, 150-HxCB, and 188-HpCB in sample SED-03-SB-5.0
- 2-MoCB, 18/30-TrCB, 20/28-TrCB, 22-TrCB, 60-TeCB, 64-TeCB, 77-TeCB, 108/124-PeCB, 139/140-HxCB, 169-HxCB, and 191-HpCB in sample SED-03-SB-8.45
- 8-DiCB, 15-DiCB, 16-TrCB, 17-TrCB, 22-TrCB, 25-TrCB, 26/29-TrCB, 32-TrCB, 46-TeCB, 50/53-TeCB, 54-TeCB, 59/62/75-TeCB, 77-TeCB, 83-PeCB, 107-PeCB, 133-HxCB, 134-HxCB, 167-HxCB, 171/173-HpCB, 175-HpCB, 176-HpCB, 189-HpCB, 201-OcCB, and 206-NoCB in sample SED-03-SS-1.0
- 1-MoCB, 4-DiCB, 6-DiCB, 8-DiCB, 34-TrCB, 35-TrCB, 96-PeCB, 98/102-PeCB, 103-PeCB, 108/124-PeCB, 123-PeCB, 131-HxCB, 133-HxCB, 190-HpCB, 191-HpCB, and 205-OcCB in sample SED-04-SS-1.0
- 2-MoCB, 6-DiCB, 8-DiCB, 27-TrCB, 93/100-PeCB, 96-PeCB, 98/102-PeCB, 103-PeCB, 123-PeCB, 134-HxCB, 154-HxCB, and 207-NoCB in sample SED-04-SS-1.0-DUP
- 1-MoCB, 8-DiCB, 27-TrCB, 35-TrCB, 43-TeCB, 79-TeCB, 83-PeCB, 89-PeCB, 93/100-PeCB, 114-PeCB, 120-PeCB, 137-HxCB, 148-HxCB, 167-HxCB, 172-HpCB, 175-HpCB, 189-HpCB, 191-HpCB, 205-OcCB, and 207-NoCB in sample SED-08-SB-2.0

- 8-DiCB, 41-TeCB, 63-TeCB, 89-PeCB, 107-PeCB, 108/124-PeCB, 114-PeCB, 134-HxCB, 137-HxCB, 146-HxCB, 175-HpCB, 178-HpCB, 201-OcCB, and 206-NoCB in sample SED-08-SB-3.25
- 41-TeCB, 121-PeCB, 123-PeCB, and 155-HxCB in sample SED-09-SB-2.0
- 4-DiCB, 6-DiCB, 16-TrCB, 17-TrCB, 21/33-TrCB, 22-TrCB, 105-PeCB, 144-HxCB, 154-HxCB, 164-HxCB, 178-HpCB, 190-HpCB, and 196-OcCB in sample SED-09-SB-4.85
- 3-MoCB, 31-TrCB, 44/47-TeCB, 61/66/70/76-TeCB, 86/87/97/109/119/125-PeCB, 90/101/113-PeCB, 95-PeCB, 99-PeCB, 105-PeCB, 128/166-HxCB, 156/157-HxCB, 170-HpCB, 177-HpCB, and 179-HpCB in sample SED-09-SB-6.85
- 11-DiCB, 41-TeCB, 57-TeCB, 111-PeCB, 114-PeCB, and 150-HxCB in sample SED-10-SB-2.0
- 1-MoCB, 15-DiCB, 17-TrCB, 43-TeCB, 67-TeCB, 72-TeCB, 83-PeCB, 107-PeCB, 108/124-PeCB, 154-HxCB, 167-HxCB, and 191-HpCB in sample SED-10-SB-5.2
- 1-MoCB, 44/47-TeCB, 61/66/70/76-TeCB, 66-TeCB, 84-PeCB, 85/116/117-PeCB, 86/87/97/109/119/125-PeCB, 99-PeCB, 118-PeCB, 128/166-HxCB, 132-HxCB, 156/157-HxCB, 164-HxCB, 171/173-HpCB, 172-HpCB, 176-HpCB, 194-OcCB, 196-OcCB, and 197/200-OcCB in sample SED-10-SB-7.2
- 11-DiCB, 21/33-TrCB, 86/87/97/109/119/125-PeCB, 90/101/113-PeCB, 95-PeCB, 156/157-HxCB, and 183/185-HpCB in sample SED-SB-RB

Note: The final Total PCB Congeners values should be adjusted based on blank contamination and EMPC actions noted in the previous sections.

Various PCBs and associated labeled compounds were flagged as “Q” by the laboratory indicating that quantitative interference resulted in an estimated value. The following results that were not already qualified due to labeled compound recoveries or as an EMPC are qualified as estimated (J or UJ).

- 54-TeCB in sample SED-03-SB-8.45
- 32-TrCB, 54-TeCB, and 89-PeCB in samples SED-04-SS-1.0 and SED-04-SS-1.0-DUP
- 126-PeCB in sample SED-08-SB-2.0

Organochlorine pesticides

The laboratory indicated that several results were an EMPC / NDR as the peak detected does not meet ratio criteria and has resulted in an elevated detection limit. Results were reported as non-detected. The following results were qualified as estimated detection limit (UJK) to be consistent with the qualification of EMPCs:

- Aldrin, g-Chlordane, and o,p-DDE in sample SED-03-SB-3.0
- a-Chlordane and Aldrin in sample SED-03-SB-5.0
- Aldrin and o,p-DDE in samples SED-03-SB-8.45, SED-08-SB-3.25, and SED-04-SS-1.0
- Aldrin, o,p-DDE, and Endrin in sample SED-08-SB-2.0
- Aldrin, o,p-DDE, Endrin, and trans-Nonachlor in sample SED-09-SB-2.0
- o,p-DDE in sample SED-09-SB-4.85 and SED-10-SB-5.2
- Aldrin, alpha-BHC, beta-BHC, delta-BHC, Lindane, Endrin, and cis-Nonachlor in sample SED-10-SB-2.0
- a-Chlordane, Aldrin, o,p-DDE, Endrin, and trans-Nonachlor in sample SED-01-SS-1.0
- Aldrin, g-Chlordane, o,p-DDE, and Endosulfan II in sample SED-02-SS-1.0
- Aldrin, o,p-DDE, and Endosulfan II in sample SED-03-SS-1.0
- Aldrin, g-Chlordane, o,p-DDE, Endrin, and Dieldrin in sample SED-04-SS-1.0-DUP
- Endosulfan II in sample SED-SB-RB

Grain Size by ASTM D 422M/PSET Parameters
The laboratory note/narrative for most samples indicated that the No. 4 sieve (gravel) and No. 10 sieve (coarse sand) grain size fractions contained organic materials. See the grain size case narratives included at the end of the Apex Laboratories report.

Overall Assessment

The analytical data are acceptable and usable as reported with the minor qualifications noted above. All sediment Organochlorine Pesticides were qualified due to exceeded holding times. Additional results were qualified due to LCS, labeled compound recoveries, field duplicate precision or MS/MSD and duplicate accuracy and precision issues. Results for Dioxin/Furans, Organochlorine Pesticides and PCB Congeners were also qualified as not detected due to blank contamination or as EMPCs.

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following validation qualifiers and associated definitions are provided for use by the data validator to summarize the data quality.

Data Qualifier	Description
Standard Data Qualifiers	
U	The analyte was analyzed for, but was not detected at or above the associated value.
UJ	The analyte was not detected. The reported sample quantitation limit is considered estimated for QC reasons.
J	The analyte was detected. The reported numerical value is considered estimated for QC reasons.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
R	The sample result is rejected as unusable due to serious deficiencies in one or more QC criteria. The analyte may or may not be present in the sample.
K	Estimated Maximum Possible Concentration (EMPC)

DATA VALIDATION REPORT

Validated by:	Bill Fear, AlterEcho
Report Date:	Revised December 26, 2019
Project/Site:	Siltronic Sediment Sampling
Laboratory No:	A9J0427, WO15644, B9T0140, 570-10374-1

This report presents the validation of the data obtained during the field activities for the above referenced work assignment. The purpose of this review is to provide a Level 2A technical validation and quality control review of the following samples and rinsate blank collected on October 10, 2019 and submitted to APEX Laboratories, LLC. Portland, OR. In addition, raw data associated with samples SED-05-SS-1.0, SED-06-SS-1.0, SED-07-SS-1.0, and SED-08- SS-1.0 were evaluated as part of a Level 4 review in order to meet project requirements for Level 4 validation.

Field Sample Numbers	Laboratory ID	Analyses/Methods
SED-05-SS-1.0	A9J0427-01 15644001 LAY795 570-10374-1	Diesel and Oil Hydrocarbons by NWTPH-Dx Semivolatiles and PAHs by GC/MS SW8270D Alkylated PAH Homologs by 8270D (Modified) Total metals and mercury (ICP-MS) by SW6020A Cyanide - Total (solid) by ASTM D7511 Total Organic Carbon (solid) by EPA 9060A Mod Total Solid Determination by PSEP-TS Grain Size by ASTM D 422M/PSET Parameters Percent Dry Weight by SW8000C Chlorinated Herbicides by 8151A Percent Solids by EPA 160.3M Dioxins and Furans by Method 1613B PCB Congeners by Method 1668C Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified) Organotins (Tributyltin) by GC/MS SIM
SED-06-SS-1.0	A9J0427-02 15644002 LAY796 570-10374-2	
SED-07- SS-1.0	A9J0427-03 15644005 LAY797 570-10374-3	
SED-07- SS-1.0-DUP	A9J0427-04 15644006 LAY798 570-10374-4	
SED-08- SS-1.0	A9J0427-05 15644007 LAY799 570-10374-5	
SED-09- SS-1.0	A9J0427-06 15644008 LAY800 570-10374-6	
SED-10- SS-1.0	A9J0427-07 15644009 LAY801	

Field Sample Numbers	Laboratory ID	Analyses/Methods
	570-10374-7	
SED-SS-RB	A9J0427-08 15644010 LAY802 570-10374-8	Diesel and Oil Hydrocarbons by NWTPH-Dx Semivolatiles and PAHs by GC/MS SW8270D Total metals and mercury (ICP-MS) by SW6020A Cyanide – Total (aqueous) by EPA 335.4 Total Organic Carbon by SM5310C Chlorinated Herbicides by 8151A Dioxins and Furans by Method 1613B PCB Congeners by Method 1668C Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified) Organotins (Tributyltin) by GC/MS SIM

The data submitted by the laboratory has been reviewed and verified for compliance with the Sediment Sampling Work Plan Willamette River Mile 6.55 to 6.9, West Siltronic Corporation Portland, Oregon prepared by Maul Foster & Alongi, Inc. (MFA) (May 2019) and the analytical procedures listed in the Test Methods for Evaluating Solid Wastes, SW-846, 3rd Edition and other referenced analytical methods. Data validation/data quality review was conducted in accordance with the current or most applicable versions of the National Functional Guidelines (NFG) for Superfund Organics Method Data Review (January 2017), the NFG for Superfund Inorganics Method Data Review (January 2017), and the NFG for High Resolution Superfund Methods Data Review (April 2016), along with the Region 10 Data Validation and Review Guidelines for Polychlorinated Dibenzo-p-Dioxin and Polychlorinated Dibenzofuran Data (PCDD/PCDF) Using Method 1613B, and SW846 Method 8290A, May 2014, modified for the method criteria. Laboratory QC limits/acceptance limits were used to evaluate the data unless where noted. Based on discussions with the data users, AlterEcho did not verify the toxic equivalencies (TEQs) listed for Dioxins and Furans in the laboratory reports since these factors will not be used for data reporting. Also, AlterEcho did not verify the Total PCB Congener concentrations listed in the laboratory reports since the data user plans to recalculate the Total PCB Congener concentrations using the validated data.

The herbicide samples were subcontracted to Weck Laboratories, Inc. and reported in the Apex Laboratories report. The Dioxins and Furans and PCB Congener samples were subcontracted to Cape Fear Analytical, LLC (Work Order WO15644) while the Organotins samples were subcontracted to Eurofins Calscience (Work Order 570-10374-1). The samples were subcontracted to Bureau Veritas Laboratories (formerly Maxxam Analytics International (Data Package B9T0140) for Organochlorine Pesticides by BRL SOP 00014/1, GC/MS/MS (EPA Method 1699 Modified). Samples were shipped and received under proper custody and preservation.

Both a Stage 4 and Stage 2A Manual Validation as defined in the Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use, EPA-540-R-08-005, January 2009 USEPA, was performed. The data were evaluated based on the following parameters:

- Chain-of-Custody (COC)
- Case Narrative
- Field and Sample ID's
- Holding Time, including sample receipt, Preservation and Cooler Temperature
- Instrument Stability and Performance (e.g., MS tuning, interference check samples, chromatographic resolution) (Level 4)
- Calibration and Calibration Verification [e.g., initial calibration, initial calibration verification (ICV) and continuing calibration verification (CCV)] (Level 4)
- Blanks [e.g., method blank; initial calibration blank (ICB), and continuing calibration blank (CCB), reagent/preparation blanks, and trip blank (VOC only) if specified in method] (Only method blank evaluated for Level 2A)
- Laboratory Control Samples (LCS)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Post Digestion Spikes (Metals)
- Laboratory Duplicates
- Field Duplicates
- Serial Dilution Samples (Metals)
- Surrogate (DMC) Recovery (Organics)
- Labeled Compounds and Clean-Up Standards (Dioxins/Furans, PCB Congeners, and Organochlorine Pesticides and Toxaphene)
- Internal Standards (Level 4)
- Sample Results [e.g., Recalculation and Reduction of Results from Raw Data, Transcription Check, and Analyte Identification] (Level 4)

Data Completeness (Chain-of-Custody, Case Narrative, Field and Sample IDs)

The Level 4 data package was complete and included COC forms, a case narrative, identification of field and sample numbers, sample results, laboratory quality control results, instrument calibration; calibration verifications, sample receipt information, and all appropriate raw data.

The COC forms were properly filled out including signatures, date and time of sampling, sampling identification, analyses requested, and custody transfers between different parties were signed and dated. The samples collected were appropriately identified and analyzed as per the COC.

Case narratives or a list of laboratory flags (Notes and Definitions) were provided and QC anomalies and QC outliers were noted.

Holding Times, Preservation and Cooler Temperature

The samples were received by the laboratory in good condition and within the recommended temperature range of 4 ± 2°C or just below, but not frozen.

Analytical holding times were assessed to determine whether the method holding time requirements were met by the laboratory. The holding times were met as all samples were prepared and/or analyzed within the method suggested holding times with the exceptions noted below.

Organochlorine Pesticides

The samples were collected on October 10, 2019 but were not extracted until November 4, 2019 which exceeds the 14-day holding time by 11 days. As a result of exceeded holding times, the following results were qualified as estimated with low bias (J- or UJ):

- All Organochlorine Pesticides in all sediment samples

Various results were also Estimated Maximum Possible Concentrations (EMPCs) and have a final qualifier of "UJK".

Tributyltin

The rinsate blank sample was collected on October 10, 2019 but was not extracted until October 18, 2019 which exceeds the 7-day holding time by one day. As a result of exceeded holding times, the following non-detected result was qualified as estimated with low bias (UJ):

- Tributyltin sample SED-SS-RB

Alkylated PAH Homologs

Upon arrival at the laboratory, the alkylated PAH homologs volume was frozen to a temperature of -18°C rather than being stored at a temperature of 4 ± 2°C because it was unknown whether the alkylated PAH homologs analysis would be needed. The eventual extraction of the alkylated PAH homologs analysis for these samples was performed 33 days after sample collection which was within the one year holding time for frozen samples as indicated by Table 4-2 of the Sediment Sampling Work Plan. No qualification of the results was required because the extraction was performed within the extended, one year holding time.

Instrument Stability and Performance (e.g., MS tuning, interference check samples, chromatographic resolution) (Level 4)

Tunes / Instrument Performance

The instruments were tuned prior to calibration and calibration verification at the correct frequency. All instrument tune criteria were met for Methods SW6020A Method SW8260C and Method SW8270D. No raw data issues were noted.

Resolving power and instrument performance checks were analyzed prior to the initial calibration and at the beginning of each 12-hour period of analysis. All instrument resolving power criteria were met. Peak separation between 2,3,7,8-TCDD and the other TCDD isomers met the ≤ 25% criteria. Peak separation between the 23-TrCB/34-TrCB and 182-HpCB/187-HpCB isomer pairs met the ≤ 40% criteria.

Interference Check Samples (Metals)

All interference check sample percent recoveries for ICSAB for Method SW6020A were within 80-120%.

Initial and Continuing Calibrations (Level 4)

The instruments associated with the level 4 samples were calibrated at the required frequency and with the appropriate number of standards. The lowest calibration standards were at or near the laboratory reporting or quantitation limits. The relative standard deviation (%RSDs) were less than method calibration requirements or the correlation coefficients were greater than 0.99.

The method minimum RRFs were met for the SVOC compounds. All pesticide breakdown results were acceptable.

The low-level calibration verification standards for Method SW6020A were within the QC limits of 70-130%.

Initial Calibration Verification (ICV)
All second source ICV method criteria were met.

Continuing Calibration Verification
The CCV standards were analyzed at the correct frequency for each method as applicable. All CCV or continuing calibration method criteria were met with the exceptions noted below.

Semivolatile Organic Compounds
Several continuing calibration percent differences or percent drifts exceeded 20% in the continuing calibration associated with the Level 4 review samples. The following non-detected results are qualified as estimated (UJ) because of associated continuing calibration percent differences or percent drift outliers:

Analytical sequence 9J21035

- 2,4-Dichlorophenol, di-n-octylphthalate, and hexachlorocyclopentadiene in sample SED-06-SS-1.0

Analytical sequence 9J21036

- 2,4-Dinitrophenol, 4,6-dinitro-2-methylphenol, aniline, benzoic acid, 2-nitrophenol, and 3,3'-dichlorobenzidine in samples SED-05-SS-1.0 and SED-08-SS-1.0

Analytical sequence 9J22033

- 4-Chloroaniline, bis(2-chloroethyl) ether, aniline, benzoic acid, and 3,3'-dichlorobenzidine in sample SED-07-SS-1.0

Metals
A CCV for selenium exceeded the QC limits of 90-110%. No data were qualified as the associated selenium results were reported from reanalysis which met QC limits.

<u>Laboratory Blanks (method blank; instrument blanks (e.g., initial calibration blank, CCB, if specified in method); reagent/preparation blanks)</u>

The method blanks, calibration blanks, and preparation blanks were prepared and analyzed as appropriate and at the required frequency. No contaminants were found in the laboratory method blanks and calibration blanks associated with these sample analyses with the exceptions noted below.

Semivolatile Organic Compounds
Numerous compounds were detected in the method blank for QC Batch 9101073. However, the associated rinsate blank sample results were non-detected and therefore data are not qualified.

Dioxin/Furan
Numerous Dioxin/Furans were detected in the method blanks for QC Prep Batch 42119 and 42129. Several of these blank results were reported as EMPCs. The following results less than five times the method blank concentration are qualified as Non-Detected (U) at the sample concentration due to method blank contamination.

- 1,2,3,7,8-PeCDD in samples SED-07-SS-01-DUP, SED-08-SS-01, and SED-10-SS-01
- 1,2,3,4,7,8-HxCDD in samples SED-07-SS-01-DUP, SED-08-SS-01, SED-09-SS-01, and SED-10-SS-01
- 1,2,3,6,7,8-HxCDD in samples SED-05-SS-01 and SED-08-SS-01
- 1,2,3,7,8,9-HxCDD in samples SED-06-SS-01, SED-07-SS-01-DUP, SED-08-SS-01, and SED-10-SS-01
- 1,2,3,7,8-PeCDF in sample SED-07-SS-01-DUP
- 2,3,4,7,8-PeCDF in sample SED-05-SS-01
- 1,2,3,7,8,9-HxCDF in samples SED-05-SS-01, SED-07-SS-01-DUP, and SED-08-SS-01
- 2,3,4,6,7,8-HxCDF and 1,2,3,4,7,8,9-HpCDF in samples SED-05-SS-01, SED-08-SS-01, and SED-10-SS-01
- Total-PeCDD and Total- HxCDD in sample SED-05-SS-01

PCB Congeners
Various PCB congeners were detected in the method blanks for QC Prep Batches 42225 and 42253. The following sample results are less than five times the method blank concentration (adjusted for sample size) and are qualified as Non-Detects (U) at the sample concentration due to method blank contamination.

- 52-TeCB, 61/66/70/76-TeCB, 110/115-PeCB, 129/138/163-HxCB, 147/149-HxCB, 153/168-HxCB, 170-HpCB, 174-HpCB, 180/193-HpCB, 194-OcCB, 198-OcCB, 206-NoCB, and 209-DeCB in sample SED-SS-RB (associated with MB - 42225)

Note: Several of the sample results in the bullet items above were qualified as EMPCs by the laboratory. Since these results were qualified as not detected (U) due to method blank contamination, no additional action was required.

Organochlorine pesticides
Hexachlorobenzene (0.011 ng/g) and Methoxychlor (0.0126 ng/g) were detected in the method blank for QC Prep Batch 6423301. No qualification is needed since all sample results were greater than 5 times the method blank concentration (adjusted for sample size) or were not detected.

Field Blanks

Sample SED-SS-RB was an equipment rinsate blank collected with these samples. Low level positive equipment rinsate blank results did not impact any detected sediment sample results.

Laboratory Control Samples

At least one laboratory control sample (LCS) analysis was analyzed per QC batch and for each analysis. A laboratory control sample duplicate (LCSD) was also analyzed with several methods if laboratory duplicates or matrix spikes were not performed. Accuracy and precision were evaluated using these analyses.

All LCS and LCSD recoveries were within the laboratory QC limits and all precision criteria were met as the RPDs were within laboratory QC limits with the exceptions noted below.

Semivolatile Organic Compounds
The LCS or LCSD recoveries of several compounds in analytical batch 9101073 were below the control limits. The following non-detected results were qualified as estimated (UJ) due to the low LCS recoveries.

- Acenaphthene, 1-Methylnaphthalene, 2-Methylnaphthalene, Naphthalene, Hexachloroethane, Hexachlorobutadiene, 1,2-Dichlorobenzene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 2-Chloronaphthalene, 1,2,4-Trichlorobenzene, 4-Chlorophenyl phenyl ether in sample SED-SS-RB

The LCS recovery for 4,6-Dinitro-2-methylphenol and the LCS/LCSD RPD for benzoic acid in analytical batch 9101073 and the LCS recoveries for 4-Nitroaniline and 3,3'-Dichlorobenzidine in analytical batch 9101492 were above the control limits. Qualification was not appropriate because these compounds were not detected in the associated samples.

The laboratory indicated that due to erratic or low blank spike recoveries, results for 3,3'-dichlorobenzidine are considered Estimated Values. However, the LCS/LCSD recoveries of 3,3'-dichlorobenzidine were within the control limits or above the control limits. Qualification was not appropriate because this compound was not detected in any of the samples.

Chlorinated Herbicides
The LCS recoveries for four compounds were greater than the QC limit for QC batch W9J0978. However, qualification was not needed as the affected compounds were not detected in the associated sample.

Matrix Spike/Matrix Spike Duplicates (MS/MSD)

MS/MSD analyses were not requested on a sample from this SDG. However, the laboratory did perform a MS or MS/MSD on sample SED-06-SS-1.0 or SED-10-SS-1.0 for a various analyses. All MS/MSD recoveries were within the laboratory QC limits and all precision criteria were met as the RPDs were within laboratory QC limits with the exceptions noted below.

Semivolatile Organic Compounds
The compounds 2,4-dinitrophenol, hexachlorocyclopentadiene, 3-nitroaniline, benzoic acid, 3,3'-dichlorobenzidine were not recovered in the MS performed on sample SED-10-SS-1.0, resulting in 0% recoveries. The following non-detected results were rejected (R) due to the 0% recoveries.

- 2,4-Dinitrophenol, hexachlorocyclopentadiene, 3-nitroaniline, benzoic acid, 3,3'-dichlorobenzidine in sample SED-10-SS-1.0

The MS/MSD results for sample SED-06-SS-1.0 were not applicable as the QC samples were analyzed at 100 times dilution and the results are below the linear calibration or the unspiked sample results were significantly above the spiking levels.

Chlorinated Herbicides
The MS/MSD RPD for Dinoseb was greater than the QC limit of 35% for sample SED-06-SS-1.0. However, qualification was not needed as the affected compound was not detected in the associated sample.

Total Cyanide
The MS/MSD recoveries for *Total Cyanide* (50%/43%) for sample SED-06-SS-1.0 were below the QC limits (64-136%). The following detected results were qualified as estimated with low bias (J-) due to the low MS/MSD recoveries.

- Total Cyanide in all sediment samples

Dioxin/Furan
The MS/MSD recoveries for 1,2,3,4,6,7,8-HpCDD for sample SED-06-SS-1.0 at –62.4% and –64.8% were below the QC limits (70-130%) and the MS recovery for 2,3,7,8-TCDF from the confirmation analysis at 135% exceeded the QC limits. The following detected results were qualified as estimated (J) due to the MS/MSD accuracy anomalies.

- 2,3,7,8-TCDF (confirmation result) and 1,2,3,4,6,7,8-HpCDD in sample SED-06-SS-1.0

MS/MSD recoveries for OCDD were not applicable due to the high native concentrations of this analyte in the unspiked parent sample. No data additional validation qualifiers are added to the data.

PCB Congeners
The MS recovery for 118-PeCB at 171% exceeded the QC limit (50-150%) for sample SED-06-SS-1.0. The following detected result was qualified as estimated (J) due to the MS accuracy anomaly.

- 118-PeCB in sample SED-06-SS-1.0

Organochlorine pesticides
The MS/MSD RPDs for Aldrin and Endrin aldehyde exceeded the QC limit for sample SED-06-SS-1.0. However, no qualification is required as these compounds were not detected in the sample.

The laboratory indicated that the recoveries for o,p-DDD, p,p-DDD, p,p-DDE, o,p-DDT and p,p-DDT were not calculated (applicable) due to the high native concentrations of these analytes in the unspiked parent sample. No data validation qualifiers are added to the data.

The laboratory also provided MS and/or MSD analyses that were performed on unknown samples from other SDGs or work orders for several analyses. Typically, sample data are not qualified using MS/MSD results from unknown samples or samples from other SDGs. Additionally, for organic analyses only the unspiked parent sample is usually qualified for the MS/MSD results unless a systematic issue is noted. Therefore, these MS/MSD analyses were not evaluated and no data in this SDG were qualified using only the matrix spike results from unknown non-site samples or site samples from other SDGs. Refer to the LCS/LCSD for precision and accuracy data.

Post Digestion Spikes (Metals)

A post digestion spike (PDS) was not provided or required.

Laboratory Duplicates

Duplicate analyses were not requested on the samples from this sample delivery group. The laboratory analyzed a laboratory duplicate on sample SED-05-SS-1.0 or SED-10-SS-1.0 for several analyses. All laboratory duplicate criteria were met with the exception noted below.

Diesel Range Organics
A laboratory duplicate was performed on sample SED-05-SS-1.0. The RPD between parent and laboratory duplicate for oil exceeded 30%. However, since the concentrations were less than 5x the reporting limit and the difference between the sample and duplicate results were less than the reporting limit, data qualification was not appropriate.

Semivolatile Organic Compounds
The results for the following compounds in sample SED-10-SS-1.0 are qualified as estimated (J) because the associated laboratory duplicate RPDs exceeded 30% or the difference between the sample and duplicate result was greater than the reporting limit.

- Benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, benzo(a)pyrene, and benz(a)anthracene in sample SED-10-SS-1.0

The laboratory also flagged results for anthracene, dibenzofuran, acenaphthylene, dibenz(a,h)anthracene, and hexachloroethane in sample SED-10-SS-1.0 for not meeting duplicate criteria. However, no qualification was required for these compounds because the results or the difference between the results were less than the reporting limits.

Total Organic Carbon (solid) by EPA 9060A Mod
The RPD between parent and duplicate results for the laboratory duplicate performed on sample SED-06-SS-1.0 in analytical batch 9101455 at 30% was above the control limits of 20%. The following results have been qualified as estimated (J) for laboratory duplicate precision anomalies.

- Total organic carbon for all sediment samples

The laboratory also provided duplicate analyses that were performed on unknown samples from other SDGs or work orders. Other duplicate results were not evaluated as they were performed on unknown or non-site samples.

Field Duplicates

Sample SED-07-SS-1.0-DUP is a field duplicate of sample SED-07-SS-1.0. All field duplicate precision criteria were met as the RPDs for results greater than the reporting limit were less than 50% or the difference between the sample and field duplicate results was less than the reporting limits with the exceptions noted below:

Dioxin/Furan

These samples did not demonstrate acceptable precision as the majority of the results exceeded field duplicate criteria. It should be noted that the original sample was analyzed at a 10X dilution but the duplicate was analyzed undiluted. The following results were qualified as estimated (J) or (UJ) due to exceeded field duplicate precision:

- All Dioxin/Furan results for samples SED-07-SS-1.0 and SED-07-SS-1.0-DUP

Note that results were also qualified for EMPCs and blank contamination.

Organochlorine pesticides

The duplicate RPD for o,p-DDD exceeded the QC limit of 50%. As a result of exceeded precision, the following detected results were qualified as estimated (J):

- o,p-DDD in samples SED-07-SS-1.0 and SED-07-SS-1.0-DUP

These results are also qualified for holding times and have a qualifier of (J-).

Serial Dilution Samples (Metals)

A serial dilution was not provided for the total and dissolved metals for this review.

Surrogate (DMC) Recovery (Organics)

Surrogate compounds were appropriately added to all samples and QC samples for the organic analyses. The surrogate percent recoveries were within laboratory QC limits for all analyses.

Semivolatile Organic Compounds

Surrogate recoveries for samples SED-05-SS-01, SED-06-SS-01, and SED-09-SS-01 were considered diluted below the linear calibration range due to the 100X and 40X dilutions. Therefore any recoveries outside QC limits were not used to qualify any data.

Labeled Compounds and Clean-Up Standards (Dioxins/Furans, PCB Congeners, and Organochlorine Pesticides)

The recoveries of the labeled compounds and clean-up standards met the method or laboratory criteria with the exceptions noted below.

Dioxin/Furan
The recovery for the labeled compound 13C-1,2,3,7,8,9-HxCDF was less than the QC limits (29-147%) for samples SED-06-SS-1.0 (18.9%). As a result of the low recoveries, the following detected results were qualified as estimated (J-).

- 1,2,3,7,8,9-HxCDF and Total HxCDF in sample SED-06-SS-1.0

The result for Total HxCDF has a final qualifier of "JK" as the concentration is also effected by EMPCs.

PCB Congeners
The recoveries for the labeled compounds 13C-205-OcCB for sample SED-10-SS-1.0 and 13C-206-NoCB for samples SED-7-SS-1.0 and SED-7-SS-1.0-DUP exceeded the QC limits (10-145%). As a result of the elevated recoveries, the following detected results were qualified as estimated with high bias (J+) and non-detected results were qualified as estimated (UJ).

- All OcCB congeners except for 202-OcCB in sample SED-10-SS-1.0
- 206-NoCB and 207-NoCB in samples SED-7-SS-1.0 and SED-7-SS-1.0-DUP

Note that 205-OcCB in sample SED-10-SS-1.0 was qualified as an EMPC and has a final qualifier of "UJK".

Internal Standards

Internal standards (IS) were added to every field sample, standard, and QC sample for the organic GCMS analyses. All internal standard acceptance criteria were met for these analyses.

Sample Results

All appropriate raw data were included. The raw data were evaluated to verify reduction of the sample results, calibrations, blank, and QC results to the results summary forms.

Calculations were performed to verify quantitation accuracy. The appropriate sample sizes, final volumes, dilution or run factors were used and no transcription or calculation errors were observed. The results and reporting limits or detection limits were correctly reported.

According to the case narrative or lab notes, various analyses for these samples were diluted or re-extracted with reduced sample size due to high target concentrations, high non target matrix interference, sample matrix, or due to the appearance of the final extract. The non-detected results for these analyses are at elevated detection limits due to the dilutions performed on these samples. Additionally, the reporting limits for several individual analytes were raised to account for interference from co-eluting analytes present in the sample or dilution. These analytes are reported as not-detected at the raised detection limit/reporting limit.

Diesel Range Organics
The laboratory noted that the oil and diesel results samples SED-7-SS-1.0, SED-7-SS-1.0-DUP, and SED-9-SS-1.0 are estimated due to overlap from the other result. These results are considered estimated concentrations with a final qualifier of (J).

The laboratory also indicated that the remaining oil results are elevated due to the presence of individual analyte peaks in the quantitation range that are not representative of the fuel pattern reported. No qualification is required.

Semivolatile Organic Compounds
The laboratory indicated that the benzo(k)fluoranthene results associated with samples SED-05-SS-1.0, SED-06-SS-1.0, and SED-08-SS-1.0 are estimated because the peak separation for structural isomers is insufficient for accurate quantification. The affected results have been qualified as estimated (J).

Dioxin/Furan
The results for Total-TeCDF in sample SED-09-SS-1.0 was flagged for exceeding the instrument linear calibration range. The result is considered an estimated quantity and is qualified as estimated (J). This result is also impacted by EMPCs, see below.

A few dioxin and furan results were reported as EMPCs and were qualified with the laboratory “K” flag denoting an EMPC value. The results were below the PQL and were reported by the laboratory as estimated (JK) values. The following EMPCs not previously qualified as non-detected due to method blank contamination were qualified as estimated non-detects (UJK) at the reported concentration in accordance with EPA Region 10 PCDD/PCDF DV guidelines and NFG use of regional guidance and/or professional judgment in evaluating these results.

- 2,3,7,8-TCDD in sample SED-10-SS-1.0
- 2,3,7,8-TCDF in samples SED-07-SS-1.0 and SED-07-SS-1.0-DUP

The following total dioxin and furan results were flagged (K) by the laboratory indicating the result was impacted by an EMPC. Results also below the PQL were flagged as (JK). These total results are considered estimated quantities and are qualified as an estimated value (JK).

- Total TeCDF and Total HxCDF in sample SED-05-SS-1.0
- Total TeCDD, Total PeCDF, and Total HxCDF in sample SED-06-SS-1.0
- Total TeCDD, Total PeCDD, Total HxCDD, Total TeCDF, and Total HxCDF in sample SED-07-SS-1.0
- Total TeCDD, Total PeCDD, Total HxCDD, Total TeCDF, Total PeCDF, and Total HxCDF in sample SED-07-SS-1.0-DUP
- Total TeCDD, Total PeCDD, Total TeCDF, Total PeCDF, and Total HxCDF in sample SED-08-SS-1.0
- Total TeCDD, Total HxCDD, Total TeCDF, and Total HpCDF in sample SED-09-SS-1.0
- Total TeCDD, Total PeCDD, Total TeCDF, Total PeCDF and Total HxCDF in sample SED-10-SS-1.0

The above total results were greater than the results for the individual dioxin/furan congeners or were impacted by both EMPCs and confirmed homologues and the results were qualified as estimated (JK) rather than as not detected.

Various dioxin and furan and their associated labeled compounds were flagged as “Q” by the laboratory indicating that quantitative interference resulted in an estimated value. The following results that were not already qualified due to low labeled compound recoveries or as an EMPC are qualified as estimated (J or UJ).

- Total PeCDF in samples SED-05-SS-1.0, SED-07-SS-1.0
- Total PeCDD in sample SED-06-SS-1.0
- 1,2,3,7,8,9-HxCDF, Total PeCDD, Total PeCDF, and Total HxCDF in sample SED-09-SS-1.0
- 1,2,3,7,8,9-HxCDF in sample SED-10-SS-1.0

Confirmatory runs for 2,3,7,8-TCDF were analyzed for these samples and the detected results for 2,3,7,8-TCDF greater than the PQLs were confirmed by the second analysis. The results for 2,3,7,8-TCDF from both analyses were reported on the EDD. The confirmation results which should be reported were reported from the November 5, 2019 analysis.

PCB Congeners

Several PCB Congener results were reported as EMPCs and were qualified with the laboratory “K” flag denoting an EMPC value. All but one of the results were also below the PQL and were reported by the laboratory as estimated (JK) values. The following EMPCs that were not previously qualified as non-detected due to method blank contamination are qualified as estimated non-detects (UK or UJK) at the reported concentration in accordance with EPA Region 10 PCDD/PCDF DV guidelines and NFG use of regional guidance and/or professional judgment in evaluating these results.

- 1-MoCB, 8-DiCB, 16-TrCB, 55-TeCB, 120-PeCB, 150-HxCB, and 152-HxCB in sample SED-05-SS-1.0
- 1-MoCB, 3-MoCB, 6-DiCB, 11-DiCB, 15-DiCB, 54-TeCB, 63-TeCB, 67-TeCB, 137-HxCB, 154-HxCB, and 208-NoCB in sample SED-06-SS-1.0
- 10-DiCB, 122-PeCB, 123-PeCB, and 181-HpCB in sample SED-07-SS-1.0
- 11-DiCB, 36-TrCB, and 41-TeCB in sample SED-07-SS-1.0-DUP
- 3-MoCB, 36-TrCB, 114-PeCB, 172-HpCB, and 186-HpCB in sample SED-08-SS-1.0
- 41-TeCB, 85/116/117-PeCB, 94-PeCB, and 150-HxCB in sample SED-09-SS-1.0
- 7-DiCB, 34-TrCB, 79-TeCB, 103-PeCB, 122-PeCB, and 205-OcCB in sample SED-10-SS-1.0
- 11-DiCB, 20/28-TrCB, 31-TrCB, 105-PeCB, 118-PeCB, 135/151-HxCB, and 187-HpCB in sample SED-SS-RB

Note: The final Total PCB Congeners values should be adjusted based on blank contamination and EMPC actions noted in the previous sections.

Various PCBs and associated labeled compounds were flagged as “Q” by the laboratory indicating that quantitative interference resulted in an estimated value. The following results that were not already qualified due to labeled compound recoveries or as an EMPC are qualified as estimated (J).

- 89-PeCB, 135/151-HxCB, 144-HxCB, 156/157-HxCB, and 172-HpCB in sample SED-05-SS-1.0

Organochlorine pesticides

The results for p,p-DDT in sample SED-09-SS-1.0 from the 20X dilution exceeds the instrument linear calibration range. The result is considered an estimated quantity and is qualified as estimated (J).

The laboratory indicated that several results were an EMPC / NDR as the peak detected does not meet ratio criteria and has resulted in an elevated detection limit. Results were reported as non-detected. The following results were qualified as estimated detection limit (UJK) to be consistent with the qualification of EMPCs:

- a-Chlordane, g-Chlordane, Aldrin, and o,p-DDE in sample SED-05-SS-1.0
- a-Chlordane, g-Chlordane, Aldrin, o,p-DDE, Dieldrin, and trans-Nonachlor in sample SED-06-SS-1.0
- Aldrin, o,p-DDE, Dieldrin, and Endosulfan sulfate in sample SED-07-SS-1.0
- Aldrin, o,p-DDE, Endosulfan sulfate, cis-Nonachlor, and trans-Nonachlor in sample SED-07-SS-1.0-DUP
- Aldrin, Endosulfan sulfate, and Endrin in sample SED-08-SS-1.0
- Aldrin, beta-BHC, delta-BHC, Dieldrin, Endosulfan sulfate, Endosulfan II, and trans-Nonachlor in sample SED-09-SS-1.0
- Endosulfan II in sample SED-SS-RB

Grain Size by ASTM D 422M/PSET Parameters
The laboratory note/narrative for most samples indicated that the No. 4 sieve (gravel) and No. 10 sieve (coarse sand) grain size fractions contained organic materials. See the grain size case narratives included at the end of the Apex Laboratories report.

Overall Assessment

The analytical data are acceptable and usable as reported with the minor qualifications noted above, with the exception of the rejected results noted below. All sediment Organochlorine Pesticides were qualified due to exceeded holding times. Additional results were qualified due to CCV, LCS, labeled compound recoveries, field duplicate precision, MS/MSD, laboratory duplicate accuracy and precision issues and results above the calibration range. Results for Dioxin/Furans, Organochlorine Pesticides and PCB Congeners were also qualified as not detected due to blank contamination or as EMPCs. The semivolatile results for 2,4-Dinitrophenol, hexachlorocyclopentadiene, 3-nitroaniline, benzoic acid and 3,3'-dichlorobenzidine in sample SED-10-SS-1.0 were rejected due to 0% MS/MSD recovery.

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following validation qualifiers and associated definitions are provided for use by the data validator to summarize the data quality.

Data Qualifier	Description
Standard Data Qualifiers	
U	The analyte was analyzed for, but was not detected at or above the associated value.
UJ	The analyte was not detected. The reported sample quantitation limit is considered estimated for QC reasons.
J	The analyte was detected. The reported numerical value is considered estimated for QC reasons.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
R	The sample result is rejected as unusable due to serious deficiencies in one or more QC criteria. The analyte may or may not be present in the sample.
K	Estimated Maximum Possible Concentration (EMPC)

ATTACHMENT D

DATA FILE

ATTACHMENT E

FIELD SAMPLE FORMS

8128.02-19

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

sonar depth sounder

Sampling Date:	10/9/19	**Sampling Location:**	SED-01
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	sunny, 50s, calm	**Subcontractor Personnel:**	
Depth Sounding Method: sonar	~~Lead Line~~ Transducer	dep **Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height and Datum:	0.92 ft PRD Time: 835	**Sampling Equipment:**	Powergrab, Stainless Steel Bowls & Spoons
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.55
Latitude:	cw ~~45.578255~~ 45.578275		
Longitude:	~~-122.7534~~ 122.753373		

Attempt Summary

Attempt #:	Radius (ft)	Time	Coordinates		Water Depth	Recovery Depth	JC?	OLW?	Accepted?	Photo?	Additional Comments	Sample Interval cm	In 3-PT?
			Latitude:	Longitude:									
1	1.9	955	45.578275 86	122-753380 43	10.8	21cm	Y	Y	Y	Y	—	0-24	Y
2	17.4	1020	45.57831432	122-75341123	11.2	18cm	Y	Y	N	N	—	0-18	N
3	9.8	1025	45.57830114	122-75338145	18.4 cw	0	N cw	N cw	N	N	trash in jaws		N
4	14.9	1036	45.57831582	122.75336796	18.9	10cm	Y	Y	N	N	—	0-10	N
5	48.5	1047	45.57840793	122.75336547	29.7	30	Y	Y	Y	Y	—	0-30	Y
6	46.7	1105	45.57838946	122.75315441	24.8 cw	28	Y	Y	Y	Y	—	0-28	Y

Notes: JC = Jaws Closed; OLW = overlying water, In 3-PT? = sediment used in 3-Point composite.

Homogenized 3-Point Composite Sample Description

3x Attempts #s:	Color, Minor/Major Constituent %, Density:
1, 5, 6	gray, 90% silt, 10% fine sand, trace mottles, very soft, no odor, no sheen.

Sample Information

Sample ID	Sample Time	Sample Type (Primary, Duplicate, MS/MSD)	# of Containers
SED-01-SS-1.0	1118	Primary, MS/MSD	cw ~~6~~ 18
		~~MS/MSD~~ cw	~~12~~ cw

Additional Comments

Substrate Bin #2; metal and trash observed in several grabs

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/9/19	**Sampling Location:**	SED-01

Sediment Description:

Attempt #: 1 Redox Potential Disxontinuity (RPD): 5 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

tan to gray (subsurface), soft, silty with
fine sand, trace medium sand
85% fines, 15% sand, metal fragments

Odor/Sheen: slight hydrocarbon-like odor, ~~[illegible]~~ sheen

Organics, Biota, or Other: woody debris, no biota

Sediment Description:

Attempt #: 5 Redox Potential Disxontinuity (RPD): 0 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

soft, 0-0.5 cm, tan, silt, trace fine sand
0.5-30 cm, gray, silt, trace fine sand

Odor/Sheen: no odor or sheen

Organics, Biota, or Other: rootlets, no biota

Sediment Description:

Attempt #: 6 Redox Potential Disxontinuity (RPD): 1 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

Soft 0-~~0.5~~ 1.0 cm: tan, silt w/ sand
1-28 cm: sandy silt

Odor/Sheen: hydrocarbon-like odor

Organics, Biota, or Other: no biota, ~~no~~ trace rootlets

Notes:

Typical Structure Descriptions: stratified, laminated, fissured, lensed, and homogeneous.

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/9/19	**Sampling Location:**	SED-02
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	sunny, 60s	**Subcontractor Personnel:**	
Depth Sounding Method:	Sonar depth sounder	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height and Datum:	0.22 ft PRD Time: 1035	**Sampling Equipment:**	Powergrab, Stainless Steel Bowls & Spoons
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.58
Latitude:	cw ~~45.57806~~ 45.57808		
Longitude:	~~-122.753017~~ -122.75299		

Attempt Summary

Attempt #:	Radius (ft)	Time cw	Coordinates		Water Depth	Recovery Depth cm	JC?	OLW?	Accepted?	Photo?	Additional Comments	Sample Interval cm	In 3-PT?
			Latitude:	Longitude:									
1	1.7	1150	45.57807861	-122.75298382	3.4	23	Y	Y	Y	Y	—	cw 0-23	✓
2	13.3	1200	45.57811518	-122.75300292	10.3	—	N	N	N	N	—	cw [illegible]	—
3	8.6	1205	45.57808832	-122.75295859	5.8	30	Y	Y	Y	Y	—	0-30	✓
4	14.3	1225	45.57806507	-122.7529384	11.6	27	Y	Y	Y	Y	—	0-27	✓

Notes: JC = Jaws Closed; OLW = overlying water, In 3-PT? = sediment used in 3-Point composite.

Homogenized 3-Point Composite Sample Description

3x Attempts #s:	Color, Minor/Major Constituent %, Density:
1, 3, 4	Gray, sandy silt (85% fines, 15% sand, f-m) trace organic debris (rootlets). Slight odor. No sheen

Sample Information

Sample ID	Sample Time	Sample Type (Primary, Duplicate, MS/MSD)	# of Containers
SED-02-SS-1.0	1245	Primary	6

Additional Comments

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date: 10/9/19 **Sampling Location:** SED-02

Sediment Description:

Attempt #: 1 Redox Potential Discontinuity (RPD): 1 ~~23~~ cm Low

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

23 cm, sandy silt, gray 0-1 cm: tan
very soft 1-23 cm: gray

Odor/Sheen: no odor, no sheen

Organics, Biota, or Other: trace rootlets

Sediment Description:

Attempt #: ~~3~~ 3 Redox Potential Discontinuity (RPD): / cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

soft 1-30
0-1 cm: tan, sandy silt, gray, increasing fines w/depth
trace cobbles, subrounded

Odor/Sheen: slight odor (hydrocarbon-like), no sheen

Organics, Biota, or Other: trace rootlets

Sediment Description:

Attempt #: 4 Redox Potential Discontinuity (RPD): / cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

27 0-1: tan, 1-27 cm, gray
sandy silt, 70% silt, 30% sand

Odor/Sheen: no sheen or odor

Organics, Biota, or Other: trace rootlets and biota

Notes:

Typical Structure Descriptions: stratified, laminated, fissured, lensed, and homogeneous.

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/9/19	**Sampling Location:**	SED-03
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	Sunny, 50s	**Subcontractor Personnel:**	
Depth Sounding Method:	sonar depth sounder	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height and Datum:	0.9 ft PRD Time: 1335	**Sampling Equipment:**	Powergrab, Stainless Steel Bowls & Spoons
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.65W
Latitude:	~~45.577562~~ 45.577582		
Longitude:	~~-122.75193~~ -122.751903		

Attempt Summary

Attempt #:	Radius (ft)	Time	Coordinates		Water Depth	Recovery Depth	JC?	OLW?	Accepted?	Photo?	Additional Comments	Sample Interval	In 3-PT?
			Latitude:	Longitude:									
1	6.93	1500	45.57757517	122.75187390	13.5	23	Y	Y	Y	Y	large root in jaws	0-23	✓
~~2~~	~~cw~~	~~1500~~			~~54~~	~~—~~	~~N~~	~~—~~	~~—~~	~~—~~	~~—~~	~~—~~	
~~3~~ 2	6.05	1515	45.57760915	122.75186281	6.3	25	Y	Y	Y	Y	—	0-25	✓
3	6.05	1525	45.57759336	122.75194063	6.4	23	Y	Y	Y	Y	—	0-23	✓

Notes: JC = Jaws Closed; OLW = overlying water, In 3-PT? = sediment used in 3-Point composite.

Homogenized 3-Point Composite Sample Description

3x Attempts #s:	Color, Minor/Major Constituent %, Density:
1, 2, 3	Gray brown, silty 30/70 sand, soft to loose, no odor or sheen

Sample Information

Sample ID	Sample Time	Sample Type (Primary, Duplicate, MS/MSD)	# of Containers
SED-03-SS-1.0	~~1530~~ cw 1545	Primary	6

Additional Comments

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date: 10/9/19 **Sampling Location:** SED-03

Sediment Description:

Attempt #: 1 Redox Potential Discontinuity (RPD): 0 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

brown only at surface, sandy silt at surface (0-1in.)
then grades to gray silty sand at depth
soft to loose

Odor/Sheen: no odor or sheen

Organics, Biota, or Other: trace roots

Sediment Description:

Attempt #: 2 Redox Potential Discontinuity (RPD): 0 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

0-23; 100% gray, f-c sand, loose, trace cobbles
and gravel

Odor/Sheen: no odor or sheen

Organics, Biota, or Other: small clam, trace rootlets

Sediment Description:

Attempt #: 3 Redox Potential Discontinuity (RPD): 2 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

medium dense, brown, 100% fine sand
trace cobbles and gravel subangular

Odor/Sheen: no odor or sheen

Organics, Biota, or Other: no biota or organics

Notes:

Typical Structure Descriptions: stratified, laminated, fissured, lensed, and homogeneous.

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/9/19	**Sampling Location:**	SED-04
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	Sunny, 50s	**Subcontractor Personnel:**	
Depth Sounding Method:	Sonar depth sounder	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height and Datum:	2.3 ft PRD Time: 1435	**Sampling Equipment:**	Powergrab, Stainless Steel Bowls & Spoons
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.72W
Latitude:	~~45.577223~~ 45.577243		
Longitude:	~~-122.750855~~ -122.750828		

Attempt Summary

Attempt #:	Radius (ft)	Time	Coordinates		Water Depth	Recovery Depth	JC?	OLW?	Accepted?	Photo?	Additional Comments	Sample Interval	In 3-PT?
			Latitude:	Longitude:									
1	8.58	1530	45.57724010	122.75082439	15.0	27	Y	Y	Y	Y	—	0-27	Y
2	6.97	1604	45.57725683	122.75084761	16.3	25	Y	Y	Y	Y	—	0-25	Y
3	0.99	1616	45.57726471	122.75081425	18.7	21	Y	Y	Y	Y	—	0-21	Y

Notes: JC = Jaws Closed; OLW = overlying water, In 3-PT? = sediment used in 3-Point composite.

Homogenized 3-Point Composite Sample Description

3x Attempts #s:	Color, Minor/Major Constituent %, Density:
1, 2, 3	Gray, sandy silt, soft, trace rootlets, sheen and odor

Sample Information

Sample ID	Sample Time	Sample Type (Primary, Duplicate, MS/MSD)	# of Containers
SED-04-SS-1.0	1630	Primary	6
SED-04-SS-1.0-DUP	1430	Duplicate	6

Additional Comments

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date: 10/9/19 **Sampling Location:** SED-04

Sediment Description:

Attempt #: 1 Redox Potential Discontinuity (RPD): / cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

0-5cm - sandy silt, tan

5- 27 - silt w/ sand, gray

soft

Odor/Sheen: sheen, hydrocarbon- like odor

Organics, Biota, or Other: dead clam and rootlets

Sediment Description:

Attempt #: 2 Redox Potential Discontinuity (RPD): / cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

0- 7cm : sandy silt gray

7- 25cm silt w/ sand gray

medium dense

Odor/Sheen: hydrocarbon- like odor, sheen

Organics, Biota, or Other: trace rootlets

Sediment Description:

Attempt #: 3 Redox Potential Discontinuity (RPD): / cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

~~Sandy~~ silt w/ sand, trace cobbles

Odor/Sheen: hydrocarbon- like odor, sheen

Organics, Biota, or Other: trace organics

Notes:

Typical Structure Descriptions: stratified, laminated, fissured, lensed, and homogeneous.

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/10/19	**Sampling Location:**	SED-05
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	sunny, calm, 40s	**Subcontractor Personnel:**	
Depth Sounding Method:	sonar depth sounder	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height and Datum:	2.38 ft PRD Time: 635	**Sampling Equipment:**	Powergrab, Stainless Steel Bowls & Spoons
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.73W
Latitude:	CW ~~45.576971~~ 45.576991		
Longitude:	~~-122.750634~~ -122.750607		

Attempt Summary

Attempt #:	Radius (ft)	Time	Coordinates		Water Depth	Recovery Depth	JC?	OLW?	Accepted?	Photo?	Additional Comments	Sample Interval	In 3-PT?
			Latitude:	Longitude:									
1	9.4	830	45.57697725	122.75059321	4.7 ~~[illegible]~~ CW	0-20.5	Y	Y	Y	Y	rock stuck at bottom	0-20.5	✓
2	0.5	838	45.57699123	122.75060516	6.4	0-25	Y	Y	Y	Y	—	0-25	✓
3	11.8	850	45.57698770	122.75056103	8.7	25	Y	Y	Y	Y	—	0-25	✓

Notes: JC = Jaws Closed; OLW = overlying water, In 3-PT? = sediment used in 3-Point composite.

Homogenized 3-Point Composite Sample Description

3x Attempts #s:	Color, Minor/Major Constituent %, Density:
1, 2, 3	Gray, 100% sand w/ trace gravels & cobbles, loose to medium dense slight odor, no sheen

Sample Information

Sample ID	Sample Time	Sample Type (Primary, Duplicate, MS/MSD)	# of Containers
SED-05-SS-1.0	900	Primary	6

Additional Comments

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date: 10/10/19 **Sampling Location:** SED-05

Sediment Description:

Attempt #: 1 Redox Potential Discontinuity (RPD): 2 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

100% sand fine to medium gr, gray
trace gravel, fine
loose

Odor/Sheen: no odor or sheen

Organics, Biota, or Other: shells

Sediment Description:

Attempt #: 2 Redox Potential Discontinuity (RPD): 2 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

gray, 100% sand, f-~~m~~c gr., loose, trace gravels, fine
trace cobbles

Odor/Sheen: slight hydrocarbon-like odor, no sheen

Organics, Biota, or Other: wood fragments

Sediment Description:

Attempt #: 3 Redox Potential Discontinuity (RPD): 2 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

0-2: Redox tan color
2-10: gray
100% sand, f-c, trace of gravel and cobbles, med dense

Odor/Sheen: no odor or sheen

Organics, Biota, or Other: organics present (rootlets), shells

Notes:

Typical Structure Descriptions: stratified, laminated, fissured, lensed, and homogeneous.

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/10/19	**Sampling Location:**	SED-06
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	sunny, 50, calm	**Subcontractor Personnel:**	
Depth Sounding Method:	sonar depth sounder	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height and Datum:	2.06 ft PRD Time: 735	**Sampling Equipment:**	Powergrab, Stainless Steel Bowls & Spoons
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.7
Latitude:	~~45.576771~~ 45.576791		
Longitude:	~~-122.750215~~ 122.750188		

Attempt Summary

Attempt #:	Radius (ft)	Time	Coordinates Latitude:	Coordinates Longitude:	Water Depth	Recovery Depth	JC?	OLW?	Accepted?	Photo?	Additional Comments	Sample Interval	In 3-PT?
1	1.2	910	45.57678891	122.75019149	8.1	24.5	Y	Y	Y	Y	—	0-24.5	✓
2	5.8	930	45.57680335	122.75020245	15.2	25	Y	Y	Y	Y	—	0-25	✓
3	7.3	940	45.57679728	122.75016082	9.8	22	Y	Y	Y	Y	—	0-22	✓ cw

Notes: JC = Jaws Closed; OLW = overlying water, In 3-PT? = sediment used in 3-Point composite.

Homogenized 3-Point Composite Sample Description

3x Attempts #s:	Color, Minor/Major Constituent %, Density:
1, 2, 3.	gray, 90% f-m sand, 10% fines, loose, trace gravel, slight odor, no sheen

Sample Information

Sample ID	Sample Time	Sample Type (Primary, Duplicate, MS/MSD)	# of Containers
SED-06-SS-1.0	1000	Primary, MS/MSD	18

Additional Comments

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date: 10/10/19 **Sampling Location:** SED-06

Sediment Description:

Attempt #: 1 Redox Potential Discontinuity (RPD): 4 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

100% sand, f-c; trace of gravel, gray,
loose

Odor/Sheen: no odor, no sheen

Organics, Biota, or Other: trace rootlets

Sediment Description:

Attempt #: 2 Redox Potential Discontinuity (RPD): 1 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

tan to gray after 1 cm, loose
85/15 sand w/ silt, trace of gravel
s f-m

Odor/Sheen: no odor. ~~or~~ Sheen

Organics, Biota, or Other: rootlets

Sediment Description:

Attempt #: 3 Redox Potential Discontinuity (RPD): 1.5 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

85% fine to med sand,
15% silt
medium dense

Odor/Sheen: slight hydrocarbon-like odor, no sheen

Organics, Biota, or Other: rootlets, shells

Notes:

Typical Structure Descriptions: stratified, laminated, fissured, lensed, and homogeneous.

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/10/19	**Sampling Location:**	SED-07
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	sunny, calm, 40s	**Subcontractor Personnel:**	
Depth Sounding Method:	sonar depth sounder	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height and Datum:	7.66 ft PRD Time: 835	**Sampling Equipment:**	Powergrab, Stainless Steel Bowls & Spoons
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.82W
Latitude:	CW ~~45.576374~~ 45.576394		
Longitude:	~~122.749314~~ 122.749287		

Attempt Summary

Attempt #:	Radius (ft)	Time	Coordinates Latitude:	Coordinates Longitude:	Water Depth	Recovery Depth	JC?	OLW?	Accepted?	Photo?	Additional Comments	Sample Interval	In 3-PT?
1	6.0	1005	45.57640959	122.74927960	5.5	10	Y	Y	N	N	metal frags	—	—
2	2.1	1008	45.57638841	122.74928768	13.4	23	Y	Y	Y	Y	—	0-23	✓
3	6.4	1025	45.57638755	122.7492639	15.6	20.5	Y	Y	Y	Y	—	0-20.5	✓
4	9.7	1035	45.57636769	122.74926240	14.0	18	Y	N	N	Y	—	—	—
5	10.9	1100	45.57640552	122.74924790	14.3	23	N	Y	Y	Y	wood catch in jaws	0-23	✓

Notes: JC = Jaws Closed; OLW = overlying water, In 3-PT? = sediment used in 3-Point composite.

Homogenized 3-Point Composite Sample Description

3x Attempts #s:	Color, Minor/Major Constituent %, Density:
2, 3, 5	Gray, sandy silt (30/70), fine sand, soft to firm, rootlets hydrocarbon-like odor, slight sheen.

Sample Information

Sample ID	Sample Time	Sample Type (Primary, Duplicate, MS/MSD)	# of Containers
SED-07-SS-1.0	1100	Primary	6
SED-07-SS-1.0-DUP	1100	Duplicate	6

Additional Comments

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/10/19	**Sampling Location:**	SED-07

Sediment Description:

Attempt #: 2 Redox Potential Discontinuity (RPD): 0 cm surface

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

~~dense~~, surface has fine sand
100% silt, firm, tannish gray, med. plasticity
stiff

Odor/Sheen: odor, slight sheen

Organics, Biota, or Other: organics present (rootlets)

Sediment Description:

Attempt #: 3 Redox Potential Discontinuity (RPD): 0 cm surface

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

gray, 70% silt w/ ~~fi~~ 30% sand, fine, trace gravels
~~dense~~ stiff

Odor/Sheen: hydrocarbon-like odor, ~~no~~ sheen slight

Organics, Biota, or Other: rootlets

Sediment Description:

Attempt #: ~~4~~ 5 Redox Potential Discontinuity (RPD): 1 cm —

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

0-5cm: silty 30/70 sand, gray, fine grained
5-23cm: silt w/ sand, fine grained
trace gravel, medium dense, trace cobbles

Odor/Sheen: no odor or sheen

Organics, Biota, or Other: rootlets, wood fragments

Notes:

Typical Structure Descriptions: stratified, laminated, fissured, lensed, and homogeneous.

Surface Sediment Field Sampling Form

MAUL FOSTER ALONGI

Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

Sampling Date:	10/10/19	**Sampling Location:**	SED-08
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	Sunny, calm, 50s	**Subcontractor Personnel:**	
Depth Sounding Method:	Sonar depth sounder	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PR103] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height and Datum:	0.61 ft PRD Time: 1135	**Sampling Equipment:**	Powergrab, Stainless Steel Bowls & Spoons
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.86 W
Latitude:	~~45.575696~~ 45.575716		
Longitude:	~~122.749148~~ 122.749287		

Attempt Summary

Attempt #:	Radius (ft)	Time	Coordinates Latitude:	Coordinates Longitude:	Water Depth	Recovery Depth	JC?	OLW?	Accepted?	Photo?	Additional Comments	Sample Interval	In 3-PT?
1	~~1.62~~	1230	45.57612659	122.74890007	17.8	21	Y	Y	Y	Y	—	0-21	Y ✓
2	~~4.43~~	1244	45.57606773	122.74889761	15.3	22	Y	Y	Y	Y	metal piece in jaws	0-22	Y ✓
3	~~8.42~~	1300	45.57609380	122.74886741	4.5	23	Y	Y	Y	Y	—	0-23	Y ✓
	~~160.5~~												
	~~140.44~~ cw												
	~~152.3~~												
	21.11												
	7.91 cw 22.3												

Notes: JC = Jaws Closed; OLW = overlying water, In 3-PT? ≐ sediment used in 3-Point composite.

Homogenized 3-Point Composite Sample Description

3x Attempts #s:	Color, Minor/Major Constituent %, Density:
1, 2, 3	Gray sand, fine to coarse; trace gravel, fine; loose; wood fragments. (90% sand; 10% fines), no odor or sheen

Sample Information

Sample ID	Sample Time	Sample Type (Primary, Duplicate, MS/MSD)	# of Containers
SED-08-SS-1.0	1310	Primary	6

Additional Comments

Due to low water level, positioned offshore near location of vibracore

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/10/19	**Sampling Location:**	SED-08

Sediment Description:

Attempt #: 1 Redox Potential Discontinuity (RPD): ~~0~~ cw 8 cm ~~surface~~ cw

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

95% sand, f-c, 5% gravel, f-m, gray
lens of gray silt @ ~~2~~8 cm bml, discontinuous
loose

Odor/Sheen: no odor or sheen

Organics, Biota, or Other: rootlets and small twigs

Sediment Description:

Attempt #: 2 Redox Potential Discontinuity (RPD): 0 cm surface

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

90% sand, f-c, gray, loose
10% silt

Odor/Sheen: no odor or sheen

Organics, Biota, or Other: woody debris, rootlets

Sediment Description:

Attempt #: 3 Redox Potential Discontinuity (RPD): 3 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

95% sand, f-c, 5% gravel, f-m, loose
trace cobbles

Odor/Sheen: no odor or sheen

Organics, Biota, or Other: wood fragments

Notes:

Typical Structure Descriptions: stratified, laminated, fissured, lensed, and homogeneous.

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/10/19	**Sampling Location:**	SED-09
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	Sunny, 50s, breezy	**Subcontractor Personnel:**	
Depth Sounding Method:	sonar depth sounder	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height and Datum:	0.36 ft PRD Time: 1235	**Sampling Equipment:**	Powergrab, Stainless Steel Bowls & Spoons
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.9
Latitude:	ow ~~45.575224~~ 45.575244		
Longitude:	~~122.748819~~ 122.748792		

Attempt Summary

Attempt #:	Radius (ft)	Time	Coordinates Latitude:	Coordinates Longitude:	Water Depth	Recovery Depth	JC?	OLW?	Accepted?	Photo?	Additional Comments	Sample Interval	In 3-PT?
1	181.1	1418	45.57556659	122.74825407	15.8	17	Y	Y	N	Y	—	—	—
2	~~169.9~~ ow	1430	45.57558268	122.74833614	18.6	25	Y	Y	Y	Y	—	0-25	✓
3	~~164.9~~	1444	45.57559983	122.74837491	17.8	26	Y	Y	Y	Y	—	0-26	✓
4	~~174.6~~	1453	45.57562870	122.74838587	28.6 ow	27	Y	Y	Y	Y	—	0-27	✓
	10.64												
	5.91 ow												
	13.01												

Notes: JC = Jaws Closed; OLW = overlying water, In 3-PT? = sediment used in 3-Point composite.

Homogenized 3-Point Composite Sample Description

3x Attempts #s:	Color, Minor/Major Constituent %, Density:
2, 3, 4	Gray silty sand, very soft, slight hydrocarbon-like odor (80% sand, 20% fines) slight sheen

Sample Information

Sample ID	Sample Time	Sample Type (Primary, Duplicate, MS/MSD)	# of Containers
SED-09-SS-1.0	1515	Primary	6

Additional Comments

Moved north due to low water level of river and location positioned upland

Surface Sediment Field Sampling Form
Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date: 10/10/19		**Sampling Location:**	SED-09

Sediment Description:

Attempt #: 2 Redox Potential Discontinuity (RPD): 2 cm

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

80% sand, f, gray

20% fines,

medium dense

Odor/Sheen: no odor or sheen

Organics, Biota, or Other: rootlets

Sediment Description:

Attempt #: 3 Redox Potential Discontinuity (RPD): 0 cm surface

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

medium dense, gray

sand w/ silt (85%; 15%), trace fine gravel

f-m sand

Odor/Sheen: slight hydrocarbon-like odor, slight sheen

Organics, Biota, or Other: rootlets

Sediment Description:

Attempt #: 4 Redox Potential Discontinuity (RPD): 0 cm surface

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

loose, gray, 70% fine sand, 30% silt

cw

Odor/Sheen: sheen, ~~no odor~~ slight hydro carbon-like, odor

Organics, Biota, or Other: twigs, organic debris

Notes:

Typical Structure Descriptions: stratified, laminated, fissured, lensed, and homogeneous.

Surface Sediment Field Sampling Form
River mile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/10/19	**Sampling Location:**	SED-10
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	sunny, 50s, windy	**Subcontractor Personnel:**	
Depth Sounding Method:	sonar depth sounder	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height and Datum:	0.36 ft PRD Time: 1235	**Sampling Equipment:**	Powergrab, Stainless Steel Bowls & Spoons
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.87
Latitude:	cw ~~45.575604~~ 45.575624		
Longitude:	~~122.748782~~ 122.748755		

Attempt Summary

Attempt #:	Radius (ft)	Time	Coordinates		Water Depth	Recovery Depth	JC?	OLW?	Accepted?	Photo?	Additional Comments	Sample Interval	In 3-PT?
			Latitude:	Longitude:									
1	~~132.8~~	1320	45.57589958	122.74841599	14.6	27	Y	Y	Y	Y	—	0-27	✓
2	~~127.60~~ cw	1340	45.57587098	122.74840193	27.8	29	Y	Y	Y	Y	—	0-29	✓
3	~~141.8~~	1350	45.57594560	122.74844402	~~29~~	27	Y	Y	Y	Y	—	0-27	✓
	→ 7.2				↑ 32.8								
	12.55 cw												
	21.86												

Notes: JC = Jaws Closed; OLW = overlying water, In 3-PT? = sediment used in 3-Point composite.

Homogenized 3-Point Composite Sample Description

3x Attempts #s:	Color, Minor/Major Constituent %, Density:
1, 2, 3	Gray, silt w/ sand (75% fines, 25% fine sand) very soft, hydrocarbon-like odor, slight sheen

Sample Information

Sample ID	Sample Time	Sample Type (Primary, Duplicate, MS/MSD)	# of Containers
SED-10-SS-1.0	1415	Primary	6

Additional Comments

Located offshore to north near railroad buttress due to proposed location positioned upland.

Surface Sediment Field Sampling Form
River mile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date: 10/10/19 **Sampling Location:** SED-10

Sediment Description:

Attempt #: 1 Redox Potential Discontinuity (RPD): 0 cm surface

Structure: homogeneous

Density, Color, Minor/Major Constituent %:

0-20; 100% silt, gray

20-27; 70% sand, 30% silt, gray

soft to very soft

Odor/Sheen: slight hydrocarbon-like, no sheen

Organics, Biota, or Other: ~~no~~ wood fragments

Sediment Description:

Attempt #: 2 Redox Potential Discontinuity (RPD): 0 cm surface

Structure: homogeneous

Density, Color, Minor/Major Constituent %: , very soft

0-7cm: 100% silt, gray

7-29 : 30% fines gray, silty sand

70% sand, fine

Odor/Sheen: hydrocarbon-like odor, slight sheen

Organics, Biota, or Other:

Sediment Description:

Attempt #: 3 Redox Potential Discontinuity (RPD): 0 cm surface

Structure: homogeneous

Density, Color, Minor/Major Constituent %: very soft

0-13: 100% silt, gray

13-27: 30% fines silty sand, f-m, gray

70% sand,

Odor/Sheen: hydrocarbon-like odor, sheen

Organics, Biota, or Other: rootlets

Notes:

Typical Structure Descriptions: stratified, laminated, fissured, lensed, and homogeneous.

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/8/19 945	**Sampling Location:**	SED-01
		Attempt #:	1
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW, CS
Weather Conditions:	partly cloudy, 60s, calm	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	0.56 ft PRD Time: 835	**Sampling Equipment:**	Vibracore
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.56
Latitude:	45.578255	**Core Tube Length:**	10-ft
Longitude:	-122.7534	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	0.9'	Actual Coordinates:	
Bottom Conditions:	tan silt w/ woody debris	Latitude:	45.57825256
Mudline Elevation:	9.6' water level	Longitude:	122-75339940

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 4.3 Total Drive Length (ft): 4.5

Avg. % Recovery (= length recovered / total drive length): 95.6%

Core Accepted (Y/N): N, encountered refusal

Additional Comments:

Refusal at 5 ft
Odor and black stained wood in shoe sample

If core sectioned in field for transport: not sectioned for transport

		Section:	Length (ft):	Description at Cuts:
headspace:		A-B =		
		B-C =		
		C-D =		
		D-E =		
catcher:		Catcher (0.3 ft):		

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

Sampling Date:	10/8/19 1020	**Sampling Location:**	SED-01
		Attempt #:	2
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	partly sunny, calm 65	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT08] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	0.19 ft PRD Time: 935	**Sampling Equipment:**	Vibracore
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.56
Latitude:	45.578255	**Core Tube Length:**	10-ft
Longitude:	-122.7534	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	7.9'	Actual Coordinates:	
Bottom Conditions:	tan silt with f sand	Latitude:	45.57827170
Mudline Elevation:	13.7 water level	Longitude:	122.75338030

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 8.8 Total Drive Length (ft): 9.5

Avg. % Recovery (= length recovered / total drive length): 92.6%

Core Accepted (Y/N): Y

Additional Comments:

hydrocarbon-like odor and black staining in shoe of sampler

If core sectioned in field for transport:

	Section:	Length (ft):	Description at Cuts:
headspace:	A-B =		
	B-C =		
	C-D =	0 - 4.65	-
	D-E =	4.65 - 8.65	-
catcher:	Catcher (0.3 ft):		

CW

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date: + Time	10/8/19 910	**Sampling Location:**	SED-02
		Attempt #:	1
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	partly cloudy, 55°	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	1.02 ft PRD Time: 735	**Sampling Equipment:**	Vibracore
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.57
Latitude:	45.57806	**Core Tube Length:**	10-ft
Longitude:	-122.753017	**Target Drive Depth:**	up to 16 feet bml, as available.

Sampling Summary

Radius from Target:	5.1'	Actual Coordinates:	
Bottom Conditions:	tan silt w/ fine/ sand,	Latitude:	45.57805196
Mudline Elevation:	3.9 - water ~~depth~~ level CW	Longitude:	-122.75303345

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 8.3 Total Drive Length (ft): 9.7

Avg. % Recovery (= length recovered / total drive length): ~~86%~~ 85.6% CW

Core Accepted (Y/N): Y

Additional Comments:

strong odor and sheen in shoe sample.
-may be able to get more recovery in area w/ longer core

If core sectioned in field for transport:

headspace:	
catcher:	

Section:	Length (ft):	Description at Cuts:
A-B =		
B-C =		
C-D =	0 - 4.4	
D-E =	4.4 - 8.25	
Catcher (0.3 ft):	[illegible] CW	

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/8/19 1050	**Sampling Location:**	SED-03
		Attempt #:	1
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	partly cloudy, 50s	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	0.19 ft PRD Time: 935	**Sampling Equipment:**	
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.65W
Latitude:	45.577562	**Core Tube Length:**	10-ft
Longitude:	-122.75193	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	6'	Actual Coordinates:	
Bottom Conditions:	MLS	Latitude:	45.57754791
Mudline Elevation:	5" water level	Longitude:	122.75194177

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 6.2' Total Drive Length (ft): 9.5

Avg. % Recovery (= length recovered / total drive length): 65.3%

Core Accepted (Y/N): N

Additional Comments:

Silt w/ fine sand. No staining, hydrocarbon-like odor. Trace wood frags

If core sectioned in field for transport:

headspace:	Section:	Length (ft):	Description at Cuts:
	A-B =		
	B-C =		
	C-D =		
	D-E =		
catcher:	Catcher (0.3 ft):		

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/8/19 1135	**Sampling Location:**	SED-03
		Attempt #:	2
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	Raing, calm, 50s	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	Lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	-0.1 ft PRD Time: 1035	**Sampling Equipment:**	Vibracore
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.65W
Latitude:	45.577562	**Core Tube Length:**	10-ft
Longitude:	-122.75193	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	4.3'	Actual Coordinates:	
Bottom Conditions:	Silt, tan	Latitude:	45.57760915
Mudline Elevation:	5.6' - water level	Longitude:	122.75186281

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 8.6 Total Drive Length (ft): 9.5

Avg. % Recovery (= length recovered / total drive length): 90.5%

Core Accepted (Y/N): Y

Additional Comments:

Sheen on outside of core. Silt w/ ~~organic~~ woody fragments
~~at~~ slight sheen on shoe sample

If core sectioned in field for transport:

headspace:

catcher:

Section:	Length (ft):	Description at Cuts:
A-B =		
B-C =		
C-D =	0 - 4.45	
D-E =	4.45 - 8.45	
Catcher (0.3 ft):	[illegible]	

cw

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/7/19 1510	**Sampling Location:**	SED-04
		Attempt #:	1
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW MRM
Weather Conditions:	Overcast, 60°F, calm	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew
Gage Height, Datum, Time:	2.28 ft PRD Time: 1335	**Sampling Equipment:**	Vibracore Rosfelder P3
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.72 W
Latitude:	45.577223	**Core Tube Length:**	10'
Longitude:	-122.750855	**Target Drive Depth:**	up to 10 feet bml, as available.

Sampling Summary

Radius from Target:	~~5ft~~ ~~3~~ 2.0'	Actual Coordinates:	
Bottom Conditions:	Silt w/ sand	Latitude:	45.57721757
Mudline Elevation:	Water depth = 14.0'	Longitude:	-122.75085545

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 8.2 Total Drive Length (ft): ~~10~~ 9.5'

Avg. % Recovery (= length recovered / total drive length): 86%

Core Accepted (Y/N): Y

Additional Comments:

Switched to 10-ft core barrel.
Sediment in shoe, tan sandy silt. No odor.

If core sectioned in field for transport:

	Section:	Length (ft):	Description at Cuts:
headspace:	A-B =		
	B-C =		
	C-D =	0-3.95	—
	D-E =	3.95-7.75	—
catcher:	Catcher (0.3 ft):	[illegible]	—

CW

Lead Line

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/7/19 12:05	**Sampling Location:**	SED-05
		Attempt #:	1
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW MRM
Weather Conditions:	Overcast 60°F, calm	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	~~Ship Depth Sounder~~ MM	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	-0.48 ft PRD Time: 10:35 AM	**Sampling Equipment:**	Vibracore Rosenfeld P3 6.75mm
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM7.~~75~~W
Latitude:	45.576971	**Core Tube Length:**	15'
Longitude:	-122.750634	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	1.1'	Actual Coordinates:	
Bottom Conditions:	Sand	Latitude:	45.57697403
Mudline Elevation:	water Depth= 4.2'	Longitude:	-122.75063457

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 2.2 Total Drive Length (ft): 2.5

Avg. % Recovery (= length recovered / total drive length): 89%

Core Accepted (Y/N): No - too Short

Additional Comments:

Vibracore refusal on wood Debris

If core sectioned in field for transport:

		Section:	Length (ft):	Description at Cuts:
headspace:		A-B =		
		B-C =		
		C-D =		
		D-E =		
catcher:		Catcher (0.3 ft):		

lead line

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/7/19 12:35	**Sampling Location:**	SED-05
		Attempt #:	2
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW MRM
Weather Conditions:	Overcast, 60°F, calm	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method: MM	~~Ship Depth Sounder~~	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Moth
Gage Height, Datum, Time:	0.14 ft PRD Time: 11:35	**Sampling Equipment:**	Vibracore Rosenfelder P3
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM ~~7.75~~ 6.75 MM W
Latitude:	45.576971	**Core Tube Length:**	15'
Longitude:	-122.750634	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	13.4'	Actual Coordinates:	
Bottom Conditions:	Sand	Latitude:	45.5770 0211
Mudline Elevation:	Water Depth = 17.2	Longitude:	-122.75060650

Measurement (to nearest 0.1 foot):

Length Recovered (ft): ~~3.8~~ MM 3.9 Total Drive Length (ft): 4.8

Avg. % Recovery (= length recovered / total drive length): 81.2%

Core Accepted (Y/N): N

Additional Comments:

Vibracore encountered Refusal.

If core sectioned in field for transport:

		Section:	Length (ft):	Description at Cuts:
headspace:		A-B =		
		B-C =		
		C-D =		
		D-E =		
catcher:		Catcher (0.3 ft):		

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/7/19 1304	**Sampling Location:**	SED-05
		Attempt #:	3
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW MRM
Weather Conditions:	overcast, 60°F, calm	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	0.14 ft PRD Time: 11:35	**Sampling Equipment:**	Vibracore-Rossenfeller P3
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 7.75W
Latitude:	45.576971	**Core Tube Length:**	15'
Longitude:	-122.750634	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	24.7'	Actual Coordinates:	
Bottom Conditions:	Sand	Latitude:	45.5770 2222
Mudline Elevation:	Water Depth=10.5	Longitude:	-122.7505 7069

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 7.1 Total Drive Length (ft): 8.8

Avg. % Recovery (= length recovered / total drive length): 80.7%

Core Accepted (Y/N): Y

Additional Comments:

Vibracore run into compacted Sand until refusal

If core sectioned in field for transport: not sectioned for transport

	Section:	Length (ft):	Description at Cuts:
headspace:	A-B =		
	B-C =		
	C-D =		
	D-E =		
catcher:	Catcher (0.3 ft):		

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/7/2019 10:04 AM	**Sampling Location:**	SED-06
		Attempt #:	1
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW MRM
Weather Conditions:	Calm, Sunny, 58°F	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	Lead line 6.9'	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	0.62 ft PRD Time: 6:35	**Sampling Equipment:**	Vibracore - Rossfelder P3
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM ~~7.15~~ 6.75mi W
Latitude:	45.576771	**Core Tube Length:**	26'
Longitude:	-122.750215	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	13'	Actual Coordinates:	
Bottom Conditions:	Sand	Latitude:	45.57677333
Mudline Elevation:	Water Depth = 6.9'	Longitude:	-122.75016265

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 9.0'   Total Drive Length (ft): 13.0'

Avg. % Recovery (= length recovered / total drive length): 69.2%

Core Accepted (Y/N): Yes - Best of 3

Additional Comments:

Orig. location on Beach w/ riprap, shifted offshore. Encountered hardpack Sand at Depth - Vibracore refusal at 13' Drive depth.

If core sectioned in field for transport:

headspace: ☐

catcher: ☐

Section:	Length (ft):	Description at Cuts:
A-B =		
B-C =		
C-D =	0 - 5.2	
D-E =	5.2-8.6	
Catcher (0.3 ft):		Dark grey, slight petro. odor, No Sheen

CW

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/7/19 10:39AM	**Sampling Location:**	SED-06
		Attempt #:	2
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW MRM
Weather Conditions:	Sunny, calm, 60°F	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	Depth Sounder / lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Mirth
Gage Height, Datum, Time:	-0.46ft PRD Time: 9:35AM	**Sampling Equipment:**	Vibracore - Rossfelder P3
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM ~~7.75~~ 6.75mm W
Latitude:	45.576771	**Core Tube Length:**	15'
Longitude:	-122.750215	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	19.9'	Actual Coordinates:	
Bottom Conditions:	Sand	Latitude:	45.57678915
Mudline Elevation:	Water Depth = 8.1	Longitude:	-122.75014160

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 7.3 Total Drive Length (ft): 12.1

Avg. % Recovery (= length recovered / total drive length): 60.3%

Core Accepted (Y/N): No

Additional Comments:

moved about 5' off of Attempt 1 location for SED-06. vibracore hit refusal in compacted sand.

If core sectioned in field for transport:

		Section:	Length (ft):	Description at Cuts:
headspace:		A-B =		
		B-C =		
		C-D =		
		D-E =		
catcher:		Catcher (0.3 ft):		Firm sand, some Clay, slight Petro. odor

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/7/19 11:21	**Sampling Location:**	SED-06
		Attempt #:	3
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW MRM
Weather Conditions:	Sunny/clouds, 60°F	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	Depth Sounder	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	-0.44 ft PRD Time: 9:35AM	**Sampling Equipment:**	Vibracore-Rosfelder P3
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		6.75RM
Proposed Coordinates:		**General River Location:**	RM ~~6.5~~ W
Latitude:	45.576771	**Core Tube Length:**	15'
Longitude:	-122.750215	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	25.4	Actual Coordinates:	
Bottom Conditions:	Sand	Latitude:	45.57679850
Mudline Elevation:	Water Depth = 10.1'	Longitude:	122.75012386

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 7.3

Total Drive Length (ft): 11.2

Avg. % Recovery (= length recovered / total drive length): 65.1%

Core Accepted (Y/N): NO

Additional Comments:

Vibracore to just before refusal depth encountered in Attempts 1&2.

If core sectioned in field for transport:

		Section:	Length (ft):	Description at Cuts:
headspace:		A-B =		
		B-C =		
		C-D =		
		D-E =		
catcher:		Catcher (0.3 ft):		

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/7/19 1600	**Sampling Location:**	SED-07
		Attempt #:	1
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW MRM
Weather Conditions:	partly cloudy, calm, 60°	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	[✓ 2.62 ft PRD] Time: 235PM	**Sampling Equipment:**	Vibracore Rosfelder P3
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.8
Latitude:	45.576374	**Core Tube Length:**	10 ft
Longitude:	-122.749314	**Target Drive Depth:**	up to 10 feet bml, as available.

Sampling Summary

Radius from Target:	0.8'	Actual Coordinates:	
Bottom Conditions:	gray fine sand	Latitude:	45.57637168
Mudline Elevation:	16.1' = water depth	Longitude:	-122.74931401

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 6.4 Total Drive Length (ft): 8.6

Avg. % Recovery (= length recovered / total drive length): ~~[illegible]~~ cw ~~74.4%~~ cw ~~70.7~~ cw 74.4 %

Core Accepted (Y/N): ~~N~~ cw Y, best of 3

Additional Comments:

If core sectioned in field for transport:

headspace:		Section:	Length (ft):	Description at Cuts:
		A-B =		
		B-C =		
		C-D =	0 - 3.2	
		D-E =	3.2 - 6.35	
catcher:		Catcher (0.3 ft):	[illegible] cw	

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/7/19 1620	**Sampling Location:**	SED-07
		Attempt #:	2
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW MRM
Weather Conditions:	partly cloudy calm 60	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT08] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	2.62ft PRD Time: 1435	**Sampling Equipment:**	Vibracore Rosfelder P3
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.8
Latitude:	45.576374	**Core Tube Length:**	10 ft
Longitude:	-122.749314	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	7.1'	Actual Coordinates:	
Bottom Conditions:	gray fine sand	Latitude:	45.57639202
Mudline Elevation:	15.8' water level	Longitude:	122.74932456

Measurement (to nearest 0.1 foot):

Length Recovered (ft): ~~5~~ 4.9

Total Drive Length (ft): 9.5

Avg. % Recovery (= length recovered / total drive length): 51.6%

Core Accepted (Y/N): N

Additional Comments:

If core sectioned in field for transport:

headspace:		Section:	Length (ft):	Description at Cuts:
		A-B =		
		B-C =		
		C-D =		
		D-E =		
catcher:		Catcher (0.3 ft):		

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/7/19 1635	**Sampling Location:**	SED-07
		Attempt #:	3
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW MRM
Weather Conditions:	partly cloudy, calm 60	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	2.62 ft PRD Time: 1435	**Sampling Equipment:**	Vibracore Rostfelder P3
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.8
Latitude:	45.576374	**Core Tube Length:**	10 ft
Longitude:	-122.749314	**Target Drive Depth:**	up to 18 feet bml, as available.

Sampling Summary

Radius from Target:	11.7'	Actual Coordinates:	
Bottom Conditions:	gray fine sand	Latitude:	45.57640412
Mudline Elevation:	14.6' = water level	Longitude:	122.74933023

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 6.1 Total Drive Length (ft): 9.5

Avg. % Recovery (= length recovered / total drive length): 64.2%

Core Accepted (Y/N): N

Additional Comments:

If core sectioned in field for transport:

		Section:	Length (ft):	Description at Cuts:
headspace:		A-B =		
		B-C =		
		C-D =		
		D-E =		
catcher:		Catcher (0.3 ft):		

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/8/19 1220	**Sampling Location:**	SED-08
		Attempt #:	1
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	partly cloudy, calm 50s	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	-0.1 ft PRD Time: 1035	**Sampling Equipment:**	Vibracore Rostfelder P3
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.87W
Latitude:	45.575696	**Core Tube Length:**	10 ft
Longitude:	-122.749148	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	143'	Actual Coordinates:	
Bottom Conditions:	gray fine sand	Latitude:	45.57606990
Mudline Elevation:	13.3	Longitude:	122.74898119

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 5.3 Total Drive Length (ft): 9.5

Avg. % Recovery (= length recovered / total drive length): 55.8%

Core Accepted (Y/N): N

Additional Comments:

Due to water level, location moved approximately 143 N of target, adjacent to outfall 22C discharge point. No odor or staining on shoe.

If core sectioned in field for transport:

headspace:

catcher:

Section:	Length (ft):	Description at Cuts:
A-B =		
B-C =		
C-D =		
D-E =		
Catcher (0.3 ft):		

- 8 AM on site, set up equip., drop off cores
-

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/8/19 1255	**Sampling Location:**	SED-08
		Attempt #:	2
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	cloudy, 50s, breezy	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	-0.15 ft PRD Time: 1135	**Sampling Equipment:**	Vibracore
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.87W
Latitude:	45.575696	**Core Tube Length:**	10-ft
Longitude:	-122.749148	**Target Drive Depth:**	up to 16 feet bml, as available.

Sampling Summary

Radius from Target:	155'	Actual Coordinates:	
Bottom Conditions:	Gray f-m sand	Latitude:	45.57609422
Mudline Elevation:	17.7	Longitude:	122.74893432

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 2.9 Total Drive Length (ft): 9.5

Avg. % Recovery (= length recovered / total drive length): 30.5%

Core Accepted (Y/N): N

Additional Comments:

Due to low water level, location moved north approx. 155' near discharge point of OF22C
No odor or sheen.

If core sectioned in field for transport:

		Section:	Length (ft):	Description at Cuts:
headspace:		A-B =		
		B-C =		
		C-D =		
		D-E =		
catcher:		Catcher (0.3 ft):		

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/8/19 1320	**Sampling Location:**	SED-08
		Attempt #:	3
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	cloudy, 50s	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Arthur Muth
Gage Height, Datum, Time:	-0.15 ft PRD Time: 1135	**Sampling Equipment:**	Vibracore
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.87W
Latitude:	45.575696	**Core Tube Length:** CW	~~10 ft~~ 10-ft
Longitude:	-122.749148	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	~~180 ft~~ 162 ft CW	Actual Coordinates:	
Bottom Conditions:	Gray f-m sand	Latitude:	45.57609380
Mudline Elevation:	19.9 - water level	Longitude:	122.74886741

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 3.7 Total Drive Length (ft): 5

Avg. % Recovery (= length recovered / total drive length): 74% best of 3

Core Accepted (Y/N): Y, best of 3

Additional Comments:

Due to loose sand, reduced drive length to ensure recovery

If core sectioned in field for transport: not sectioned

headspace:

catcher:

Section:	Length (ft):	Description at Cuts:
A-B =		
B-C =		
C-D =	0-3.25	
D-E =	[illegible]	
Catcher (0.3 ft):	[illegible]	

CW

MAUL FOSTER ALONGI

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

Sampling Date:	10/8/19 1400	**Sampling Location:**	SED-09
		Attempt #:	1
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	cloudy, breezy, 50s	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PR103] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	0.62 ft PRD Time: 1235	**Sampling Equipment:**	Vibracore
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM-6.9W
Latitude:	45.575224	**Core Tube Length:**	10-ft
Longitude:	-122.748819	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	161'	Actual Coordinates:	
Bottom Conditions:	silty sand gray	Latitude:	45-57551993
Mudline Elevation:	6.9 water level	Longitude:	122.74834684

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 7.0

Total Drive Length (ft): 9.7

Avg. % Recovery (= length recovered / total drive length): 72%

Core Accepted (Y/N): Y, best of 3

Additional Comments:

Due to low water level, location adjusted north approximately 161 feet in order to be in water

If core sectioned in field for transport:

		Section:	Length (ft):	Description at Cuts:
headspace:		A-B =		
		B-C =		
		C-D =	0-3.5	
		D-E =	3.5-6.85	
catcher:		Catcher (0.3 ft):		

CW

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/8/19 1435	**Sampling Location:**	SED-09
		Attempt #:	2
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	windy, cloudy, 50s	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	1.98 ft PRD Time: 1335	**Sampling Equipment:**	Vibracore
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM-6.9W
Latitude:	45.575224	**Core Tube Length:**	10-ft
Longitude:	-122.748819	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	169.8'	Actual Coordinates:	
Bottom Conditions:	gray fine sand	Latitude:	45.57554738
Mudline Elevation:	10.2 - water level	Longitude:	122.74834194

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 6.8 Total Drive Length (ft): 9.5

Avg. % Recovery (= length recovered / total drive length): 71.6%

Core Accepted (Y/N): N

Additional Comments:

~~#~~ Due to low~~er~~ water, moved core ~ 169.8' from original location.

If core sectioned in field for transport:

headspace:		Section:	Length (ft):	Description at Cuts:
		A-B =		
		B-C =		
		C-D =		
		D-E =		
catcher:		Catcher (0.3 ft):		

Subsurface Sediment Field Sampling
Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/8/19 1505	**Sampling Location:**	SED-09
		Attempt #:	3
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	50s breezy, partly cloudy	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	1.98 ft PRD Time: 1335	**Sampling Equipment:**	Vibracore
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.9W
Latitude:	45.575224	**Core Tube Length:**	7.5
Longitude:	-122.748819	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	191'	Actual Coordinates:	
Bottom Conditions:	grey fine sand	Latitude:	45.57561791
Mudline Elevation:	17.9 water level	Longitude:	122.74832521

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 4.2' Total Drive Length (ft): 7.5

Avg. % Recovery (= length recovered / total drive length): 56%

Core Accepted (Y/N): N

Additional Comments:

Due to low water, moved location north.
Only drove 7.5' due to previous low recovery

If core sectioned in field for transport:

		Section:	Length (ft):	Description at Cuts:
headspace:		A-B =		
		B-C =		
		C-D =		
		D-E =		
catcher:		Catcher (0.3 ft):		

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

MAUL FOSTER ALONGI

Sampling Date:	10/8/19 1545	**Sampling Location:**	SED-10
		Attempt #:	1
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW CS
Weather Conditions:	partly sunny, 50s	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PRT03] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	2.94 ft PRD Time: 1435	**Sampling Equipment:**	Vibracore
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.88W
Latitude:	45.575604	**Core Tube Length:**	10-ft
Longitude:	-122.748782	**Target Drive Depth:**	up to 15 feet bml, as available.

Sampling Summary

Radius from Target:	124'	Actual Coordinates:	
Bottom Conditions:	gray, fine sand w/ silt	Latitude:	45.57587773
Mudline Elevation:	26.3 - water level	Longitude:	122.74849510

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 3.8 Total Drive Length (ft): 9.5

Avg. % Recovery (= length recovered / total drive length): 40%

Core Accepted (Y/N): N

Additional Comments:

Moved north due to low water and railroad buttress position. Large fragment of woody debris in shoe

If core sectioned in field for transport:

		Section:	Length (ft):	Description at Cuts:
headspace:		A-B =		
		B-C =		
		C-D =		
		D-E =		
catcher:		Catcher (0.3 ft):		

MAUL FOSTER ALONGI

Subsurface Sediment Field Sampling Form Rivermile 6.55 to 6.9
Siltronic Corporation
Portland, Oregon

Sampling Date:	10/8/19 1610	**Sampling Location:**	SED-10
		Attempt #:	2
Vessel:	Carolyn Dow	**Sampling Personnel:**	CRW, CS
Weather Conditions:	partly sunny, 50s	**Subcontractor Personnel:**	Research Support Services, Inc.
Depth Sounding Method:	lead line	**Captain:**	Eric Parker
Gage Source (circle one):	[✓ NOAA PR103] USGS 14211720	**Deckhand:**	Andrew Muth
Gage Height, Datum, Time:	2.94 ft PRD Time: 1435	**Sampling Equipment:**	Vibracore
Horizontal Coordinate Datum:	NAD 1983 Oregon State Plane North		
Proposed Coordinates:		**General River Location:**	RM 6.88W
Latitude:	45.575604	**Core Tube Length:**	10-ft
Longitude:	-122.748782	**Target Drive Depth:**	up to 1~~5~~0 feet bml, as available.

Sampling Summary

Radius from Target:	126'	Actual Coordinates:	
Bottom Conditions:	tan hard pack fine sand of silt	Latitude:	45.57586040
Mudline Elevation:	29.6 - water level	Longitude:	122.74845149

Measurement (to nearest 0.1 foot):

Length Recovered (ft): 7.6 Total Drive Length (ft): 9.5

Avg. % Recovery (= length recovered / total drive length): 80%

Core Accepted (Y/N): Y

Additional Comments:

moved north due to low water and railroad buttress position.

If core sectioned in field for transport:

headspace:	Section:	Length (ft):	Description at Cuts:
	A-B =		
	B-C =		
	C-D =		
	D-E =	0-7.2	
catcher:	Catcher (0.3 ft):		

CW

ATTACHMENT F

BORING LOGS

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
8128.02.19	**SED-01**	**1 of 1**

Project Name	**Siltronic Corporation**	TOC Elevation (feet)	
Project Location	**Willamette River, Portland, Oregon**	Surface Elevation (feet)	**-15.1**
Start/End Date	**10/8/2019 to 10/8/2019**	Northing	
Driller/Equipment	**Research Support Services, Inc. (RSS)/Vibracore Rosfelder**	Easting	
Geologist/Engineer	**Courtney Savoie, RG**	Hole Depth	**8.8-feet**
Sample Method	**Vibracore**	Outer Hole Diam	**4-inch**

Depth (feet, BGS)	Well Details	Sample Data: Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	Lithologic Column	Soil Description
0–1						**SED-01-SB-2.0**			0.0 to 1.3 feet: SILT (ML); very dark gray; 95% fines, low plasticity; 5% sand; wet. @ 0.9 feet: minor wood fragments.
2						**SED-01-SB-3.5**			1.3 to 2.3 feet: SILT (ML); very dark gray; 95% fines, low plasticity; 5% sand; wet; trace mica. @ 1.9 feet: minor wood fragments.
3									2.3 to 2.9 feet: SILT WITH SAND (ML); very dark gray; 85% fines, low plasticity; 15% sand, very fine to fine; wet; trace mica.
4–5						**SED-01-SB-5.5**			2.9 to 5.2 feet: SILT (ML); very dark gray; 95% fines, low plasticity; 5% sand, very fine, wet; trace mica. @ 3.3 feet: brown wood fragments. Jar method sheen test produced no sheen or odor.
6–8						**PID = 0.6 ppm** **SED-01-SB-6.65** **SED-01-SB-8.65** **PID = 0.6 ppm** **PID = 1.4 ppm**			5.2 to 8.65 feet: SILT (ML); very dark gray; 95% fines, low plasticity; 5% sand, very fine, moist; trace mica. @ 5.4 feet: approximately 1-inch of mottled black and brown wood fragments, with mild to moderate hydrocarbon-like odor. Sheen test produced moderate sheen. @ 5.9 feet: approximately 1-inch of mottled black and brown wood fragments, with mild to moderate hydrocarbon-like odor. @ 6.7 feet: approximately 0.5-inch of of black wood fragments, mild to moderate hydrocarbon-like odor. Sheen test produced moderate sheen. @ 7.5 feet: approximately 1-inch of black wood fragments, with mild to moderate hydrocarbon-like odor. Sheen test produced moderate to heavy sheen, with visible blebs of brown NAPL approximately 0.3 mm in diameter. @ 8.0 feet: approximately 1-inch of black wood fragments, mild to moderate hydrocarbon-like odor.
									8.65 to 8.8 feet: Material in cutting shoe not logged. Field sheet from Vibracore collection indicates bottom conditions to be tan silt with fine sand; hydrocarbon-like odor and black staining in shoe.

Length Recovered: 8.8 feet
Total Drive Length: 9.5 feet

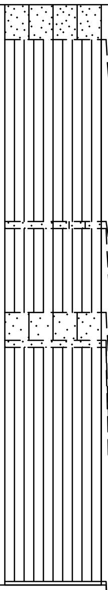
Recovery: 92.6%

NOTES: 1. Depths are relative to feet below mudline. 2. RSS Vessel: Carolyn Dow. 3. Sediment core was cut into two sections on the boat after collection: 0.0 to 4.65 feet, and 4.65 to 8.65 feet. 4. Sediment core was processed on 10/9/2019. 5. A photoionization detector (PID) was used over the entire sediment core immediately after opening; results were 0 parts per million (ppm), unless otherwise noted (headspace readings). 6. NAPL = nonaqueous-phase liquid. 7. mm = millimeter. 8. Surface elevation (mudline) vertical datum is NGVD29. 9. Location of sediment core collection: Latitude 45.57827170; Longitude -122.75338030.

Maul Foster & Alongi, Inc.	**Geologic Borehole Log/Well Construction**		
	Project Number	*Well Number*	*Sheet*
	8128.02.19	***SED-02***	***1 of 1***

Project Name	***Siltronic Corporation***	*TOC Elevation (feet)*	
Project Location	***Willamette River, Portland, Oregon***	*Surface Elevation (feet)*	***-4.4***
Start/End Date	***10/8/2019 to 10/8/2019***	*Northing*	
Driller/Equipment	***Research Support Services, Inc. (RSS)/Vibracore Rosfelder***	*Easting*	
Geologist/Engineer	***Kelly Titkemeier, RG***	*Hole Depth*	***8.3-feet***
Sample Method	***Vibracore***	*Outer Hole Diam*	***4-inch***

Depth (feet, BGS)	Well Details	Sample Data: Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	Lithologic Column	Soil Description
0						***SED-02-SB-2.0***			
2						***SED-02-SB-3.0***			
3						***SED-02-SB-5.0***			
5						***SED-02-SB-6.25***			
6						***SED-02-SB-8.25***			



0.0 to 0.5 feet: SILTY SAND (SM); very dark gray (10YR 3/1); 40% fines; 60% sand, very fine to fine; very loose; trace mica; wet. Soupy at the top of the core.
@ 0.4 feet: one-half of a bivalve shell.

0.5 to 3.1 feet: SANDY SILT TO SILT (ML); very dark gray (10YR 3/1); 60-80% fines, nonplastic to low plasticity; 20-40% sand; soft; trace mica; wet. Sand and fines percentages vary with depth.
@ 1.0 to 2.0 feet: trace wood fragments.
@ 1.55 feet: one piece of gravel, medium, subrounded.
@ 1.9 feet: one piece of gravel, 0.15 ft x 0.1 ft, subangular.

3.1 to 3.2 feet: SAND WITH SILT (SP-SM); very dark gray (10YR 3/1); 5-10% fines; 90-95% sand, very fine to fine; loose; trace mica; moist.

3.2 to 4.4 feet: SILT (ML); very dark gray (10YR 3/1); 95-100% fines, low plasticity; 0-5% sand, very fine; firm; trace mica, rootlets, and small wood and plant fragments; moist.

4.4 to 4.8 feet: SANDY SILT (ML); very dark gray (10YR 3/1); 60% fines; 40% sand, very fine to fine; soft; trace wood fragments and gravel, fine to subangular; moist to wet.
@ 4.7 feet: color change to dark yellowish brown (10YR 4/4); firm.

4.8 to 4.9 feet: SAND (SP); very dark gray (10YR 3/1); trace mica, white sand grains, coarse sand, and wood fragments; moist to wet.

4.9 to 8.25 feet: SILT (ML); very dark gray (10YR 3/1); 90% fines, low plasticity to medium plasticity; 10% sand; soft, spongy texture becoming firm to stiff with depth; trace mica, rootlets, and wood fragments; wet, becoming moist with depth.
@ 6.8 to 7.2 feet: approximately 10-20% wood fragments in sediment.

8.25 to 8.3 feet: Material in cutting shoe not logged. Field sheet from Vibracore collection indicates bottom conditions to be tan silt with fine sand; strong odor and sheen in shoe.

Length Recovered: 8.3 feet
Total Drive Length: 9.7 feet

Recovery: 85.6%

NOTES: *1. Depths are relative to feet below mudline. 2. RSS Vessel: Carolyn Dow. 3. Sediment core was cut into two sections on the boat after collection: 0.0 to 4.4 feet, and 4.4 to 8.25 feet. 4. Sediment core was processed on 10/9/2019. 5. A photoionization detector (PID) was used over the entire sediment core immediately after opening; results were 0 parts per million (ppm). 6. ft = feet. 7. Surface elevation (mudline) vertical datum is NGVD29. 8. Location of sediment core collection: Latitude 45.57805196; Longitude -122.75303345.*

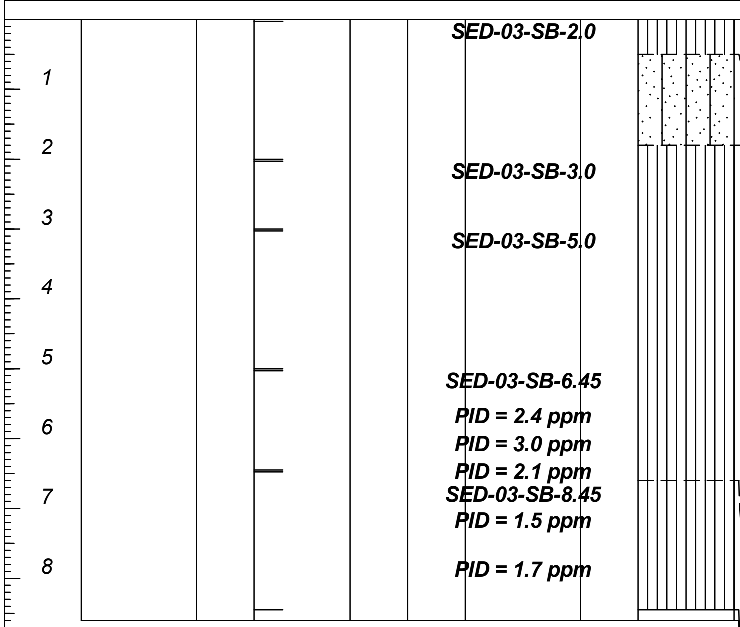
Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
8128.02.19	**SED-03**	**1 of 1**

Project Name **Siltronic Corporation**
Project Location **Willamette River, Portland, Oregon**
Start/End Date **10/8/2019 to 10/8/2019**
Driller/Equipment **Research Support Services, Inc. (RSS)/Vibracore Rosfelder**
Geologist/Engineer **Courtney Savoie, RG**
Sample Method **Vibracore**

TOC Elevation (feet)
Surface Elevation (feet) **-7.3**
Northing
Easting
Hole Depth **8.6-feet**
Outer Hole Diam **4-inch**



Name (Type)
SED-03-SB-2.0
SED-03-SB-3.0
SED-03-SB-5.0
SED-03-SB-6.45
PID = 2.4 ppm
PID = 3.0 ppm
PID = 2.1 ppm
SED-03-SB-8.45
PID = 1.5 ppm
PID = 1.7 ppm

Soil Description

0 to 0.5 feet: SILT (ML); very dark gray; 90% fines, low plasticity; 10% sand, very fine to fine; wet.

0.5 to 1.8 feet: SILT WITH SAND (ML); very dark gray; 80% fines, low plasticity; 20% sand, very fine to fine; wet; trace mica.

1.8 to 6.6 feet: SILT (ML); very dark gray; 95-97% fines, low plasticity; 3-5% sand, very fine; moist; trace mica.

@ 5.5 feet: approximately 0.5-inch thick layer of black discoloration with minor wood fragments and moderate hydrocarbon-like odor.

@ 5.9 feet: approximately 1-inch thick layer of black discoloration, with moderate hydrocarbon-like odor. Sheen test produced heavy iridescent sheen.

@ 6.3 feet: approximately 1-inch thick later of black discoloration, with moderate hydrocarbon-like odor. Sheen test produced heavy iridescent sheen.

6.6 to 8.45 feet: SILT (ML); very dark gray; 95% fines, low plasticity; 5% sand, very fine; moist; trace mice; laminations up to approximately 0.25-inches thick of black discoloration and wood fragments throughout; moderate hydrocarbon-like odor.

@ 7.0 to 7.2 feet: approximately 2-inch thick layer of wood fragments, with slight continuous sheen. Sheen test produced heavy iridescent sheen with blebs of brown NAPL approximately 0.5-1 mm in diameter.

@ 7.7 feet: slight continuous sheen. Sheen test produced heavy iridescent sheen with brown NAPL blebs up to 0.5 mm in diameter.

8.45 to 8.6 feet: Material in cutting shoe not logged. Field sheet from Vibracore collection indicates bottom conditions to be tan silt. Sheen observed on outside of core and silt with woody fragments and slight sheen in shoe.

Length Recovered: 8.6 feet
Total Drive Length: 9.5 feet

Recovery: 90.5%

NOTES: 1. Depths are relative to feet below mudline. 2. RSS Vessel: Carolyn Dow. 3. Sediment core was cut into two sections on the boat after collection: 0.0 to 4.45 feet, and 4.45 to 8.45 feet. 4. Sediment core was processed on 10/9/2019. 5. A photoionization detector (PID) was used over the entire sediment core immediately after opening; results were 0 parts per million (ppm), unless otherwise noted (headspace readings). 6. NAPL = nonaqueous-phase liquid. 7. mm = millimeter. 8. Surface elevation (mudline) vertical datum is NGVD29. 9. Location of sediment core collection: Latitude 45.57760915; Longitude -122.75186281.

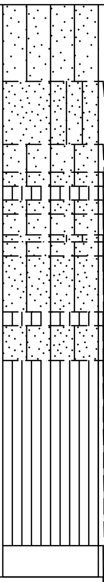
Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
8128.02.19	**SED-04**	**1 of 1**

Project Name	**Siltronic Corporation**	TOC Elevation (feet)	
Project Location	**Willamette River, Portland, Oregon**	Surface Elevation (feet)	**-13.3**
Start/End Date	**10/7/2019 to 10/7/2019**	Northing	
Driller/Equipment	**Research Support Services, Inc. (RSS)/Vibracore Rosfelder**	Easting	
Geologist/Engineer	**Kelly Titkemeier, RG**	Hole Depth	**8.2-feet**
Sample Method	**Vibracore**	Outer Hole Diam	**4-inch**

Depth (feet, BGS)	Well Details	Sample Data: Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	Lithologic Column
					SED-04-SB-2.0			
1								
					PID = 1.7 ppm			
2					**SED-04-SB-2.75**			
3					**SED-04-SB-4.75**			
4					**PID = 1.3 ppm**			
5					**SED-04-SB-5.75**			
6					**SED-04-SB-7.75**			
7								
8								



Soil Description

0.0 to 1.1 feet: SANDY SILT (ML); very dark gray (10YR 3/1); 60% fines; 40% sand, fine; slight discontinuous (spotty) sheen on water at top of core; wet; soupy.
@ 0.5 to 0.7 feet: sand lens.
@ 1.0 to 1.5 feet: slight sheen in sediment.

1.1 to 2.0 feet: SAND WITH SILT (SP-SM); very dark gray (10YR 3/1) with slightly darker, irregular areas of discoloration; 10-15% fines; 85-90% sand, very fine to fine; trace mica; wet.
@ 1.4 feet: jar method sheen test of discolored area showed slight discontinuous (spotty) sheen.

2.0 to 2.4 feet: SANDY SILT (ML); very dark gray (10YR 3/1); 70% fines, nonplastic to low plasticity; 30% sand, very fine to fine; trace mica; wet.

2.4 to 2.6 feet: SILTY SAND (SM); very dark gray (10YR 3/1); 30% fines; 70% sand, very fine to fine; wet.

2.6 to 2.8 feet: SILT (ML); very dark gray (10YR 3/1); 100% fines; trace mica and very fine sand; sticky texture; wet to moist.
@ 2.8 feet: one piece of gravel, medium, subrounded.

2.8 to 3.0 feet: SILTY SAND (SM); very dark gray (10YR 3/1); 45% fines; 55% sand, fine; trace wood fragments; wet.

3.0 to 3.3 feet: SANDY SILT (ML); very dark gray (10YR 3/1); 60% fines, nonplastic to low plasticity; 40% sand, very fine to fine; wet.

3.3 to 3.4 feet: SAND WITH SILT (SP-SM); very dark gray (10YR 3/1); 10% fines; 90% sand, very fine to fine; trace mica and white sand grains; wet.

3.4 to 3.6 feet: SILTY SAND to SANDY SILT (SM-ML); very dark gray (10YR 3/1); 50% fines; 50% sand, very fine to fine; medium to dense; trace mica and wood fragments; moist.

3.6 to 4.4 feet: SILTY SAND (SM); very dark gray (10YR 3/1); 30% fines; 70% sand, very fine to fine; approximately 50% wood fragements; loose; trace mica; wet.
@ 3.6 feet: trace sheen on wood fragments. Jar method sheen test produced no sheen. Trace white/colorless material observed floating on top of water in sheen test jar.
@ 4.3 feet: sheen on water at top of second core.

4.4 to 4.6 feet: SILT (ML); very dark gray (10YR 3/1) with black mottling; 100% fines; soft; trace mica and very fine sand; wet.
@ 4.4 feet: jar method sheen test shows slight discontinuous (spotty) sheen.

4.6 to 5.1 feet: SILTY SAND (SM); very dark gray (10YR 3/1); 30-40% fines; 60-70% sand, fine; wet.
@ 4.7 feet: wood fragments, including one large fragment 0.3' x 0.15'.
@ 4.9 to 5.0 feet: trace fine subrounded gravel.

5.1 to 7.75 feet: SANDY SILT (ML); very dark gray (10YR 3/1); 55-70% fines; 30-45% sand, very fine to fine; trace mica; wet.
@ 6.6 feet: color change to dark yellowish brown (10YR 3/4).

7.75 to 8.2 feet: Material in cutting shoe not logged. Field sheet from Vibracore collection indicates bottom conditions to be silt with sand; tan sandy silt in shoe; no odor observed.

Length Recovered: 8.2 feet
Total Drive Length: 9.5 feet

Recovery: 86.3%

NOTES: 1. Depths are relative to feet below mudline. 2. RSS Vessel: Carolyn Dow. 3. Sediment core was cut into two sections on the boat after collection: 0.0 to 3.95 feet, and 3.95 to 7.75 feet. 4. Sediment core was processed on 10/8/2019. 5. A photoionization detector (PID) was used over the entire sediment core immediately after opening; results were 0 parts per million (ppm), unless otherwise noted (headspace readings). 6. During homogenization of the sample collected from 2.75 to 4.75 feet, a 0.2' nail was found in the sediment. 7. Surface elevation (mudline) vertical datum is NGVD29. 8. Location of sediment core collection: Latitude 45.57721757; Longitude -122.75085545

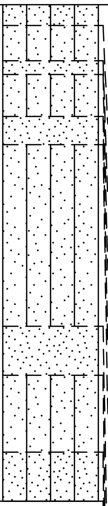
Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
8128.02.19	**SED-05**	**1 of 1**

Project Name	**Siltronic Corporation**	TOC Elevation (feet)	
Project Location	**Willamette River, Portland, Oregon**	Surface Elevation (feet)	**-11.9**
Start/End Date	**10/7/2019 to 10/7/2019**	Northing	
Driller/Equipment	**Research Support Services, Inc. (RSS)/Vibracore Rosfelder**	Easting	
Geologist/Engineer	**Kelly Titkemeier, RG**	Hole Depth	**7.1-feet**
Sample Method	**Vibracore**	Outer Hole Diam	**4-inch**

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	Lithologic Column
0						**SED-05-SB-2**		
1								
2						**SED-05-SB-3**		
3						**SED-05-SB-5**		
4								
5						**SED-05-SB-7**		
6								
7								



Soil Description

0.0 to 0.3 feet: SILTY SAND (SM); very dark gray (10YR 3/1); 40% fines; 60% sand, very fine to fine; trace mica; wet. Soupy at the top of the core.

@ 0.0 to 0.4 feet: slight sheen on top of core. Jar method sheen test produced slight discontinuous (spotty) sheen.

0.3 to 0.8 feet: SANDY SILT (ML); very dark gray (10YR 3/1); 70% fines; 30% sand, very fine; spongy texture; soft; trace mica; wet.

@ 0.6 feet: trace wood fragments up to 0.25' x 0.5".

0.8 to 1.0 feet: SAND (SP); very dark gray (10YR 3/1); 100% sand, fine; loose to medium; trace mica, fines, and white sand grains; wet.

1.0 to 1.6 feet: SANDY SILT (ML); very dark gray (10YR 3/1); 60% fines; 40% sand, very fine to fine; soft to firm; trace mica, rootlets, and possible plant material; wet.

1.6 to 2.0 feet: SAND (SP); very dark gray (10YR 3/1); 100% sand, fine; loose to medium; trace mica, fines, white sand grains, and fine angular gravel; moist to wet.

2.0 to 4.6 feet: SANDY SILT (ML); very dark gray (10YR 3/1); 60-70% fines; 30-40% sand, very fine to fine; soft to firm; trace mica, rootlets, possible plant material, and fine to medium angular to rounded gravel; moist. Increasing sand content with depth.

@ 2.75 feet: 1/4-inch thick sand lamination.

@ 3.6 to 3.8 feet: sand lens; very dark gray (10YR 3/1); fine sand; becoming firm with depth.

4.6 to 5.3 feet: SAND (SP); very dark gray (10YR 3/1); 100% sand, fine; medium density; trace mica, fines, white sand grains, medium to coarse sand, fine to medium subrounded gravel; moist.

@ 5.05 feet: 1/4-inch thick SILT (ML) lamination; very dark gray (10YR 3/1).

5.3 to 6.4 feet: SANDY SILT (ML); very dark gray (10YR 3/1); 60-70% fines; 30-40% sand, very fine; firm; trace mica; moist. SAND laminations up to 1/2-inch thick.

@ 5.4 feet: wood fragment; approximately 2 mm x 5 mm x 1 mm small thin white flecks.

6.4 to 7.1 feet: SILTY SAND (SM); very dark gray (10YR 3/1); 30% fines; 70% sand, very fine; medium to dense; trace mica and fine subangular gravel; moist.

@ 6.6 feet: wood fragment.

@ 6.8 feet: silt nodules.

Material in cutting shoe not logged. Field sheet from Vibracore collection indicates bottom conditions to be sand; Vibracore run into compacted sand until refusal.

Length Recovered: 7.1 feet
Total Drive Length: 8.8 feet

Recovery: 80.7%

NOTES: 1. Depths are relative to feet below mudline. 2. RSS Vessel: Carolyn Dow. 3. Sediment core was processed on 10/7/2019. 4. A photoionization detector (PID) was used over the entire sediment core immediately after opening; results were 0 parts per million (ppm). 5. mm = millimeter. 6. Surface elevation (mudline) vertical datum is NGVD29. 7. Locations of sediment core collection: Latitude 45.57702222; Longitude -122.75057069.

Geologic Borehole Log/Well Construction

Maul Foster & Alongi, Inc.

Project Number	Well Number	Sheet
8128.02.19	**SED-06**	**1 of 1**

Project Name	**Siltronic Corporation**	TOC Elevation (feet)	
Project Location	**Willamette River, Portland, Oregon**	Surface Elevation (feet)	**-7.8**
Start/End Date	**10/7/2019 to 10/7/2019**	Northing	
Driller/Equipment	**Research Support Services, Inc. (RSS)/Vibracore Rosfelder**	Easting	
Geologist/Engineer	**Kelly Titkemeier, RG**	Hole Depth	**9.0-feet**
Sample Method	**Vibracore**	Outer Hole Diam	**4-inch**

Depth (feet, BGS) | Well Details | Sample Data: Interval, Percent Recovery, Collection Method, Number, Name (Type), Blows/6" | Lithologic Column | Soil Description

Depth: 1, 2, 3, 4, 5, 6, 7, 8, 9

SED-06-SB-2.0

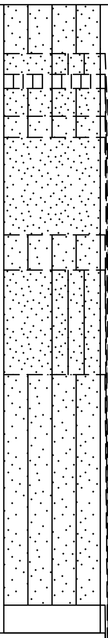
PID = 0.4 ppm
SED-06-SB-3.5

PID = 1.6 ppm
SED-06-SB-5.5

PID = 0.7 ppm

SED-06-SB-6.5

SED-06-SB-8.5



0.0 to 0.7 feet: SANDY SILT (ML); very dark gray (10YR 3/1); 55% fines; 45% sand, very fine; very soft; trace rootletes, twigs, and wood fragments; wet/soupy. Sheen near top of core observed through core liner prior to opening. Top 0.6 ft of sediment core was only approximately 1/2- to 2/3- full.
@ 0.4 feet: 0.3-ft long twig.

0.7 to 1.0 feet: SAND WITH SILT (SP-SM); very dark gray (10YR 3/1); 5-10% fines; 90-95% sand, fine; soft/loose; trace white sand grains and rootlets; wet.

1.0 to 1.2 feet: SILT (ML); very dark gray (10YR 3/1); 100% fines, low plasticity; soft; trace mica, very fine sand, and wood fragments; wet.
@ 1.2 feet: 0.25-ft long twig.

1.2 to 1.6 feet: SILTY SAND (SM); very dark gray (10YR 3/1); 30% fines; 70% sand, very fine to fine; trace mica, white sand grains, coarse red sand grains, and wood fragments; wet.

1.6 to 1.9 feet: SANDY SILT (ML); very dark gray (10YR 3/1); 60-70% fines; 30-40% sand; trace mica; wet.
@1.6 to 2.0 feet: mild hydrocarbon-like odor; slight sheen. Jar method sheen test produced slight discontinuous (spotty) sheen.

1.9 to 3.3 feet: SAND (SP); very dark gray (10YR 3/1); 5% fines; 95% sand, fine; wet, trace mica, white sand grains, coarse sand, fine subrounded gravel, and wood fragments; wet, becoming moist with depth.
@ 1.9 to 2.3 feet: slight/trace sheen. Jar method sheen test produced slight discontinuous (spotty) sheen.
@ 2.7 feet: one piece of gravel, 0.2-ft x 0.1-ft, angular.

3.3 to 3.8 feet: SILT WITH SAND (ML); very dark gray (10YR 3/1); 70-80% fines, low plasticity; 20-30% sand, very fine to fine; trace wood fragments; moist. SAND laminations. Wood fragments have hydrocarbon-like odor. Jar method sheen test produced slight discontinuous (spotty) sheen.
@ 3.3 to 3.6 feet: 1/4-inch thick vertical lamination of small wood fragments.

3.8 to 5.3 feet: SAND WITH SILT (SP-SM); very dark gray (10YR 3/1); 5-10% fines; 90-95% sand, fine; medium density; trace mica and wood fragments; moist.

5.3 to 8.6 feet: ALTERNATING LAYERS OF SAND (SP) AND SANDY SILT (ML). SAND (SP); very dark gray (10YR 3/1); 5% fines; 95% sand, fine; medium density; trace mica; moist. SANDY SILT (ML); very dark gray (10YR 3/1); 70% fines; low plasticity; 30% sand, very fine to fine; firm; trace mica; moist.
@ 8.1 feet: one half of a peanut shell.

8.6 to 9.0 feet: Material in cutting shoe not logged. Field sheet from Vibracore collection indicates hardpacked sand encountered at depth; Vibracore refusal at 13.0 feet drive depth.

Length Recovered: 9.0 feet
Total Drive Length: 13.0 feet

Recovery: 69.2%

Best recovery of three attempts. Hardpack sand and Vibracore refusal encountered at 13 feet drive depth.

NOTES: 1. Depths are relative to feet below mudline. 2. RSS Vessel: Carolyn Dow. 3. Sediment core was cut into two sections on the boat after collection: 0.0 to 5.2 feet, and 5.2 to 8.6 feet. 4. Sediment core was processed on 10/8/2019. 5. A photoionization detector (PID) was used over the entire sediment core immediately after opening; results were 0 parts per million (ppm), unless otherwise noted (headspace readings). 6. ft = feet. 7. Surface elevation (mudline) vertical datum is NGVD29. 8. Location of sediment core collection: Latitude 45.57677333; Longitude -122.75016265.

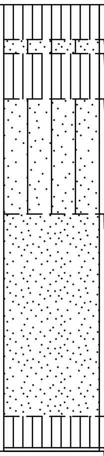
Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
8128.02.19	**SED-07**	**1 of 1**

Project Name	**Siltronic Corporation**	TOC Elevation (feet)	
Project Location	**Willamette River, Portland, Oregon**	Surface Elevation (feet)	**-15.0**
Start/End Date	**10/7/2019 to 10/7/2019**	Northing	
Driller/Equipment	**Research Support Services, Inc. (RSS)/Vibracore Rosfelder**	Easting	
Geologist/Engineer	**Kelly Titkemeier, RG / Allen Clements, GIT**	Hole Depth	**6.4-feet**
Sample Method	**Vibracore**	Outer Hole Diam	**4-inch**

Depth (feet, BGS)	Well Details	Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	Lithologic Column	Soil Description
						SED-07-SB-2.0			0.0 to 0.5 feet: SILT WITH SAND (ML); very dark gray (10YR 3/1); 70-80% fines; 20-30% sand, very fine; soft; trace wood fragments; wet.
1									0.5 to 0.7 feet: SILTY SAND (SM); very dark gray (10YR 3/1); 30-40% fines; 60-70% sand, very fine to fine; loose; trace mica; wet.
2						**SED-07-SB-4.35**			0.7 to 1.35 feet: SILT WITH SAND (ML); very dark gray (10YR 3/1); 80-90% fines, low to medium plasticity; 10-20% sand, very fine; firm; moist to wet.
3									1.35 to 3.0 feet: ALTERNATING LAYERS OF SILTY SAND (SM) AND SILT WITH SAND (ML). SILTY SAND (SM); very dark gray (10YR 3/1); 40% fines, low plasticity; 60% sand, fine to medium; loose; trace rootlets; up to 50% wood fragments; wet. SILT WITH SAND (ML); very dark gray (10YR 3/1); 80% fines, low plasticity; 20% sand; soft; trace rootlets; up to 50% wood fragments; wet.
4						**SED-07-SB-6.35**			3.0 to 5.9 feet: SAND (SP); very dark gray (10YR 3/1); 5% fines; 95% sand, fine to medium; loose; trace wood fragments; moist.
5									
6									5.9 to 6.35 feet: SILT WITH SAND (ML); very dark gray (10YR 3/1); 80% fines, low plasticity; 20% sand, fine to medium; moist.
									6.35 to 6.4 feet: Material in cutting shoe not logged. Field sheet from Vibracore collection indicates bottom conditions to be gray fine sand.



Length Recovered: 6.4 feet
Total Drive Length: 8.6 feet

Recovery: 74.4%

Best recovery of three attempts.

NOTES: 1. Depths are relative to feet below mudline. 2. RSS Vessel: Carolyn Dow. 3. Sediment core was cut into two sections on the boat after collection: 0.0 to 3.2 feet, and 3.2 to 6.35 feet. 4. Sediment core was processed on 10/8/2019. 5. A photoionization detector (PID) was used over the entire sediment core immediately after opening; results were 0 parts per million (ppm). 6. Surface elevation (mudline) vertical datum is NGVD29. 7. Location of sediment core collection: Latitude 45.57637168; Longitude -122.74931401.

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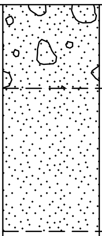
Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
8128.02.19	**SED-08**	**1 of 1**

Project Name	**Siltronic Corporation**	TOC Elevation (feet)	
Project Location	**Willamette River, Portland, Oregon**	Surface Elevation (feet)	**-21.4**
Start/End Date	**10/8/2019 to 10/8/2019**	Northing	
Driller/Equipment	**Research Support Services, Inc. (RSS)/Vibracore Rosfelder**	Easting	
Geologist/Engineer	**Courtney Savoie, RG**	Hole Depth	**3.7-feet**
Sample Method	**Vibracore**	Outer Hole Diam	**4-inch**

Depth (feet, BGS)	Well Details	Sample Data						Lithologic Column	Soil Description
		Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"		
						SED-08-SB-2.0			0 to 1.2 feet: SAND (SP); very dark gray (10YR 3/1); 5% fines; 85% sand; fine to medium; 10% gravel, angular; few cobbles up to 2-inches in diameter; wet.
1									
2									1.2 to 3.25 feet: SAND (SP); very dark gray; 5% fines; 95% sand, fine to coarse; trace mica and angular gravel; moist. @ 1.75 to 3.25 feet: color change to very dark brown; few angular white fragements approximately 0.5-2 mm in diameter.
						SED-08-SB-3.25			
3									3.25 to 3.7 feet: Material in cutting shoe not logged. Field sheet from Vibracore collection indicates bottom conditions to be gray fine to medium sand.



Length Recovered: 3.7 feet
Total Drive Length: 5.0 feet

Recovery: 74.0%

Best recovery of three attempts.

NOTES: 1. Depths are relative to feet below mudline. 2. RSS Vessel: Carolyn Dow. 3. Sediment core was processed on 10/9/2019. 4. A photoionization detector (PID) was used over the entire sediment core immediately after opening; results were 0 parts per million (ppm). 5. During homogenization of the sample collected from 0.0 to 2.0 feet, an approximately 0.1-ft x 0.1-ft glass fragment with subrounded edges was found in the sediment. 6. mm = millimeter. 7. ft = feet. 8. Surface elevation (mudline) vertical datum is NGVD29. 9. Location of sediment core collection: Latitude 45.57609380; Longitude -122.74886741.

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Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
8128.02.19	**SED-09**	**1 of 1**

Project Name	**Siltronic Corporation**	TOC Elevation (feet)	
Project Location	**Willamette River, Portland, Oregon**	Surface Elevation (feet)	**-7.8**
Start/End Date	**10/8/2019 to 10/8/2019**	Northing	
Driller/Equipment	**Research Support Services, Inc. (RSS)/Vibracore Rosfelder**	Easting	
Geologist/Engineer	**Courtney Savoie, RG**	Hole Depth	**7.0-feet**
Sample Method	**Vibracore**	Outer Hole Diam	**4-inch**

Depth (feet, BGS)	Well Details	Sample Data: Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	Lithologic Column	Soil Description

SED-09-SB-2.0

PID = 1.4 ppm

PID = 8.2 ppm

SED-09-SB-2.85

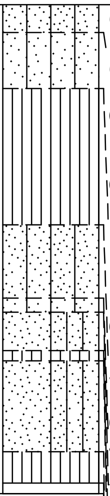
PID = 1.4 ppm

SED-09-SB-4.85

SED-09-SB-6.85

PID = 1.4 ppm

1
2
3
4
5
6
7



0 to 0.4 feet: SILTY SAND (SM); black; 20% fines; 80% sand, fine to medium; trace gravel and mica; wet.

0.4 to 1.2 feet: SILT WITH SAND (ML); black; 80% fines; 20% sand; trace mica and wood fragments; wet.

@ 0.7 feet: dark black discoloration, mild organic-like odor; slight discontinuous (spotty) sheen. Jar method sheen test produced slight iridescent sheen.

@ 1.1 to 1.2 feet: wood fragments with moderate hydrocarbon-like odor. Sheen test produced slight metallic sheen.

1.2 to 3.15 feet: SILT (ML); black; 97% fines, low plasticity; 3% sand, very fine to fine; trace mica; wood fragments throughout, including pieces of wood up to 6 inches long; mild hydrocarbon-like odor and slight sheen; wet.

@ 2.4 feet: jar method sheen test produced slight to moderate metallic sheen.

3.15 to 4.2 feet: SILTY SAND (SM); black; 25-35% fines; 65-75% sand, very fine to fine; trace mica; wet.

@ 3.6 feet: moist.

4.2 to 4.4 feet: SANDY SILT (ML); black; 65% fines, low plasticity; 35% sand, very fine to fine; trace mica; moist.

4.4 to 4.95 feet: SAND WITH SILT (SP-SM); black; 10% fines; 90% sand, fine; trace mica; moist.

4.95 to 5.1 feet: SILT (ML); black; 95% fines, low to medium plasticity; 5% sand; moist.

5.1 to 6.4 feet: SAND WITH SILT (SP-SM); black; 15% fines; 85% sand, very fine to fine; trace mica; no odor observed; moist.

@ 5.45 - 5.9 feet: laminations of fine wood fragments up to 0.5-inches thick.

@ 5.5 feet: Jar method sheen test produced no sheen.

6.4 to 6.85 feet: SILT (ML); black; 97% fines, low plasticity; 3% sand; trace mica; moist.

6.85 to 7.0 feet: Material in cutting shoe not logged. Field sheet from Vibracore collection indicates bottom conditions to be gray silty sand.

Length Recovered: 7.0 feet
Total Drive Length: 9.7 feet

Recovery: 72.2%

Best recovery of three attempts.

NOTES: *1. Depths are relative to feet below mudline. 2. RSS Vessel: Carolyn Dow. 3. Sediment core was cut into two sections on the boat after collection: 0.0 to 3.5 feet, and 3.5 to 6.85 feet. 4. Sediment core was processed on 10/9/2019. 5. A photoionization detector (PID) was used over the entire sediment core immediately after opening; results were 0 parts per million (ppm), unless otherwise noted (headspace readings). 6. Surface elevation (mudline) vertical datum is NGVD29. 7. Location of sediment core collection: Latitude 45.57551593; Longitude -122.74834684.*

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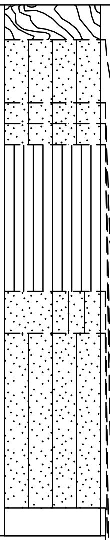
Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
8128.02.19	**SED-10**	**1 of 1**

Project Name	**Siltronic Corporation**	TOC Elevation (feet)	
Project Location	**Willamette River, Portland, Oregon**	Surface Elevation (feet)	**-28.2**
Start/End Date	**10/8/2019 to 10/8/2019**	Northing	
Driller/Equipment	**Research Support Services, Inc. (RSS)/Vibracore Rosfelder**	Easting	
Geologist/Engineer	**Kelly Titkemeier, RG**	Hole Depth	**7.6-feet**
Sample Method	**Vibracore**	Outer Hole Diam	**4-inch**

Depth (feet, BGS)	Well Details	Sample Data: Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	Lithologic Column	Soil Description
						SED-10-SB-2.0			
1									
2						**PID = 4.9 ppm** **SED-10-SB-3.0**			
3						**PID = 4.2 ppm** **PID = 2.7 ppm** **SED-10-SB-5.2**			
4									
5						**PID = 1.4 ppm**			
6						**PID = 1.5 ppm** **SED-10-7.2**			
7						**PID = 1.0 ppm**			



0.0 to 0.5 feet: WOOD FRAGMENTS; very dark brown (7.5YR 2.5/3) to very dark gray (10YR 3/1); mostly large fragments of wood up to 2.5 inches long; very loose; wet. Layer of water on top of wood.

0.5 to 1.4 feet: SILTY SAND (SM); very dark gray (10YR 3/1); 30-45% fines; 55-70% sand, fine; loose; trace mica and white sand grains; wet. Laminations of SANDY SILT (ML); very dark gray (10YR 3/1); 60% fines; 40% sand, very fine to fine; soft; wet.
@ 0.5 to 0.7 feet: wood fragments.
@ 1.1 feet: one medium gravel-sized SILT nodule.
@ 1.2 feet: one-half of a bivalve shell.

1.4 to 1.7 feet: SILTY SAND (SM); very dark gray (10YR 3/1); 40% fines; 60% sand; loose; trace mica and rootlets; approximately 50-60% wood fragments; mild hydrocarbon-like odor; wet. Jar method sheen test produced several small brown NAPL globules at the top of the water in the jar.

1.7 to 2.0 feet: SILTY SAND (SM); very dark gray (10YR 3/1); 30% fines; 70% sand, fine; loose; trace mica and gravel, fine to medium rounded to subrounded; wet.

2.0 to 4.1 feet: SILT (ML); very dark gray (10YR 3/1); 90-95% fines; 5-10% sand, very fine; trace wood fragments; hydrocarbon-like odor; wet.
@ 2.2 feet: jar method sheen test produced 1 small brown NAPL globules.
@ 2.5 to 2.7 feet: jar method sheen test produced 1 large brown NAPL globule, approximately 3 mm x 4 mm.
@ 3.6 feet: slight sheen on water at top of second core.
@ 3.6 to 4.1 feet: decrease in fines to 80-90%; increase in sand to 10-20%.

4.1 to 4.7 feet: SAND WITH SILT (SP-SM); very dark gray (10YR 3/1) with areas of slightly darker discoloration; 15% fines; 85% sand, fine; trace mica and wood fragments; hydrocarbon-like odor; moist to wet.
@ 4.3 to 4.55 feet: slight sheen on standing water in core. Jar method sheen test on sediment from 4.3 to 4.6 feet produced slight discontinuous (spotty) sheen.

4.7 to 7.2 feet: SILTY SAND (SM); very dark gray (10YR 3/1); 15-45% fines; 55-85% sand, very fine to fine; loose to medium density; trace mica and wood fragments; wet, becoming moist with depth. Sand percentage and sediment density increases with depth.
@ 4.7 to 5.0 feet: areas of slightly darker discoloration.
@ 5.0 to 5.3 slight discoloration. Jar method sheen test produced slight discontinuous (spotty) sheen.
@ 5.7 to 5.85 feet: silt lens; very dark gray (10YR 3/1); 90% fines; 10% sand; moist to wet.
@ 5.85 feet: 0.25-ft wood fragment.
@ 6.5 to 6.9 feet: large wood fragments up to 0.2-ft in the sediment.
@ 6.75 to 6.95 feet: slight sheen between sediment core and core liner. Jar method sheen test produced numerous (approximately 50) small brown NAPL globules.

7.2 to 7.6 feet: Material in cutting shoe not logged. Field sheet from Vibracore collection indicates bottom conditions to be tan hard pack fine sand or silt.

Length Recovered: 7.6 feet
Total Drive Length: 9.5 feet

Recovery: 80.0%

NOTES: 1. Depths are relative to feet below mudline. 2. RSS Vessel: Carolyn Dow. 3. Sediment core was cut into two sections on the boat after collection: 0.0 to 3.6 feet, and 3.6 to 7.2 feet. 4. Sediment core was processed on 10/9/2019. 5. A photoionization detector (PID) was used over the entire sediment core immediately after opening; results were 0 parts per million (ppm), unless otherwise noted (headspace readings). 6. NAPL = nonaqueous-phase liquid. 7. mm = millimeter. 8. ft = feet. 9. Surface elevation (mudline) vertical datum is NGVD29. 10. Location of sediment core collection: Latitude 45.5758604; Longitude -122.74845149.

ATTACHMENT G

SAMPLE COLLECTION PHOTOLOG

PHOTOGRAPHS

Project Name:	2019 Sediment Sampling
Project Number:	8128.02.19
Location:	Willamette Rivermile 6.55 to 6.9 West Portland, Oregon

Photo No. 1.

Description

West riverbank of Willamette River adjacent to sediment sampling area, looking downriver.

Photo No. 2.

Description

West riverbank of Willamette River adjacent to sediment sampling area.

Photo No. 3.

Description
West riverbank of Willamette River adjacent to sediment sampling area, looking downriver.

Photo No. 4.

Description
Subcontracted sediment sampling boat (*Carolyn Dow*, Research Support Services Incorporated [RSS]).

Photo No. 5.

Description
Vibracore sampling
from RSS's *Carolyn Dow*.

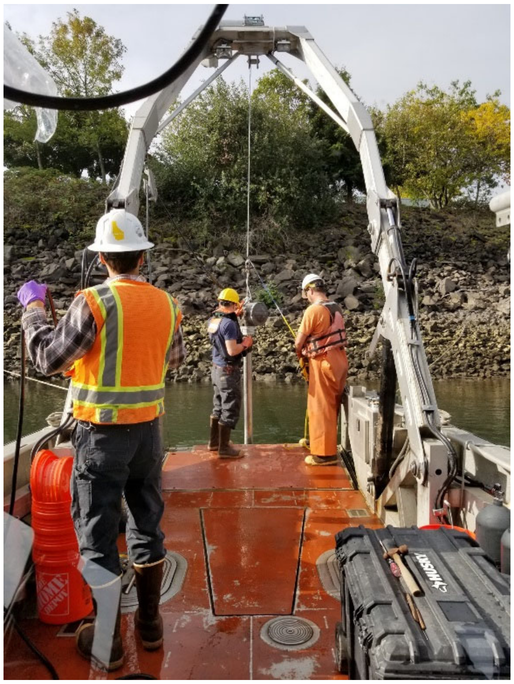


Photo No. 6.

Description
Subcontracted sediment
sampling boat (*Carolyn Dow*, RSS)

ATTACHMENT H

SURFACE SEDIMENT PHOTOLOG

PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/9/19

Surface Sediment Grabs

Location: SED-01

0–21 cm bml

0–30 cm bml

0–28 cm bml

Notes:
bml = below mudline.
cm = centimeter(s).

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PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/9/19

Surface Sediment Grabs

Location: SED-02

0–23 cm bml

0–30 cm bml

0–27 cm bml

Notes:
bml = below mudline.
cm = centimeter(s).

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PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/9/19

Surface Sediment Grabs

Location: SED-03

0–23 cm bml

0–25 cm bml

0–23 cm bml

Notes:
bml = below mudline.
cm = centimeter(s).

PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/9/19

Surface Sediment Grabs

Location: SED-04

0–27 cm bml

0–25 cm bml

0–21 cm bml

Notes:
bml = below mudline.
cm = centimeter(s).

Location: SED-05

0–20.5 cm bml

0–25 cm bml

0–25 cm bml

Notes:
bml = below mudline.
cm = centimeter(s).

PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/10/19

Surface Sediment Grabs

Location: SED-06

0–24.5 cm bml

0–25 cm bml

0–22 cm bml

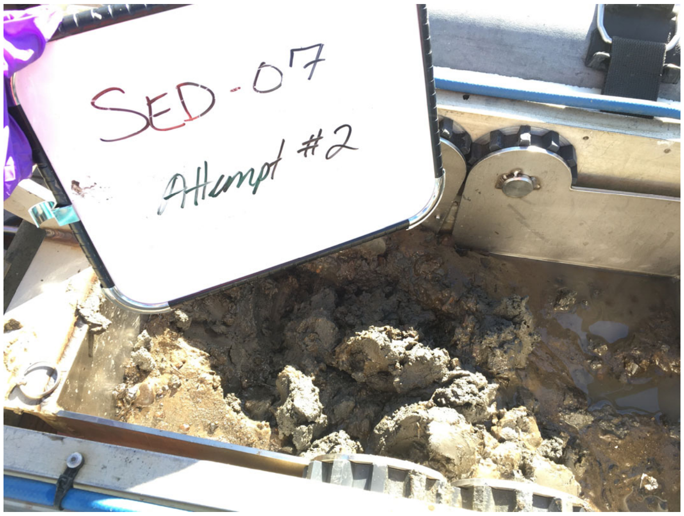
Notes:
bml = below mudline.
cm = centimeter(s).

PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/10/19

Surface Sediment Grabs

Location: SED-07



0–23 cm bml

0–20.5 cm bml

0–23 cm bml

Notes:
bml = below mudline.
cm = centimeter(s).

PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/10/19

Surface Sediment Grabs

Location: SED-08

0–21 cm bml

0–22 cm bml

0–23 cm bml

Notes:
bml = below mudline.
cm = centimeter(s).

PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/10/19

Surface Sediment Grabs

Location: SED-09

0–25 cm bml

0–26 cm bml

0–27 cm bml

Notes:
bml = below mudline.
cm = centimeter(s).

PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West,
Siltronic Corporation, Portland, Oregon
Date: 10/10/19

Surface Sediment Grabs

Location: SED-10

0–27 cm bml

0–29 cm bml

0–27 cm bml

Notes:
bml = below mudline.
cm = centimeter(s).

ATTACHMENT I

SUBSURFACE SEDIMENT PHOTOLOG

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PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/7/19 – 10/9/19

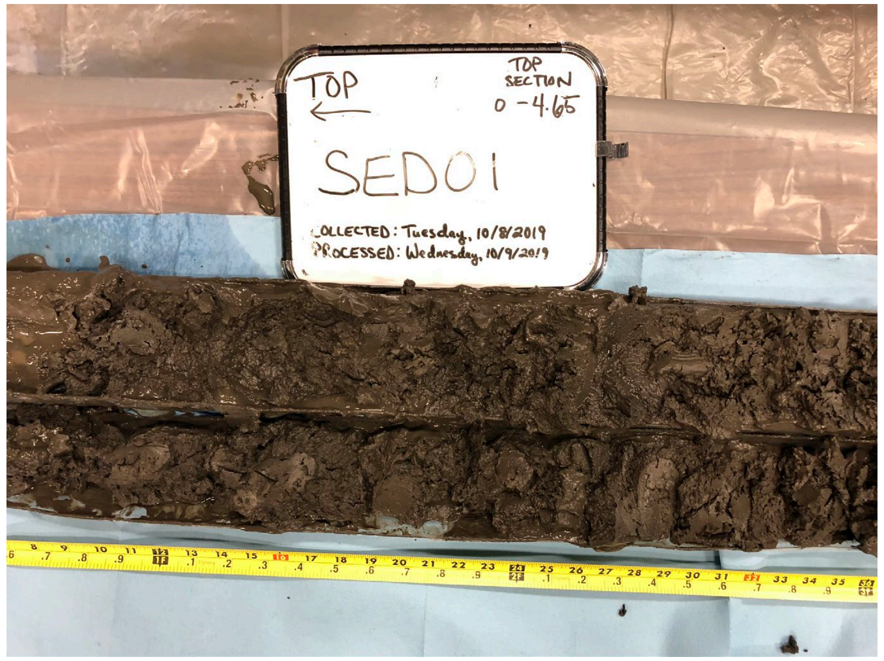
Subsurface Sediment Cores

Location: SED-01

Sample Depths: 0 - 2.0, 2 - 3.5 (archive), 3.5 - 5.5, 5.5 - 6.65 (archive), 6.65-8.65

Mudline

0 – 1.7 feet bml



0.6 – 3.0 feet bml

2.9 – 4.65 feet bml

4.65 – 6.5 feet bml

5.4 – 7.7 feet bml

6.4 – 8.65 feet bml

Notes:
Core length, including cutting shoe, was 8.8 feet.
Scale shown in feet.
bml = below mudline.

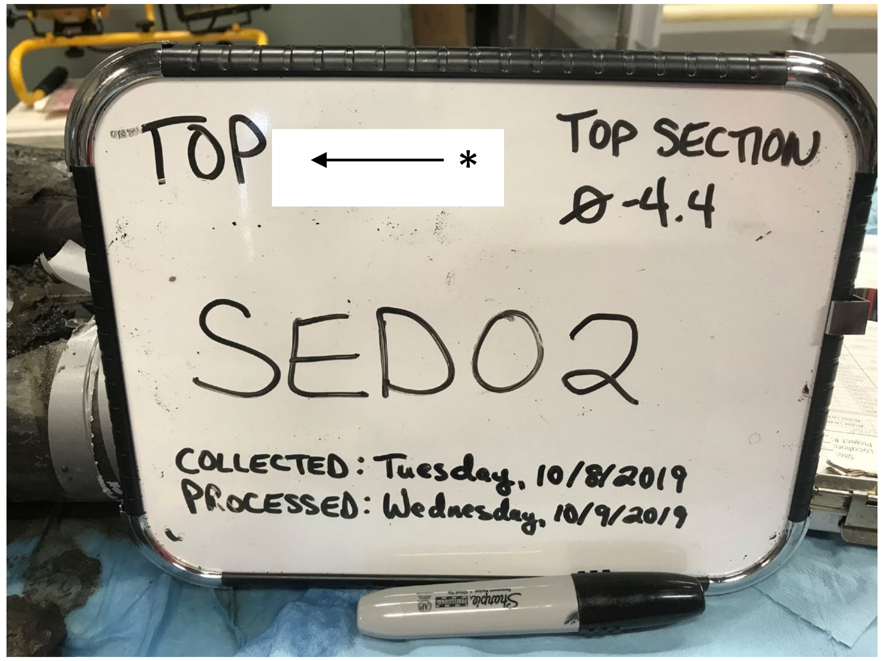
PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/7/19 – 10/9/19

Subsurface Sediment Cores

Location: SED-02

Sample Depths: 0 - 2.0, 2.0 - 3.0 (archive), 3.0 - 5.0, 5.0 - 6.25 (archive), 6.25 - 8.25



Mudline

0 – 1.1 feet bml

0.8 – 2.0 feet bml

1.9 – 3.1 feet bml

3.9 – 4.0 feet bml

3.45 – 4.4 feet bml

Notes:
Core length, including cutting shoe, was 8.3 feet.
Scale shown in feet.
bml = below mudline.
*Inserted direction arrow indicates top of core.

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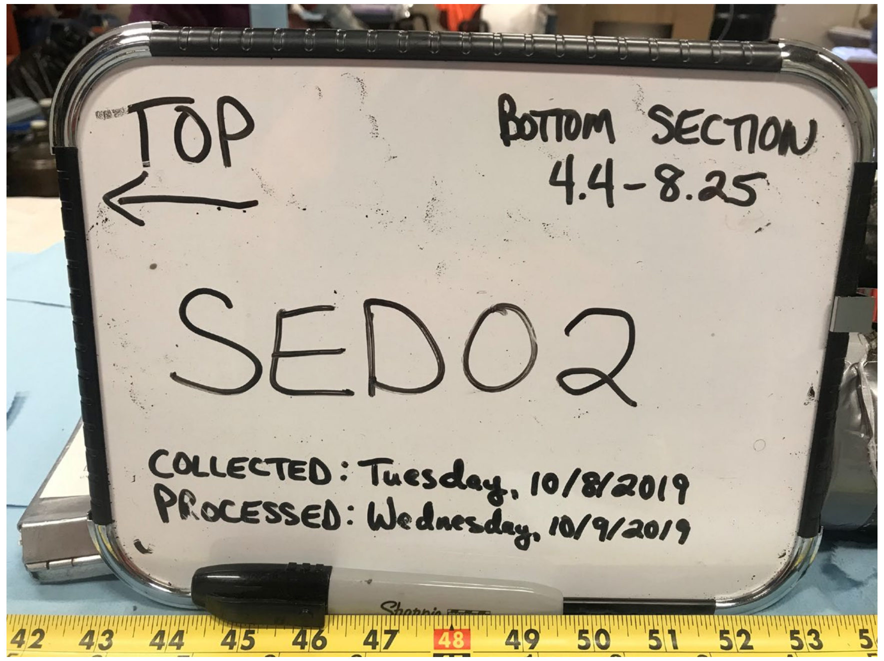
PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/7/19 – 10/9/19

Subsurface Sediment Cores
Location: SED-02

Sample Depths: 0 - 2.0, 2.0 - 3.0 (archive), 3.0 - 5.0, 5.0 - 6.25 (archive), 6.25 - 8.25



4.4 – 5.4 feet bml

5.1 – 6.3 feet bml

5.9 – 7.1 feet bml

6.7 – 7.9 feet bml

7.4 – 8.25 feet bml

Notes:
Core length, including cutting shoe, was 8.3 feet.
Scale shown in feet.
bml = below mudline.

PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/7/19 – 10/9/19

Subsurface Sediment Cores

Location: SED-03

Sample Depths: 0 - 2.0, 2.0 - 3.0 (archive), 3.0 - 5.0, 5.0 - 6.45 (archive), 6.45 - 8.45

0 – 2.2 feet bml

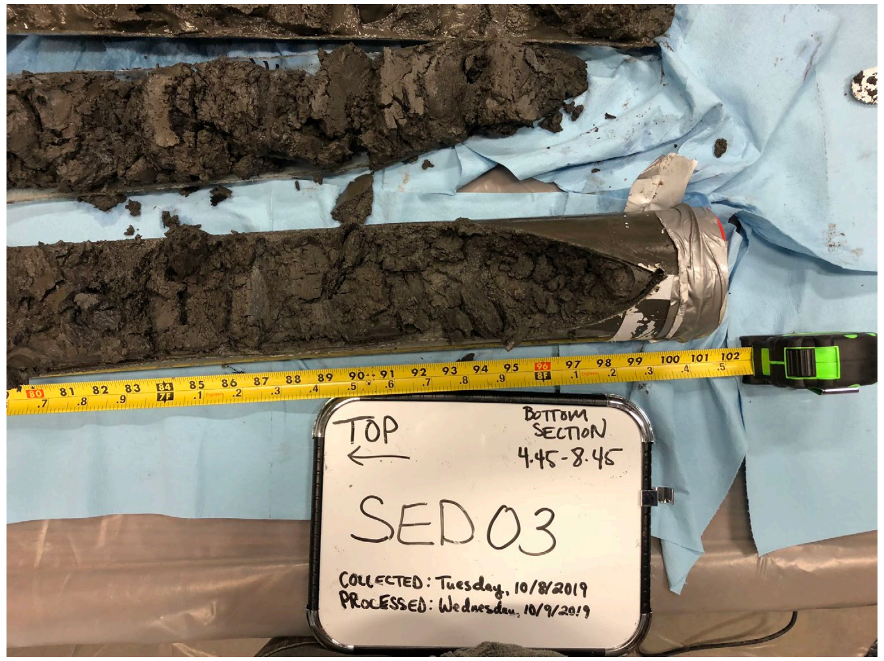
Mudline

1.0 – 3.65 feet bml

2.7 – 4.45 feet bml

4.45 – 6.35 feet bml

5.0 – 7.1 feet bml



6.6 – 8.45 feet bml

Notes:
Core length, including cutting shoe, was 8.6 feet.
Scale shown in feet.
bml = below mudline.

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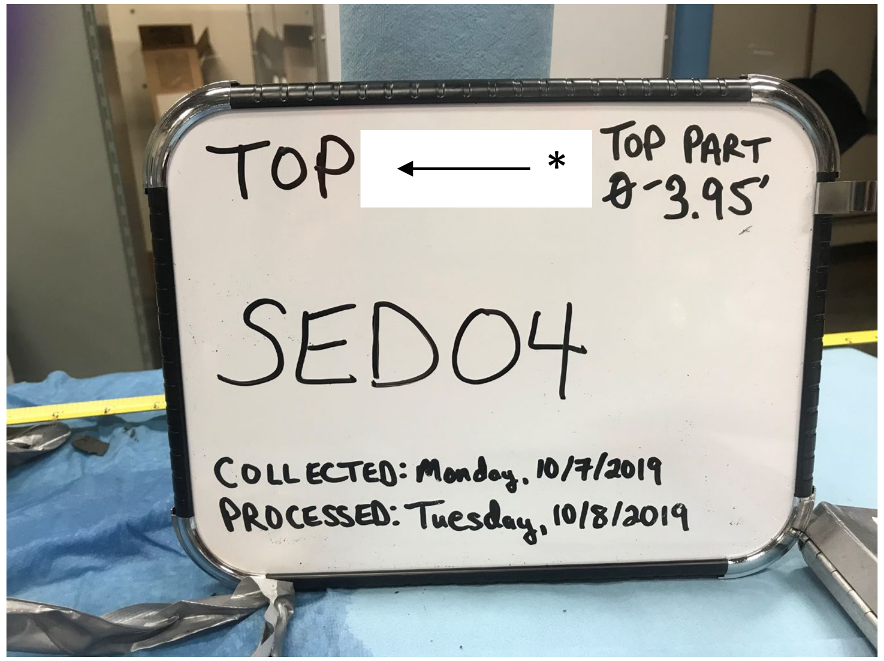
PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/7/19 – 10/9/19

Subsurface Sediment Cores

Location: SED-04

Sample Depths: 0 – 2.0, 2.0 – 2.75 (archive), 2.75 – 4.75, 4.75 – 5.75 (archive), 5.75 – 7.75



Mudline

0 – 1.1 feet bml

0.6 – 2.0 feet bml

2.0 – 3.4 feet bml

2.5 – 3.9 feet bml

3.0 – 3.95 feet bml

Notes:
Core length, including cutting shoe, was 8.2 feet.
Scale shown in feet.
bml = below mudline.
*Inserted direction arrow indicates top of core.

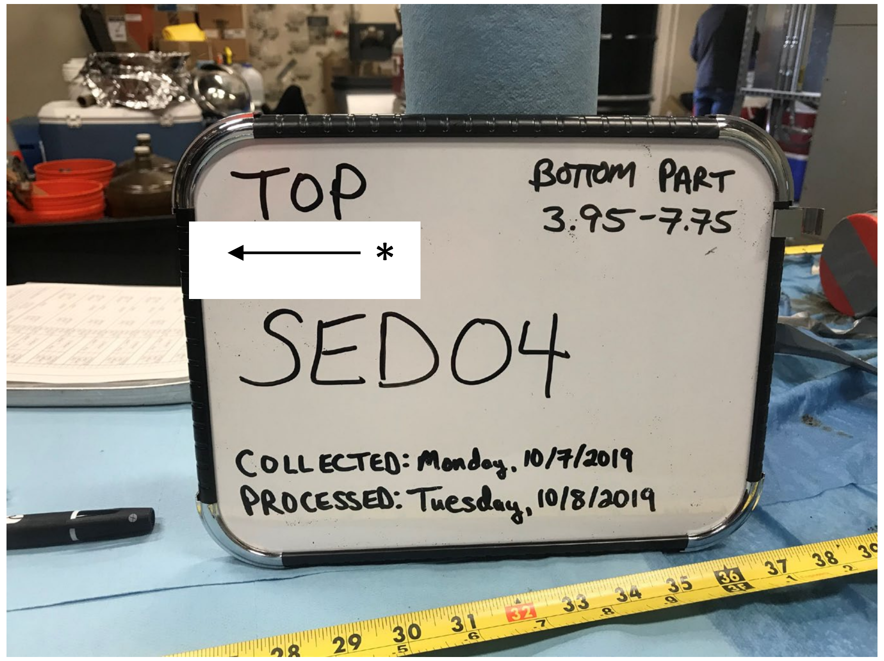
PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/7/19 – 10/9/19

Subsurface Sediment Cores

Location: SED-04

Sample Depths: 0 – 2.0, 2.0 – 2.75 (archive), 2.75 – 4.75, 4.75 – 5.75 (archive), 5.75 – 7.75



3.95 – 5.0 feet bml

4.2 – 5.5 feet bml

4.85 – 6.2 feet bml

6.0 – 7.4 feet bml

6.7 – 7.75 feet bml

Notes:
Core length, including cutting shoe, was 8.2 feet.
Scale shown in feet.
bml = below mudline.
*Inserted direction arrow indicates top of core.

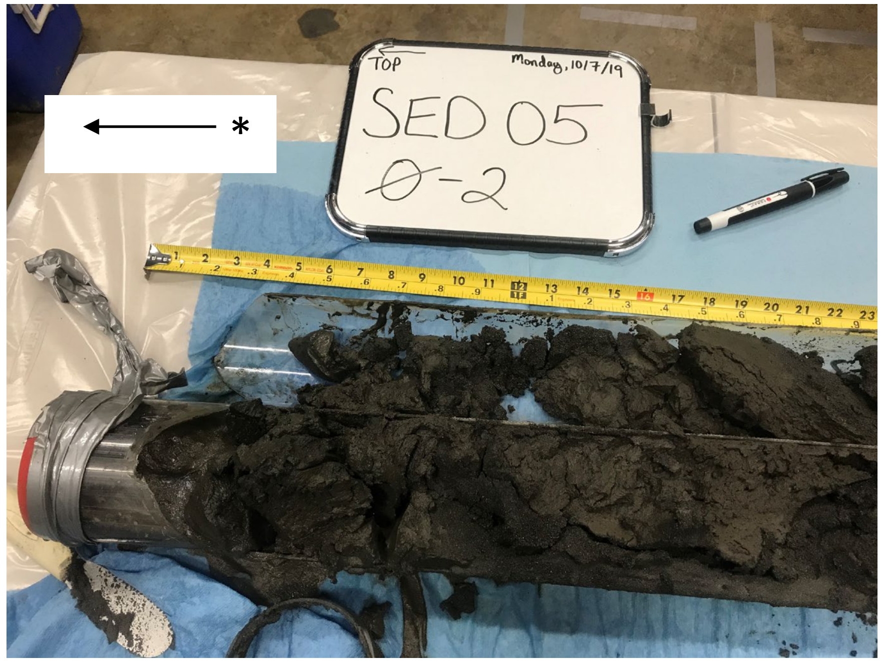
Subsurface Sediment Cores

Location: SED-05

Sample Depths: 0 - 2.0, 2.0 – 3.0 (archive), 3.0 – 5.0, 5.0 – 7.0

PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
Location: Willamette River Mile 6.55 to 6.9 West, Siltronic Corporation, Portland, Oregon
Date: 10/7/19 – 10/9/19



0 – 2.0 feet bml

Mudline

2.0 – 5.0 feet bml

4.8 – 7.1 feet bml

Notes:
Core length, including cutting shoe, was 7.1 feet.
Scale shown in feet.
bml = below mudline.
*Inserted direction arrow indicates top of core.

PHOTOGRAPHS:

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Date: 10/7/19 – 10/9/19

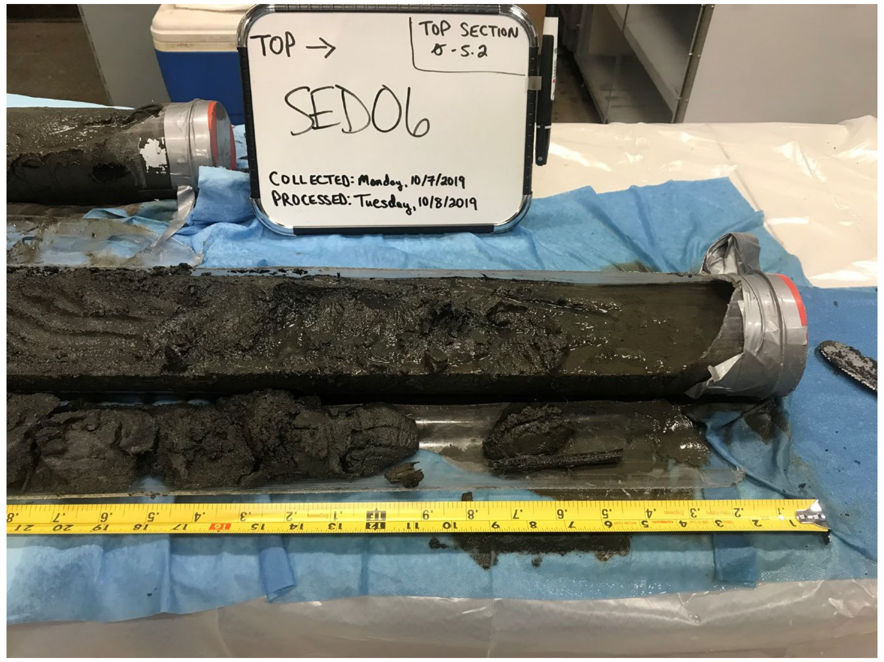
Subsurface Sediment Cores

Location: SED-06

Sample Depths: 0 – 2, 2 - 3.5 (archive), 3.5 - 5.5, 5.5 – 6.5 (archive), 6.5 – 8.5

2.2 – 3.8 feet bml

1.0 – 2.8 feet bml



0 – 1.8 feet bml

Mudline

4.0 – 5.2 feet bml

3.2 – 4.6 feet bml

Notes:
Core length, including cutting shoe, was 9.0 feet.
Scale shown in feet.
bml = below mudline.

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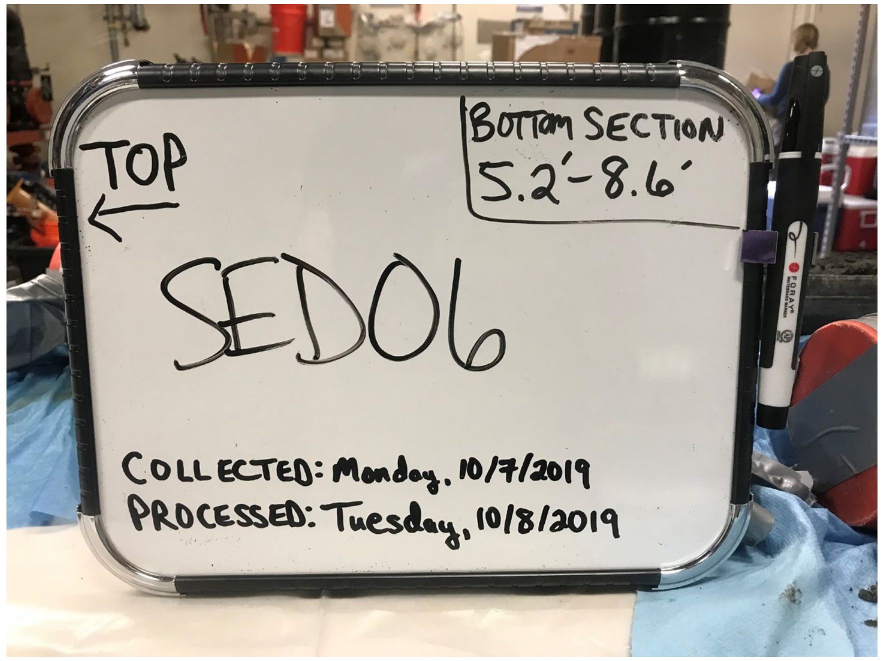
Date: 10/7/19 – 10/9/19

Subsurface Sediment Cores

Location: SED-06

Sample Depths: 0 – 2, 2 - 3.5 (archive), 3.5 - 5.5, 5.5 – 6.5 (archive), 6.5 – 8.5



5.2 – 6.1 feet bml

5.7 – 6.8 feet bml

6.6 – 7.7 feet bml

7.0 – 8.3 feet bml

7.5 – 8.6 feet bml

Notes:
Core length, including cutting shoe, was 9.0 feet.
Scale shown in feet.
bml = below mudline.

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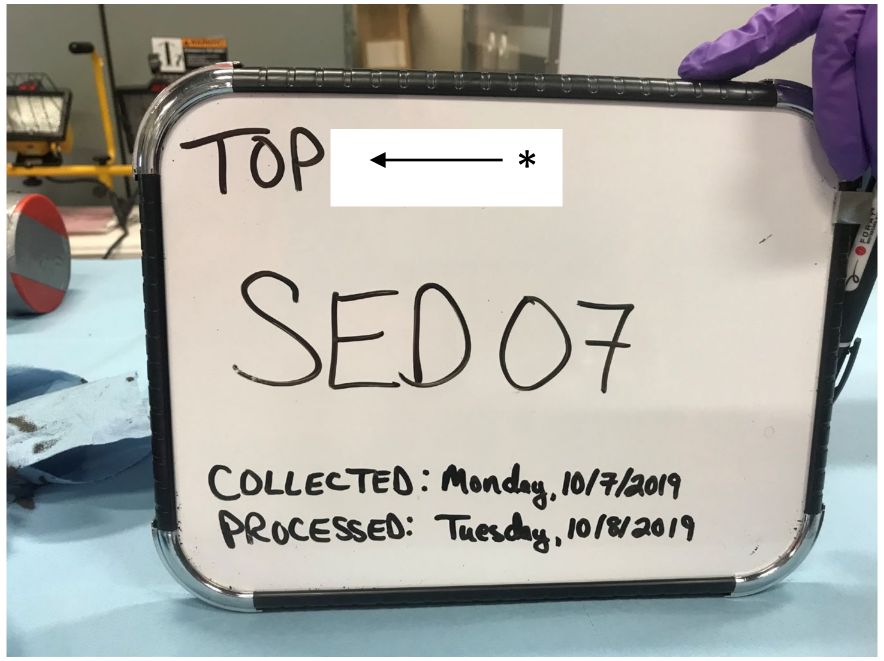
Date: 10/7/19 – 10/9/19

Subsurface Sediment Cores

Location: SED-07

Sample Depths: 0 – 2.0, 2.0 – 4.35, 4.35 – 6.35



Mudline

0 – 1.25 feet bml

0.5 – 1.8 feet bml

1.1 – 2.3 feet bml

1.6 – 2.8 feet bml

2.2 – 3.2 feet bml

Notes:
Core length, including cutting shoe, was 6.4 feet.
Scale shown in feet.
bml = below mudline.
*Inserted direction arrow indicates top of core.

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FOSTER
ALONGI

PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
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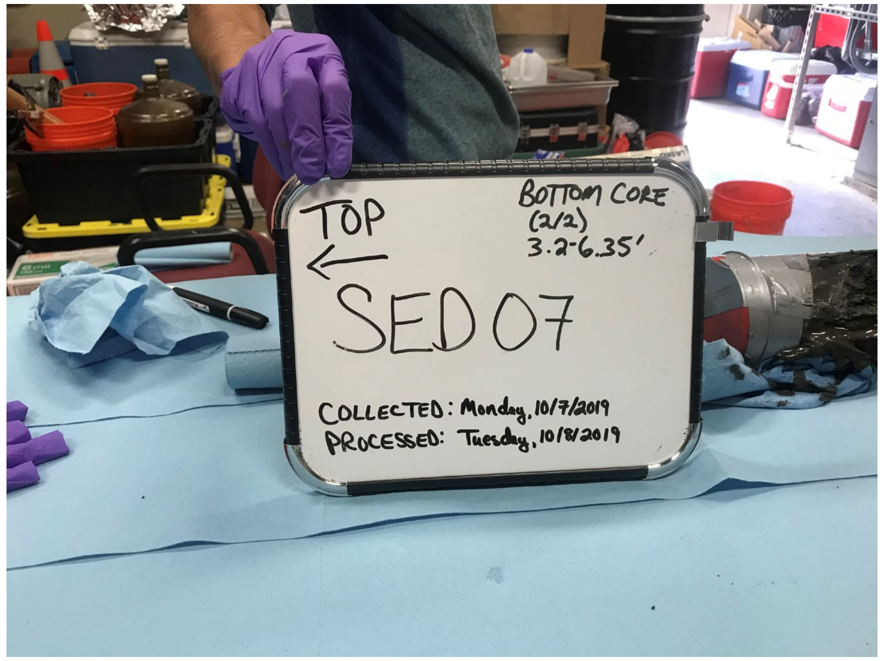
Date: 10/7/19 – 10/9/19

Subsurface Sediment Cores

Location: SED-07

Sample Depths: 0 – 2.0, 2.0 – 4.35, 4.35 – 6.35



3.2 – 4.3 feet bml

3.6 – 4.9 feet bml

4.7 – 5.9 feet bml

4.9 – 6.2 feet bml

5.3 – 6.35 feet bml

Notes:
Core length, including cutting shoe, was 6.4 feet.
Scale shown in feet.
bml = below mudline.

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Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
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Mudline

0 – 2.2 feet bml

1.1 – 3.25 feet bml

Notes:
Core length, including cutting shoe, was 3.7 feet.
Scale shown in feet.
bml = below mudline.

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PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
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Subsurface Sediment Cores

Location: SED-09

Sample Depths: 0 – 2.0, 2.0 – 2.85 (archive), 2.85 – 4.85, 4.85 – 6.85

0 – 2.4 feet bml

Mudline

0.8 – 3.05 feet bml

1.7 – 3.5 feet bml

3.5 – 5.2 feet bml

4.75 – 5.85 feet bml

5.15 – 6.85 feet bml

Notes:
Core length, including cutting shoe, was 7.0 feet.
Scale shown in feet.
bml = below mudline.

PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
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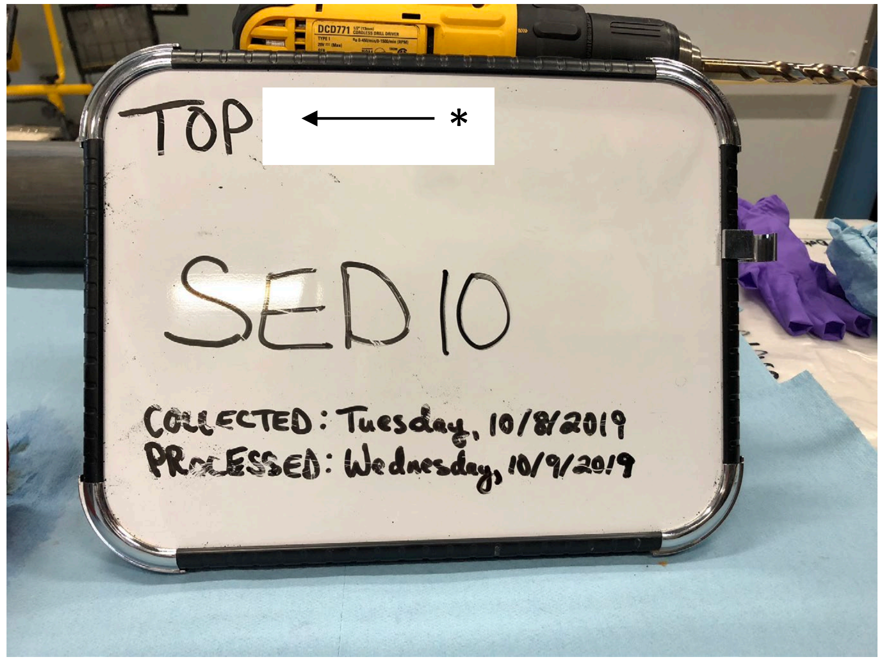
Date: 10/7/19 – 10/9/19

Subsurface Sediment Cores

Location: SED-10

Sample Depths: 0 – 2.0, 2.0 – 3.0 (archive), 3.0 – 5.2, 5.2 – 7.2



Mudline

0 – 1.15 feet bml

1.15 – 2.1 feet bml

1.75 – 2.85 feet bml

2.05 – 3.15 feet bml

2.65 – 3.6 feet bml

Notes:
Core length, including cutting shoe, was 7.6 feet.
Scale shown in feet.
bml = below mudline.
*Inserted direction arrow indicates top of core.

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PHOTOGRAPHS:

Project Name: Siltronic Sediment Sampling Willamette River Mile 6.55 to 6.9 West
Project Number: 8128.02.19
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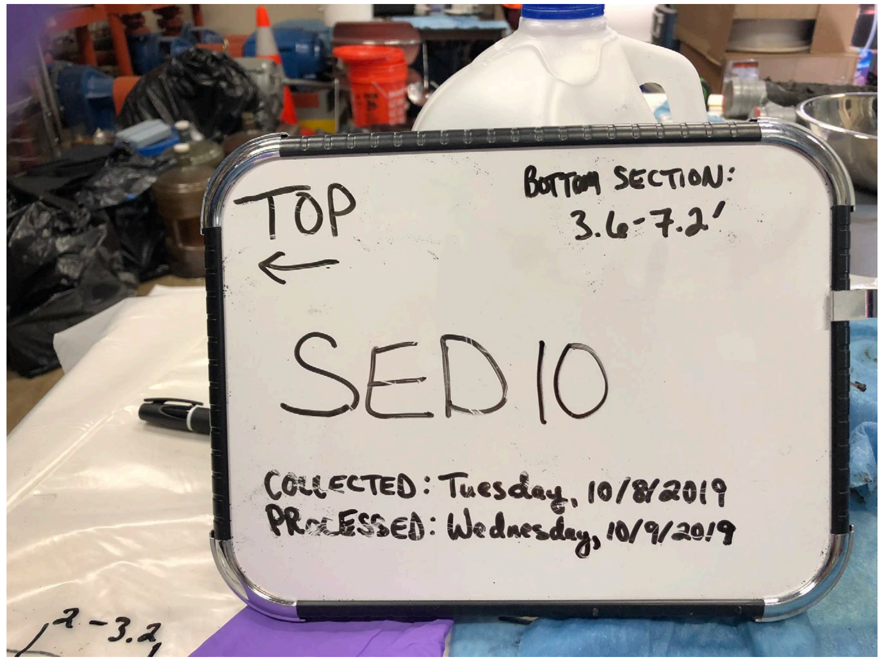
Date: 10/7/19 – 10/9/19

Subsurface Sediment Cores

Location: SED-10

Sample Depths: 0 – 2.0, 2.0 – 3.0 (archive), 3.0 – 5.2, 5.2 – 7.2



3.6 – 4.7 feet bml

4.4 – 5.6 feet bml

5.5 – 6.7 feet bml

5.9 – 7.1 feet bml

6.2 – 7.2 feet bml

Notes:
Core length, including cutting shoe, was 7.6 feet.
Scale shown in feet.
bml = below mudline.