LAKE RIVER 2020 SEDIMENT MONITORING REPORT

FORMER PACIFIC WOOD TREATING CO. SITE
FACILITY ID 1019, CLEANUP SITE ID 3020

Prepared for
PORT OF RIDGEFIELD
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MAUL FOSTER ALONGI

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

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ACRONYMS AND ABBREVIATIONS

Apex	Apex Laboratories, LLC
bml	below mud line
CAP	cleanup action plan
cm	centimeter(s)
COC	chain of custody
CUL	cleanup level
dioxins	polychlorinated dibenzo-p-dioxins and furans
DU	decision unit
Ecology	Washington State Department of Ecology
ENR	enhanced natural recovery
EPA	U.S. Environmental Protection Agency
ISM	incremental sampling methodology
MFA	Maul Foster & Alongi, Inc.
ng/kg	nanograms per kilogram
the Port	Port of Ridgefield
PWT	Pacific Wood Treating Co.
QA/QC	quality assurance and quality control
REL	remediation level
SAP	sampling and analysis plan
TEQ	toxicity equivalent
TOC	total organic carbon

1 INTRODUCTION

On behalf of the Port of Ridgefield (the Port), Maul Foster & Alongi, Inc. (MFA) has prepared this report to summarize Year 5 (2020) Lake River postremedy sediment monitoring results. Lake River is offshore of the former Pacific Wood Treating Co. (PWT) site in Ridgefield, Washington (see Figure 1-1). PWT operated a wood-treating facility from 1964 to 1993 at the Port's Lake River Industrial Site, now known as Miller's Landing.

On November 5, 2013, the Port entered into a Consent Decree with the State of Washington requiring remedial action to address contamination at the former PWT site. The selected cleanup action for the Lake River portion of the former PWT site consisted of mechanical dredging and placement of an enhanced natural recovery (ENR) sand layer and is described in the cleanup action plan (CAP) (Washington State Department of Ecology [Ecology], 2013). The remedy includes sediment chemical monitoring to assess cleanup efficacy in years 0, 2, 5, and 10.

Year 0 monitoring was completed in 2015 (MFA, 2015b) and Year 2 in 2017 (MFA, 2018). This report provides the results of the Year 5 (2020) monitoring, including sampling methodology and analysis, quality assurance protocols, and laboratory analytical results and interpretation. Sampling and reporting were conducted in accordance with the Ecology-approved sampling and analysis plan (SAP) (MFA, 2015a); any exceptions are noted in this report.

1.1 Background

The CAP identifies a remediation level (REL; 30 nanograms per kilogram [ng/kg] dioxin toxicity equivalent [TEQ]) and a cleanup level (CUL; 5 ng/kg dioxin TEQ) for polychlorinated dibenzo-p-dioxins and furans (collectively referred to as dioxins) in Lake River sediments. These numeric criteria guided the remedial action substantively completed in 2015. Areas exceeding the REL were dredged and treated with a clean ENR sand layer, whereas areas above the CUL but below the REL were treated only with clean sand (see Figure 1-2). After remedy completion, Year 0 (baseline) monitoring was conducted in July 2015 to assesses cleanup effectiveness. Year 2 monitoring was completed in 2017 to quantify any changes compared to Year 0. The 2015 results showed that sediment dioxin TEQ concentrations were below the CUL and that a significant reduction in dioxin concentrations had been attained (MFA, 2015b). The Year 2 (2017) results showed that although the average incremental sampling methodology (ISM) sample dioxin TEQ had increased slightly (3.53 ng/kg in Year 2 compared to 1.16 ng/k g in Year 0), average dioxin TEQ concentrations were still below the CUL. The Year 5 (2020) monitoring described in this report was conducted to quantify any concentration changes relative to 2015 and 2017. Final monitoring efforts will also be conducted in Year 10 (2025) to further quantify concentration trends over time, and to confirm that natural recovery is effective in meeting the CUL in the long term, as anticipated.

2 SITE CONDITIONS

Lake River is a slow, flat slough of the Columbia River. Lake River is hydraulically connected to the Columbia River through a tide gate/flushing structure along the western shoreline of Vancouver Lake and at the mouth of Lake River on the Columbia River, 11 miles downstream of the Vancouver Lake tide gate. Overall river flow is from Vancouver Lake to the mouth of Lake River, and flow direction in Lake River reverses as a result of tidal influences from the Columbia River. Low water velocity, bathymetric analysis, and grain size distribution all indicate that Lake River is a predominantly depositional fluvial environment, and that natural attenuation of sediment concentrations should be expected to occur over time (MFA, 2013b).

An approximately 1-foot-thick, clean sand layer was placed over the entire remedy area as part of the sediment remedy (see Figure 1-2). Based on visual observations of riverbed exposed during low tide in 2020, it appears that more fines have deposited over the sand layer since the previous (2017) observations. No evidence of significant sand scour (e.g., exposed native sandy silt) was observed. Surface (0 to 10 centimeters [cm] below mudline [bml]) sediment samples retrieved during the 2020 event were generally fine to coarse sands (representing the clean sand layer placed as part of the remedy) with overlying silt. The samples with little to no overlying silt were generally observed near the fish mix rock, where there is likely more wave activity.

Based on previous investigations, the subsurface (deeper than 10 cm bml) sediment characteristics in Lake River vary with depth. In the remedy area, the current depth to native sediment below the placed clean sand layer likely varies (e.g., because of propwash and mixing processes). Generally, in the nearshore slope areas, the native subsurface sediment is characterized as a fine sandy silt to a depth of approximately 5 feet bml that then transitions to a fine to medium sand. Subsurface sediment in the channel areas of Lake River is generally very fine sandy silt down to 11 feet bml, with the exception of some fine to medium sand encountered in two cores in the Lake River channel area at approximately 6 to 7 feet bml (MFA, 2013a).

3 SAMPLING PROGRAM

ISM was used to characterize dioxins in sediments. ISM characterizes the average concentration of contaminants in a predefined area termed a decision unit (DU). Samples (called increments) were collected from multiple locations in a DU under evaluation. The increments were combined into one sample (called an ISM sample), which was analyzed to obtain a representative average contaminant concentration for the entire DU. Three ISM samples, called replicates, were collected to define variability resulting from sampling error or spatial heterogeneity. ISM provides data that are more representative of average concentrations than areawide concentrations derived from discrete or traditional composite samples (HDOH, 2009; ITRC, 2012).

3.1 Incremental Sampling Methodology Design

The sampling objective was to characterize the average concentration of dioxins in surface sediments in the remedy area. The DU sampled extends from the surface to 10 cm bml across the entire remedy area, as shown in Figure 3-1. Three replicate samples (ISM samples A, B, and C) consisting of 30 increments each were collected to assess sample variability. The increment locations are consistent with those sampled in 2015 and 2017 and were selected based on a stratified random approach using a triangular grid (using ArcGIS 10 and Visual Sample Plan 6). Using a systematic random grid, as opposed to a simple random sampling approach, reduces the probability of missing areas with significantly elevated concentrations.

3.2 Sampling Methods

MFA conducted sediment sampling on December 3 and 4, 2020. Water levels were normal, and all samples were collected from the boat. Figure 3-1 shows sampling locations and Table 3-1 presents soil sample classifications.

All sediment increments were collected using a handheld Van Veen (clamshell) sampler. The locked (open) sampler was manually lowered to the riverbed. The latch would unlock upon contact with the riverbed and close the two halves of the clamshell around the sediment before being manually raised back into the boat. The contents were deposited onto a clean work surface where the sample was bisected and characterized before being placed in the laboratory-supplied sampling container. If increment recovery was poor at certain locations, the increment was discarded and resampled within a few feet of the original location. Approximately 100 grams per increment, for a total of approximately 3 kilograms per ISM sample, was collected to provide the overall mass required by the analytical laboratory. The ISM sample was analyzed for dioxins and total organic carbon (TOC).

A differential global positioning system was used to navigate to the locations shown on Figure 3-1. Locations were determined to an accuracy of ±3 meters. Horizontal coordinates were referenced to the Washington South State Plane HARN (NAD83).

All equipment was decontaminated in accordance with the SAP. All sample containers were kept on ice before submittal, with chain-of-custody (COC) documentation, to the laboratory for analysis. Use of dedicated (nondisposable) sampling equipment significantly reduced the amount of decontamination fluids generated. Nondisposable incremental sampling equipment was decontaminated only between replicates (i.e., not decontaminated between increments within the unit). Decontamination of nondisposable sampling equipment (i.e., incremental sampling equipment) used disposable, single-use paper towels that were subsequently containerized, along with used personal protective equipment, and disposed of in a sanitary landfill.

3.3 Quality Assurance and Quality Control Samples

The following quality assurance and quality control (QA/QC) sampling was conducted.

Three replicate ISM samples were collected across the DU. Replicates were processed and analyzed (consistent with the methods used for the primary sample) to assess sample variability. In addition, an equipment rinsate blank was collected from decontaminated reusable equipment coming into direct contact with sediment samples (i.e., the Van Veen sampler, bowls, and spoons).

3.4 Sample Transport

Samples for ISM processing and TOC analysis were submitted to the Ecology-approved Apex Laboratories, LLC (Apex) of Tigard, Oregon. Following ISM processing, Apex submitted sample aliquots to the Ecology-approved Cape Fear Analytical, LLC, for dioxin analysis. COC documentation was maintained throughout the sample handling and testing process and is included in the laboratory analytical reports (see Appendix A).

3.5 Laboratory Chemical Sample Process and Analysis

Prior to analysis, Apex used SAP-identified ISM procedures to process the ISM samples. As discussed above, the approximately equal mass collected from each increment was field-consolidated to generate a sample of approximately 3 kilograms (wet weight). The laboratory air-dried each DU sample at room temperature. The entire volume of each sample was chopped and sieved to facilitate obtaining a representative subsample and improving analyte extraction efficiency. The sample was sieved using an ASTM International No. 10 (2-millimeter) sieve. Once the sample was dried and sieved, the laboratory performed the "1-dimensional slabcake" subsampling procedure to sub-aliquot sample volume to be used for analysis. The slabcake procedure involves spreading the sample at a consistent depth in a line, using 20 or more passes, and then using a square scoop to cut across the line as needed to create an aliquot for each analysis. Samples for TOC were ground prior to analysis. Precise volumes (as identified in the SAP) of samples were collected as aliquots for each individual laboratory analysis and for QA/QC requirements. The following analyses of ISM aliquots, by the methods indicated, were conducted:

- TOC by Puget Sound Estuary Program/SM 5310B Modified
- Dioxins by U.S. Environmental Protection Agency (EPA) Method 1613B

Laboratory QA/QC requirements were maintained using standard EPA methods, based on EPA test methods for evaluating solid waste, physical/chemical methods (also known as SW-846) requirements, as amended (EPA, 1986).

3.6 Data Reduction, Validation, and Reporting

The laboratory data produced were independently reviewed by MFA for data quality (see Appendix B). Analytical results were evaluated according to applicable sections of EPA procedures (EPA, 2010, 2014) and appropriate laboratory and method-specific guidelines (Apex, 2019; EPA, 1986), and are reported consistent with recent dioxin data treatment guidance (Ecology, 2019). ISM sample replicates were assessed as part of the data validation. Sample results were qualified appropriately to reflect any criteria not satisfied during the aforementioned assessments. All data are considered acceptable for use, with associated qualifiers. Consistent with Washington Administrative Code 173-340-840(5) and

Ecology Toxics Cleanup Program Policy 840 (Data Submittal Requirements), data will be submitted in both written (this report) and electronic (the Ecology Environmental Information Management system) formats.

4 RESULTS

The 2015, 2017, and 2020 sediment monitoring results are provided in Table 4-1. For the 2020 monitoring event, most dioxin congener results are at or near the estimated detection limits. The dioxin TEQ concentrations for each sample (A, B, and C) were below the CUL of 5 ng/kg, with concentrations of 1.25 ng/kg, 1.53 ng/kg, and 1.62 ng/kg, respectively. Consequently, the 2020 average ISM sample concentration of 1.47 ng/mg is below the CUL. These concentrations are slightly higher than the 2015 average ISM concentration of 1.16 ng/kg, but lower than the 2017 concentration of 3.53 ng/kg.

Before the remedial action, dioxin TEQ concentrations in Lake River were as high as 910 ng/kg, and it was estimated that postremedy concentrations would range up to 23 ng/kg (MFA, 2015a), with an areawide average concentration of approximately 4.4 ng/kg following natural recovery and mixing of placed clean sand with native sediment (MFA, 2013a). Both the 2017 and 2020 average ISM concentrations are consistent with the areawide projection and are below the CUL of 5 ng/kg. Therefore, it appears that the continued mixing of sand with underlying sandy silt via bioturbation and anthropogenic events, as well as deposition from upstream sediments, are resulting in the desired long-term effect and demonstrate that the cleanup action is effective.

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 Sample Descriptions
Former PWT Site
Ridgefield, Washington

Increment Number	Group	Date Collected	Comments
0	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
1	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
2	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
3	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
4	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
5	A	12/03/2020	Dark brown to gray sand; fine to coarse; woody debris.
6	A	12/03/2020	Dark brown to gray sand; fine to coarse; woody debris.
7	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
8	A	12/03/2020	Dark brown to gray silty sand; fine; no debris.
9	A	12/03/2020	Dark brown to gray silty sand; fine; no debris.
10	A	12/03/2020	Dark brown to gray sand; fine; trace woody debris.
11	A	12/03/2020	Dark brown to gray sand; fine to coarse; trace debris.
12	A	12/03/2020	Dark brown to gray silty sand; fine; no debris.
13	A	12/03/2020	Dark brown to gray sand; fine to coarse; trace debris.
14	A	12/03/2020	Dark brown to gray silty sand; fine; no debris.
15	A	12/03/2020	Dark brown to gray sandy silt; fine to coarse; no debris.
16	A	12/03/2020	Dark brown to gray sandy silt; fine; trace debris.
17	A	12/03/2020	Dark brown to gray silt; fine; no debris.
18	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
19	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
20	A	12/03/2020	Dark brown to gray sand; fine to coarse; trace debris.
21	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
22	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
23	A	12/03/2020	Dark brown to gray sandy silt; fine; no debris.
24	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
25	A	12/03/2020	Dark brown to gray sandy silt; fine; no debris.
26	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
27	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
28	A	12/03/2020	Dark brown to gray sand; fine to coarse; no debris.
29	A	12/03/2020	Dark brown to gray silt with underlying sand.
30	B	12/04/2020	Dark brown to gray sand; fine to coarse; trace debris.
31	B	12/04/2020	Dark brown to gray, silty sand; fine to coarse; trace debris.
32	B	12/04/2020	Dark brown to gray, slightly silty sand.
33	B	12/04/2020	Dark brown to gray sand with overlying silt.
34	B	12/04/2020	Dark brown to gray sand with overlying silt; trace debris.
35	B	12/04/2020	Dark brown to gray, silty sand; trace debris.
36	B	12/04/2020	Dark brown to gray, silty sand; trace detritus.
37	B	12/04/2020	Dark brown to gray, silty sand.
38	B	12/04/2020	Dark brown to gray, silty sand.
39	B	12/04/2020	Dark brown to gray sand with overlying silt; some debris.
40	B	12/04/2020	Dark brown to gray, silty sand; trace detritus.
41	B	12/04/2020	Dark brown silt with some debris.

Table 3-1
Sediment Sample Descriptions
Former PWT Site
Ridgefield, Washington

Increment Number	Group	Date Collected	Comments
42	B	12/04/2020	Dark brown to gray, sandy silt; trace detritus.
43	B	12/04/2020	Dark brown silt.
44	B	12/04/2020	Dark brown to gray sand; mollusk.
45	B	12/04/2020	Dark brown to gray, silty sand.
46	B	12/04/2020	Dark brown to gray sand with silt.
47	B	12/04/2020	Dark brown to gray, sandy silt.
48	B	12/04/2020	Dark brown to gray sand with gravel.
49	B	12/04/2020	Dark brown to gray sand with overlying silt.
50	B	12/04/2020	Dark brown to gray sand with overlying silt.
51	B	12/04/2020	Dark brown to gray sand with overlying silt.
52	B	12/04/2020	Dark brown to gray sand with overlying silt; trace cobble.
53	B	12/04/2020	Dark brown to gray sand with some overlying silt.
54	B	12/04/2020	Sand with overlying silt.
55	B	12/04/2020	Sand with overlying silt.
56	B	12/04/2020	Sand with overlying silt.
57	B	12/04/2020	Sand with overlying silt.
58	B	12/04/2020	Sand with overlying silt.
59	B	12/04/2020	Sand with overlying silt; trace detritus.
60	C	12/04/2020	Dark brown to gray sand with silt overlay; trace debris.
61	C	12/04/2020	Dark brown to gray silty sand; some debris.
62	C	12/04/2020	Dark brown to gray sand with silt overlay; some detritus.
63	C	12/04/2020	Dark brown to gray sand with silt overlay; trace detritus.
64	C	12/04/2020	Dark brown to gray silt with sand.
65	C	12/04/2020	Dark brown to gray sand with overlying silt; trace woody debris.
66	C	12/04/2020	Dark brown to gray, sandy silt.
67	C	12/04/2020	Dark brown to gray, silty sand; no debris.
68	C	12/04/2020	Dark brown to gray sand with some overlying silt; trace detritus.
69	C	12/04/2020	Dark brown to gray sand with silt overlay; trace debris.
70	C	12/04/2020	Dark brown to gray sand with silt overlay; trace detritus.
71	C	12/04/2020	Dark brown to gray sand.
72	C	12/04/2020	Dark brown to gray silty sand with trace detritus.
73	C	12/04/2020	Dark brown to gray silty sand.
74	C	12/04/2020	Dark brown to gray sandy silt with trace detritus.
75	C	12/04/2020	Dark brown to gray sand with silt overlay.
76	C	12/04/2020	Dark brown to gray silty sand.
77	C	12/04/2020	Dark brown to gray sand with silt overlay; cobble.
78	C	12/04/2020	Dark brown to gray sand with silt overlay.
79	C	12/04/2020	Dark brown to gray sand with silt overlay.
80	C	12/04/2020	Dark brown to gray sand with silt overlay.
81	C	12/04/2020	Dark brown to gray sand with silt overlay; some detritus.
82	C	12/04/2020	Dark brown to gray sand with silt overlay; trace detritus.
83	C	12/04/2020	Dark brown to gray sand with some silt overlay.

Table 3-1
Sediment Sample Descriptions
Former PWT Site
Ridgefield, Washington

Increment Number	Group	Date Collected	Comments
84	C	12/04/2020	Dark brown to gray sand with silt overlay; trace detritus.
85	C	12/04/2020	Dark brown to gray sand with silt overlay; detritus.
86	C	12/04/2020	Dark brown to gray sand with silt overlay; some detritus.
87	C	12/04/2020	Dark brown to gray sand with silt overlay.
88	C	12/04/2020	Dark brown to gray sand with silt overlay; cobble.
89	C	12/04/2020	Dark brown to gray sand.

NOTE:
PWT = Pacific Wood Treating Co.

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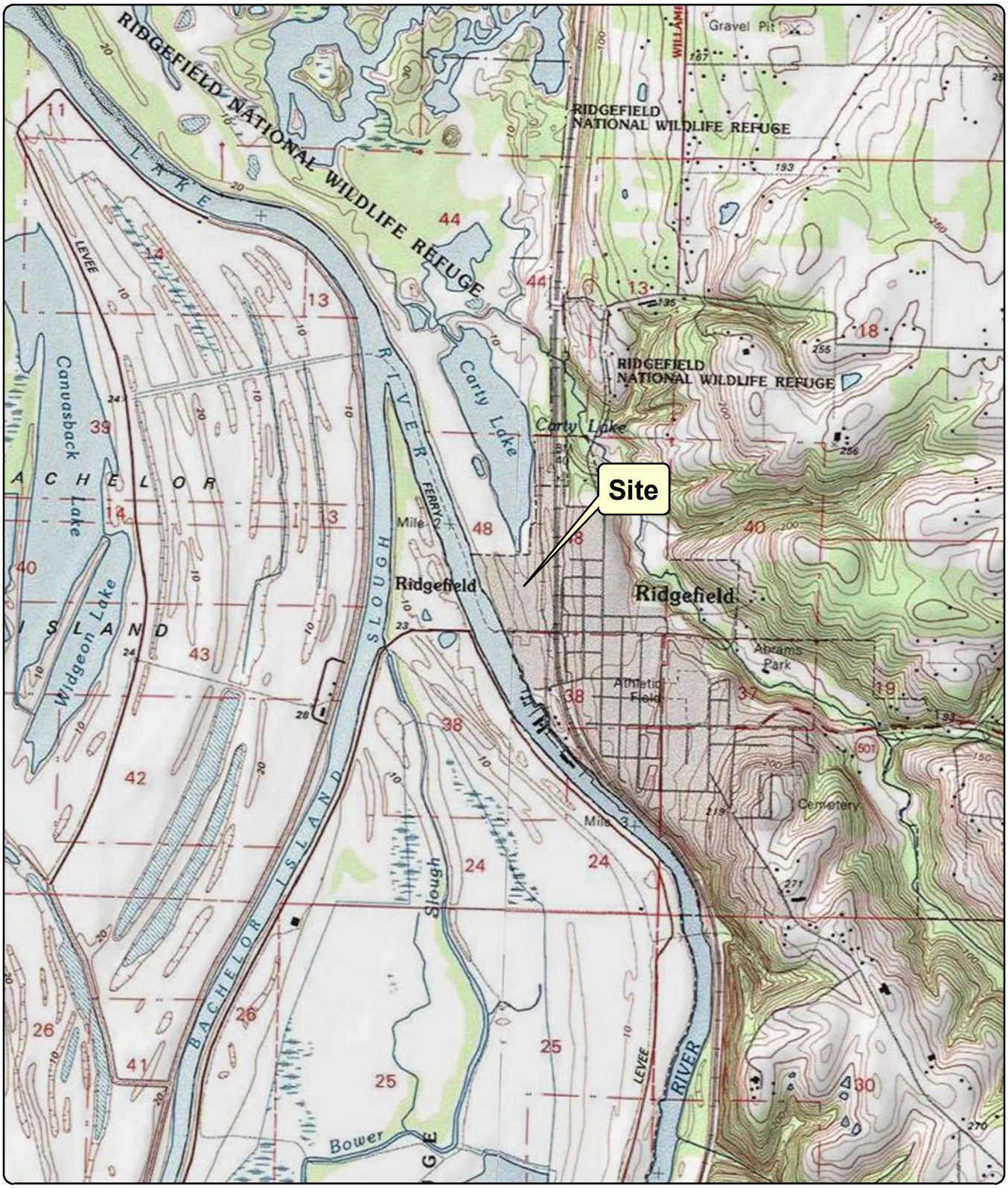
Table 4-1
Sediment Sample Results
Former PWT Site
Ridgefield, Washington

Location		ISM Sample A	ISM Sample B	ISM Sample C	ISM Sample A	ISM Sample B	ISM Sample C	ISM Sample A	ISM Sample B	ISM Sample C
Sample ID		ISM-A-150240	ISM-B-150421	ISM-C-150422	ISM-A-170925	ISM-B-170926	ISM-C-170927	ISM-A-20201203	ISM-B-20201204	ISM-C-20201204
Date Collected		04/20/2015	04/21/2015	04/22/2015	09/25/2017	09/26/2017	09/27/2017	12/03/2020	12/04/2020	12/04/2020
Sample Type		ISM	ISM	ISM	ISM	ISM	ISM	ISM	ISM	ISM
Start Depth (cm bml)		0	0	0	0	0	0	0	0	0
End Depth (cm bml)		10	10	10	10	10	10	10	10	10
	Cleanup Level	**YEAR 0 (2015)**			**YEAR 2 (2017)**			**YEAR 5 (2020)**		
Dioxins and Furans (ng/kg)										
1,2,3,4,6,7,8-HpCDD	--	30.3	9.9	6.23	30.7 J	248 J	77.5 J	44.3	60.2	61.6
1,2,3,4,6,7,8-HpCDF	--	4.03	1.65	0.969 U	4.89 J	32 J	9.38 J	7.65	10.4	10.4
1,2,3,4,7,8,9-HpCDF	--	0.806 J	0.276 J	0.291 J	1.22 U	2.25 J	0.819 J	0.627 UJ	0.646 UJ	0.686 UJ
1,2,3,4,7,8-HxCDD	--	0.77 J	0.216 J	0.282 J	0.746 U	1.33 J	0.506 J	0.385 UJ	0.369 UJ	0.459 UJ
1,2,3,4,7,8-HxCDF	--	1.15	0.278 U	0.345 J	1.07 J	4.82 J	1.37 J	0.685 UJ	1.03 UJ	1.11 UJ
1,2,3,6,7,8-HxCDD	--	2.08	0.546 J	0.527 J	1.45 J	7.26 J	2.95 J	1.87 J	2.57 J	2.48 J
1,2,3,6,7,8-HxCDF	--	0.884 J	0.251 J	0.267 J	0.541 U	1.71 J	0.62 UJ	0.368 UJ	0.532 UJ	0.521 UJ
1,2,3,7,8,9-HxCDD	--	1.2	0.316 J	0.331 J	0.676 U	2.33 J	0.899 UJ	0.762 UJ	0.868 UJ	1.01 UJ
1,2,3,7,8,9-HxCDF	--	0.675 J	0.238 UJ	0.233 J	0.963 U	1.33 J	0.53 U	0.392 UJ	0.55 UJ	0.509 UJ
1,2,3,7,8-PeCDD	--	0.607 J	0.281 U	0.208 J	0.284 U	0.404 J	0.244 U	0.275 UJ	0.145 U	0.287 UJ
1,2,3,7,8-PeCDF	--	0.666 J	0.229 U	0.255 J	0.42 U	0.428 UJ	0.425 J	0.281 J	0.32 J	0.303 J
2,3,4,6,7,8-HxCDF	--	0.76 J	0.21 UJ	0.2 J	0.586 U	1.95 J	0.759 UJ	0.54 UJ	0.572 UJ	0.661 UJ
2,3,4,7,8-PeCDF	--	0.585 J	0.222 U	0.241 J	0.414 UJ	2.04 J	0.672 UJ	0.381 UJ	0.497 UJ	0.491 UJ
2,3,7,8-TCDD	--	0.218 J	0.117 U	0.166 U	0.523 U	0.566 U	0.33 U	0.102 U	0.095 U	0.0833 U
2,3,7,8-TCDF	--	0.216 J	0.169 U	0.143 U	0.502 U	0.532 U	0.365 U	0.232 UJ	0.298 UJ	0.285 UJ
OCDD	--	264	76	53.1	298 J	2570 J	864 J	370	467	484
OCDF	--	7.36	2.11	1.81 J	8.34 J	52.9 J	27.1 J	16.2	18.3	15.8
Total HpCDDs	--	54.3	18.1	11.9	61.9 J	466 J	150 J	87.5	107	117
Total HpCDFs	--	11.3	4.48	1.84	15 J	105 J	30.5 J	25.3 J	35.5 J	32.5 J
Total HxCDDs	--	7.75	2.29	2.05	5.85	62.6 U	17 U	10.1 J	11.1 J	14.6 J
Total HxCDFs	--	9.57	2.54	2.44	9.93 U	75	18.9 U	12.1 J	18.7 J	18.2 J
Total PeCDDs	--	0.607 J	0.281 U	0.208 J	0.284 U	14.7 U	2.07 UJ	0.733 J	0.874 J	2.07 UJ
Total PeCDFs	--	1.74	0.225 U	0.668 J	2.65 UJ	28.9 U	6.38 U	3.67 J	4.29 J	5.27 J
Total TCDDs	--	0.218	0.117 U	0.166 U	0.523 U	9.24	0.33 U	0.102 U	0.095 U	0.103 J
Total TCDFs	--	0.216	0.169 U	0.143 U	0.502 U	17 U	0.365 U	1.09 UJ	0.738 UJ	1 UJ
Total TEQ Mammals (U = 1/2 EDL)	5	2.23	0.555	0.683	1.38	7.01	2.19	1.25	1.53	1.62
Average ISM Sample TEQ (U = 1/2 EDL)			**1.16**			**3.53**			**1.47**	
Conventionals (%)										
Total Organic Carbon	--	1.2	0.74	0.66	3.8	6.2	4.9	0.58	0.44	0.40
Average Total Organic Carbon	--		**0.87**			**4.97**			**0.47**	

Table 4-1
Sediment Sample Results
Former PWT Site
Ridgefield, Washington

NOTES:
Average results are in **bold** font.
-- = no value.
% = percent.
cm bml = centimeters below mudline.
EDL = estimated detection limit.
ISM = incremental sampling methodology.
J = associated result is an estimated quantity.
ng/kg = nanograms per kilogram.
PWT = Pacific Wood Treating Co.
TEQ = toxicity equivalent.
U = associated result is less than listed detection limit.
UJ = associated result is less than listed detection limit and is an estimated quantity.

FIGURES



Source: Topographic Quadrangle obtained from ArcGIS Online Services/NGS-USGS TOPO! U.S. Geological Survey (1999)
7.5-minute topographic quadrangle: Ridgefield
Address: Lake River Industrial Site
111 W. Division Street, Ridgefield, WA 98642
Section: 24 Township: 4N Range: 1W of Willamette Meridian

PWT = Pacific Wood Treating Co.

Figure 1-1
Site Location

Former PWT Site
Ridgefield, Washington

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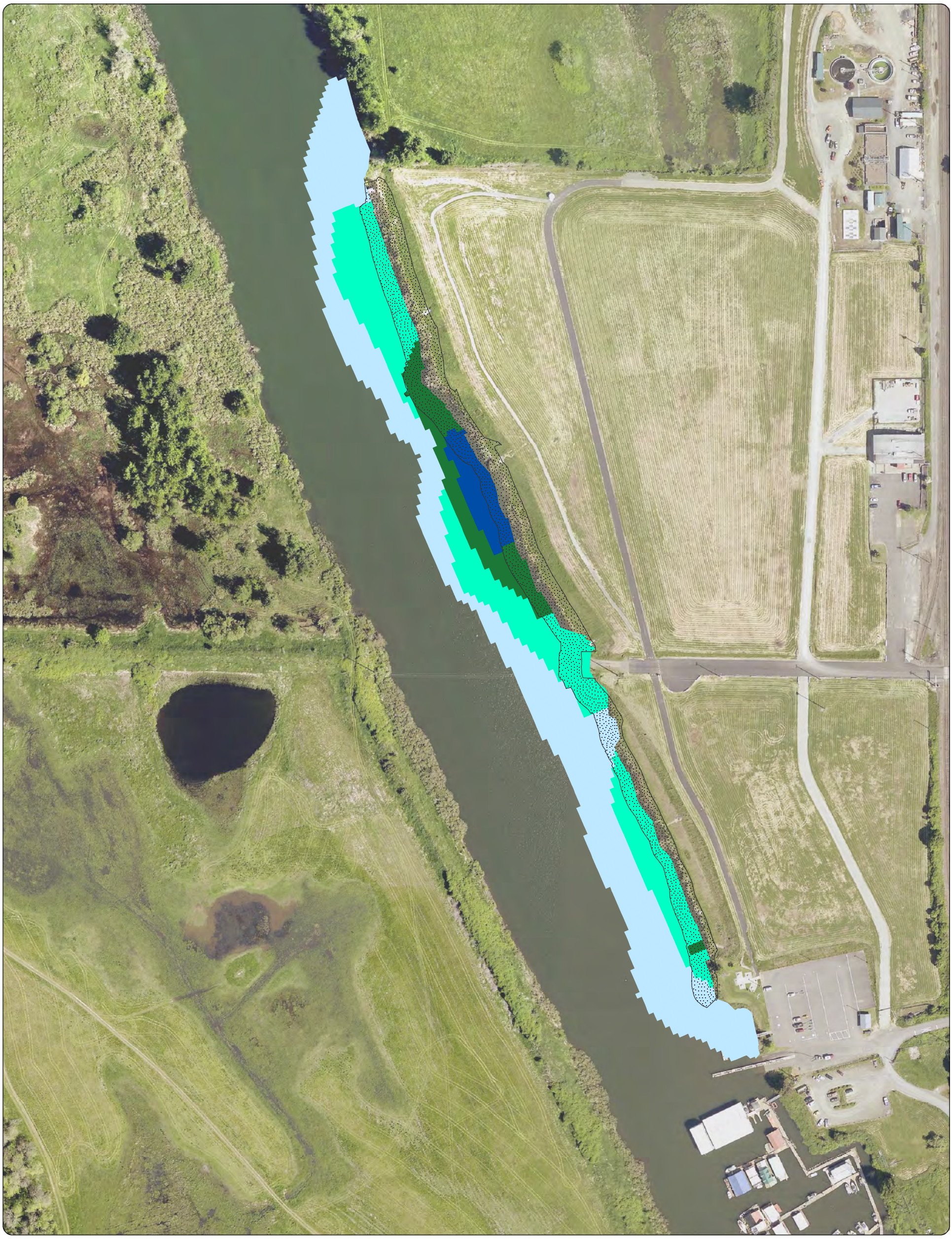
0 1,000 2,000
Feet

Path: X:\9003.01 Port of Ridgefield\40\Projects\06\Lake River SAP\Fig1_Site Location.mxd
Approved By: P. Wiescher Print Date: 6/29/2015
Produced By: R. Callihan
Project: 9003.01.40



Source: Aerial photograph (2014) obtained from Clark County GIS.

Notes:
1. PWT = Pacific Wood Treating Co.
2. ENR = Enhanced Natural Recovery.
3. Dredge depths denote neatline.
4. Dredged areas will also receive 1 foot of ENR treatment.
5. Analysis extent has been clipped to the bank-sediment interface. Dredge boundaries near the shore were generally determined by projection of a 3:1 horizontal to vertical slope down from the shoreline inflection point to the required dredge depth. ENR boundaries near the shore were determined by the point where the shore slope transitions to less than a 5:1 horizontal to vertical slope.

Legend

Fish Mix

Remedial Action Areas

ENR Only
1-ft Dredge
2-ft Dredge
3-ft Dredge

Figure 1-2
Lake River Remedy Area

Former PWT Site
Ridgefield, Washington

0 100 200
Feet

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Path: X:\9003.01 Port of Ridgefield\40\Projects\06\Lake River SAP\Fig2_Lake River Remedy Area.mxd
Print Date: 11/10/2017
Approved By: mnovak
Produced By: rroberts
Project: 9003.01.40/06

NOTES:
Bankward sample locations extent was clipped to the extent of fish plus 5 feet riverward.
ISM = incremental sampling methodology.
PWT = Pacific Wood Treating Co.

Source: Aerial photograph (2014) obtained from Clark County GIS.

Legend

- ISM Sample Location (A)
- ISM Sample Location (B)
- ISM Sample Location (C)
- ISM Sample Boundary
- Fish Mix

Figure 3-1
Sample Locations
Former PWT Site
Ridgefield, Washington

0 100 200
Feet

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Project: 9003.01.40.06 Produced By: mjosef Reviewed By: JGlenn Print Date: 1/27/2021

APPENDIX A

ANALYTICAL REPORTS

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

Tuesday, January 5, 2021

Phil Wiescher
Maul Foster & Alongi, INC.
3140 NE Broadway Street
Portland, OR 97232

RE: A0L0214 - Lake River-Sediment - 9003.01.49

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A0L0214, which was received by the laboratory on 12/7/2020 at 10:06:00AM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: pnerenberg@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	4.0 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.
All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.

Apex Laboratories

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Philip Nerenberg, Lab Director

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
3140 NE Broadway Street	Project Number: **9003.01.49**	**Report ID:**
Portland, OR 97232	Project Manager: **Phil Wiescher**	**A0L0214 - 01 05 21 1539**

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ISM-A-20201203--As Received	A0L0214-01	Sediment	12/03/20 14:45	12/07/20 10:06
ISM-A-20201203--After Processing	A0L0214-02	Sediment	12/03/20 14:45	12/07/20 10:06
ISM-B-20201204--As Received	A0L0214-03	Sediment	12/04/20 15:30	12/07/20 10:06
ISM-B-20201204--After Processing	A0L0214-04	Sediment	12/04/20 15:30	12/07/20 10:06
ISM-C-20201204--As Received	A0L0214-05	Sediment	12/04/20 12:00	12/07/20 10:06
ISM-C-20201204--After Processing	A0L0214-06	Sediment	12/04/20 12:00	12/07/20 10:06
Rinsate Blank	A0L0214-07	Water	12/04/20 15:30	12/07/20 10:06

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3140 NE Broadway Street	Project Number: **9003.01.49**	**Report ID:**
Portland, OR 97232	Project Manager: **Phil Wiescher**	**A0L0214 - 01 05 21 1539**

ANALYTICAL SAMPLE RESULTS

Demand Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
ISM-A-20201203--After Processing (A0L0214-02)				**Matrix: Sediment**				
Batch: 0120426								
Total Organic Carbon	**5800**	---	200	mg/kg dry	1	12/16/20 02:49	PSEP_SM 5310B MOD	
ISM-B-20201204--After Processing (A0L0214-04)				**Matrix: Sediment**				
Batch: 0120426								
Total Organic Carbon	**4400**	---	200	mg/kg dry	1	12/16/20 03:11	PSEP_SM 5310B MOD	
ISM-C-20201204--After Processing (A0L0214-06)				**Matrix: Sediment**				
Batch: 0120426								
Total Organic Carbon	**4000**	---	200	mg/kg dry	1	12/16/20 03:22	PSEP_SM 5310B MOD	

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Philip Nerenberg, Lab Director

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ORELAP ID: **OR100062**

Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
3140 NE Broadway Street	Project Number: **9003.01.49**	**Report ID:**
Portland, OR 97232	Project Manager: **Phil Wiescher**	**A0L0214 - 01 05 21 1539**

ANALYTICAL SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
Rinsate Blank (A0L0214-07)				**Matrix: Water**		**Batch: 0120274**		
Total Organic Carbon	ND	---	1.00	mg/L	1	12/09/20 19:30	SM 5310 C	

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3140 NE Broadway Street	Project Number: **9003.01.49**	**Report ID:**
Portland, OR 97232	Project Manager: **Phil Wiescher**	**A0L0214 - 01 05 21 1539**

ANALYTICAL SAMPLE RESULTS

Percent Dry Weight

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
ISM-A-20201203--After Processing (A0L0214-02)				**Matrix: Sediment**		**Batch: 0120419**		
% Solids	**98.6**	---	1.00	%	1	12/14/20 07:33	EPA 8000D	
ISM-B-20201204--After Processing (A0L0214-04)				**Matrix: Sediment**		**Batch: 0120419**		
% Solids	**98.8**	---	1.00	%	1	12/14/20 07:33	EPA 8000D	
ISM-C-20201204--After Processing (A0L0214-06)				**Matrix: Sediment**		**Batch: 0120419**		
% Solids	**98.9**	---	1.00	%	1	12/14/20 07:33	EPA 8000D	

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3140 NE Broadway Street	Project Number: **9003.01.49**	**Report ID:**
Portland, OR 97232	Project Manager: **Phil Wiescher**	**A0L0214 - 01 05 21 1539**

QUALITY CONTROL (QC) SAMPLE RESULTS

Demand Parameters

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120426 - PSEP-5310B TOC							**Soil**					
Blank (0120426-BLK1)			Prepared: 12/11/20 09:01		Analyzed: 12/15/20 18:32							
PSEP_SM 5310B MOD												
Total Organic Carbon	ND	---	200	mg/kg wet	1	---	---	---	---	---	---	
Blank (0120426-BLK2)			Prepared: 12/11/20 09:01		Analyzed: 12/15/20 18:21							
PSEP_SM 5310B MOD												
Total Organic Carbon	ND	---	200	mg/kg wet	1	---	---	---	---	---	---	A-01
LCS (0120426-BS1)			Prepared: 12/11/20 09:01		Analyzed: 12/15/20 18:43							
PSEP_SM 5310B MOD												
Total Organic Carbon	9200	---		mg/kg	1	10000	---	92	88-111%	---	---	
Duplicate (0120426-DUP1)			Prepared: 12/11/20 09:01		Analyzed: 12/15/20 23:56							
QC Source Sample: Non-SDG (A0K0363-28)												
Total Organic Carbon	**460**	---	250	mg/kg dry	1	---	500	---	---	8	27%	
Duplicate (0120426-DUP2)			Prepared: 12/11/20 09:01		Analyzed: 12/16/20 00:28							
QC Source Sample: Non-SDG (A0K0363-28)												
Total Organic Carbon	**410**	---	250	mg/kg dry	1	---	500	---	---	19	27%	
Duplicate (0120426-DUP3)			Prepared: 12/11/20 09:01		Analyzed: 12/16/20 03:00							
QC Source Sample: ISM-A-20201203--After Processing (A0L0214-02)												
PSEP_SM 5310B MOD												
Total Organic Carbon	**5800**	---	200	mg/kg dry	1	---	5800	---	---	0.2	27%	

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3140 NE Broadway Street	Project Number: **9003.01.49**	**Report ID:**
Portland, OR 97232	Project Manager: **Phil Wiescher**	**A0L0214 - 01 05 21 1539**

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120274 - Method Prep: Aq							**Water**					
Blank (0120274-BLK1)			Prepared: 12/08/20 08:44		Analyzed: 12/09/20 11:15							
SM 5310 C												
Total Organic Carbon	ND	---	1.00	mg/L	1	---	---	---	---	---	---	
LCS (0120274-BS1)			Prepared: 12/08/20 08:44		Analyzed: 12/09/20 11:46							
SM 5310 C												
Total Organic Carbon	10.6	---	1.00	mg/L	1	10.0	---	106	90-114%	---	---	
Duplicate (0120274-DUP1)			Prepared: 12/08/20 08:44		Analyzed: 12/09/20 12:47							
QC Source Sample: Non-SDG (A0K0936-01)												
Total Organic Carbon	ND	---	1.00	mg/L	1	---	ND	---	---	---	10%	
Matrix Spike (0120274-MS1)			Prepared: 12/08/20 08:44		Analyzed: 12/09/20 13:18							
QC Source Sample: Non-SDG (A0K0936-01)												
SM 5310 C												
Total Organic Carbon	11.6	---	1.01	mg/L	1	10.0	ND	**116**	**90-114%**	---	---	Q-01

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3140 NE Broadway Street	Project Number: **9003.01.49**	**Report ID:**
Portland, OR 97232	Project Manager: **Phil Wiescher**	**A0L0214 - 01 05 21 1539**

QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
Batch 0120419 - Total Solids (Dry Weight)							**Soil**					
Duplicate (0120419-DUP1)			Prepared: 12/11/20 07:26		Analyzed: 12/14/20 07:33							
QC Source Sample: ISM-A-20201203--After Processing (A0L0214-02)												
EPA 8000D												
% Solids	**98.6**	---	1.00	%	1	---	98.6	---	---	0.02	10%	
Duplicate (0120419-DUP2)			Prepared: 12/11/20 07:26		Analyzed: 12/14/20 07:33							
QC Source Sample: Non-SDG (A0L0300-08)												
% Solids	**76.9**	---	1.00	%	1	---	77.7	---	---	1	10%	
Duplicate (0120419-DUP3)			Prepared: 12/11/20 07:26		Analyzed: 12/14/20 07:33							
QC Source Sample: Non-SDG (A0L0329-03)												
% Solids	**74.5**	---	1.00	%	1	---	80.0	---	---	7	10%	
Duplicate (0120419-DUP4)			Prepared: 12/11/20 07:26		Analyzed: 12/14/20 07:33							
QC Source Sample: Non-SDG (A0L0336-03)												
% Solids	**75.6**	---	1.00	%	1	---	75.9	---	---	0.4	10%	
Duplicate (0120419-DUP5)			Prepared: 12/11/20 07:26		Analyzed: 12/14/20 07:33							
QC Source Sample: Non-SDG (A0L0346-12)												
% Solids	**76.7**	---	1.00	%	1	---	76.5	---	---	0.2	10%	
Duplicate (0120419-DUP6)			Prepared: 12/11/20 19:58		Analyzed: 12/14/20 07:33							
QC Source Sample: Non-SDG (A0L0415-01)												
% Solids	**90.6**	---	1.00	%	1	---	90.4	---	---	0.2	10%	
Duplicate (0120419-DUP7)			Prepared: 12/11/20 19:58		Analyzed: 12/14/20 07:33							
QC Source Sample: Non-SDG (A0L0424-02)												
% Solids	**85.7**	---	1.00	%	1	---	86.3	---	---	0.7	10%	

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

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Philip Nerenberg, Lab Director

Apex Laboratories, LLC

6700 S.W. Sandburg Street
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Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
3140 NE Broadway Street	Project Number: **9003.01.49**	**Report ID:**
Portland, OR 97232	Project Manager: **Phil Wiescher**	**A0L0214 - 01 05 21 1539**

SAMPLE PREPARATION INFORMATION

Demand Parameters

Prep: PSEP-5310B TOC

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0120426							
A0L0214-02	Sediment	PSEP_SM 5310B MOD	12/03/20 14:45	12/11/20 09:01			NA
A0L0214-04	Sediment	PSEP_SM 5310B MOD	12/04/20 15:30	12/11/20 09:01			NA
A0L0214-06	Sediment	PSEP_SM 5310B MOD	12/04/20 12:00	12/11/20 09:01			NA

Total Organic Carbon (Non-Purgeable) by Persulfate Oxidation by Standard Method 5310C

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0120274							
A0L0214-07	Water	SM 5310 C	12/04/20 15:30	12/08/20 08:44	40mL/40mL	40mL/40mL	1.00

Percent Dry Weight

Prep: Total Solids (Dry Weight)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 0120419							
A0L0214-02	Sediment	EPA 8000D	12/03/20 14:45	12/11/20 07:26			NA
A0L0214-04	Sediment	EPA 8000D	12/04/20 15:30	12/11/20 07:26			NA
A0L0214-06	Sediment	EPA 8000D	12/04/20 12:00	12/11/20 07:26			NA

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3140 NE Broadway Street	Project Number: **9003.01.49**	**Report ID:**
Portland, OR 97232	Project Manager: **Phil Wiescher**	**A0L0214 - 01 05 21 1539**

QUALIFIER DEFINITIONS

Client Sample and Quality Control (QC) Sample Qualifier Definitions:

Apex Laboratories

A-01	Grind Blank
Q-01	Spike recovery and/or RPD is outside acceptance limits.

Apex Laboratories

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REPORTING NOTES AND CONVENTIONS:

Abbreviations:

DET Analyte DETECTED at or above the detection or reporting limit.

ND Analyte NOT DETECTED at or above the detection or reporting limit.

NR Result Not Reported

RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

Detection Limits: Limit of Detection (LOD)

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

Reporting Limits: Limit of Quantitation (LOQ)

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

Reporting Conventions:

Basis: Results for soil samples are generally reported on a 100% dry weight basis.
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.

" dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")
See Percent Solids section for details of dry weight analysis.

" wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.

" " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

QC Source:

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

Miscellaneous Notes:

" --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.

" *** " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Blanks:

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to ½ the Reporting Limit (RL).
-For Blank hits falling between ½ the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
For further details, please request a copy of this document.

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3140 NE Broadway Street	Project Number: **9003.01.49**	**Report ID:**
Portland, OR 97232	Project Manager: **Phil Wiescher**	**A0L0214 - 01 05 21 1539**

REPORTING NOTES AND CONVENTIONS (Cont.):

Blanks (Cont.):

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

Preparation Notes:

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

Sampling and Preservation Notes:

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
3140 NE Broadway Street	Project Number: **9003.01.49**	**Report ID:**
Portland, OR 97232	Project Manager: **Phil Wiescher**	**A0L0214 - 01 05 21 1539**

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) - EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation

All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation.
Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provded by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

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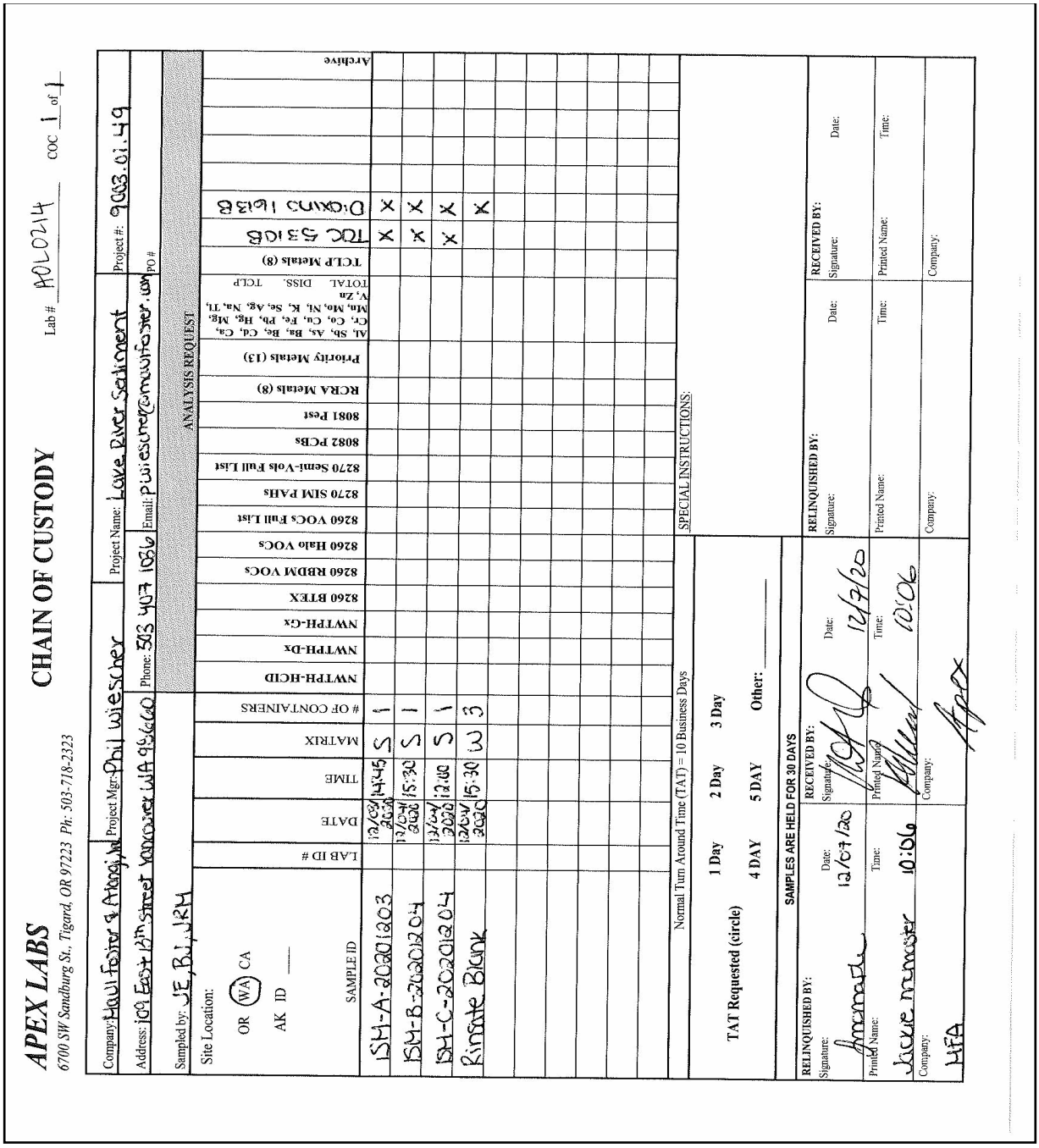

APEX LABS
6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

CHAIN OF CUSTODY

Lab # A0L0214 COC 1 of 1

Company: Maul Foster & Alongi, Inc. | Project Mgr: Phil Wiescher | Project Name: Lake River Sediment | Project #: 9003.01.49
Address: 109 East 13th Street Vancouver WA 98660 | Phone: 503 407 1686 | Email: pwiescher@maulfoster.com | PO #
Sampled by: JE, BJ, JRH

ANALYSIS REQUEST

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 BTEX	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Vols Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn TOTAL DISS. TCLP	TCLP Metals (8)	TCL 53108	Dioxins 1613B	Archive
ISM-A-20201203		12/03/2020	14:45	S	1															X	X	
ISM-B-20201204		12/04/2020	15:30	S	1															X	X	
ISM-C-20201204		12/04/2020	12:00	S	1															X		
Rinsate Blank		12/04/2020	16:30	W	3															X		

SPECIAL INSTRUCTIONS:

Normal Turn Around Time (TAT) = 10 Business Days

TAT Requested (circle): 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: ____

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature:	Signature:	Signature:	Signature:
Date: 12/07/20	Date: 12/7/20	Date:	Date:
Printed Name:	Printed Name:	Printed Name:	Printed Name:
Time: 10:06	Time: 10:06	Time:	Time:
Company: MFA	Company: Apex	Company:	Company:

Apex Laboratories

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Philip Nerenberg

Philip Nerenberg, Lab Director

Apex Laboratories, LLC
6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: **OR100062**

Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
3140 NE Broadway Street	Project Number: **9003.01.49**	**Report ID:**
Portland, OR 97232	Project Manager: **Phil Wiescher**	**A0L0214 - 01 05 21 1539**

APEX LABS COOLER RECEIPT FORM

Client: Maul Foster + Alongi, Inc Element WO#: A0 L0214

Project/Project #: Lake River Sediment #9003.01.49

Delivery Info:

Date/time received: 12/7/20 @ 10:06 By: MS

Delivered by: Apex___ Client X ESS___ FedEx___ UPS___ Swift___ Senvoy___ SDS___ Other___

Cooler Inspection Date/time inspected: 12/7/20 @ 10:06 By: MS

Chain of Custody included? Yes X No___ Custody seals? Yes___ No X

Signed/dated by client? Yes X No___

Signed/dated by Apex? Yes X No___

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	4.0						
Received on ice? (Y/N)	Y						
Temp. blanks? (Y/N)	Y						
Ice type: (Gel/Real/Other)	Real						
Condition:	Good						

Cooler out of temp? (Y/N) Possible reason why:

If some coolers are in temp and some out, were ~~green dots~~ applied to out of temperature samples? Yes/No/NA

Out of temperature samples form initiated? Yes/No/NA

Samples Inspection: Date/time inspected: 12/7/20 @ ~~13~~ 1410 By: AKK

All samples intact? Yes X No___ Comments: akk 12/7/20

Bottle labels/COCs agree? Yes___ No X Comments: No DIT on jars. IDs on Conts. reads ISMA, ISMB, ISM C, Rinsate.

COC/container discrepancies form initiated? Yes___ No X

Containers/volumes received appropriate for analysis? Yes X No___ Comments:

Do VOA vials have visible headspace? Yes___ No___ NA X

Comments

Water samples: pH checked: Yes X No___ NA___ pH appropriate? Yes X No___ NA___

Comments:

Additional information:

Labeled by: AKK Witness: [illegible] Cooler Inspected by: AKK See Project Contact Form: Y

Apex Laboratories

Philip Nerenberg

Philip Nerenberg, Lab Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

CFA | Cape Fear Analytical LLC
an affiliate of The GEL Group INC

3306 Kitty Hawk Road, Suite 120 Wilmington, NC 28405
P 910.795.0421
www.capefearanalytical.com

December 31, 2020

Mr. Philip Nerenberg
Apex Laboratories
6700 SW Sandburg Street
Portland, Oregon 97223

Re: DXN & PCB Subcontract
Work Order: 17497
SDG: A0L0214

Dear Mr. Nerenberg:

Cape Fear Analytical LLC (CFA) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on December 14, 2020. This original data report has been prepared and reviewed in accordance with CFA's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at 910-795-0421.

Sincerely,

Cynde Larkins

Cynde Larkins
Project Manager

Enclosures

SUBCONTRACT ORDER EJ

Apex Laboratories

OB 12/10/20 **A0L0214** CFA WO#17497

SENDING LABORATORY:	**RECEIVING LABORATORY:**
Apex Laboratories	Cape Fear Analytical, LLC
6700 S.W. Sandburg Street	3306 Kitty Hawk Rd Suite 120
Tigard, OR 97223	Wilmington, NC 28405
Phone: (503) 718-2323	Phone :(910) 795-0421
Fax: (503) 336-0745	Fax: -
Project Manager: Philip Nerenberg	

Sample Name: ISM-A-20201203--After Processing **Sedimen** **Sampled: 12/03/20 14:45** (A0L0214-02)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	01/11/20 17:00	06/01/21 14:45	Cape Fear, subcontract unground volume
Containers Supplied:			
(B)4 oz Glass Jar			

Sample Name: ISM-B-20201204--After Processing **Sedimen** **Sampled: 12/04/20 15:30** (A0L0214-04)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	01/11/20 17:00	06/02/21 15:30	Cape Fear, subcontract unground volume
Containers Supplied:			
(B)4 oz Glass Jar			

Sample Name: ISM-C-20201204--After Processing **Sedimen** **Sampled: 12/04/20 12:00** (A0L0214-06)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	01/11/20 17:00	06/02/21 12:00	Cape Fear, subcontract unground volume
Containers Supplied:			
(B)4 oz Glass Jar			

ID on Conts. read Rinsate.

Sample Name: Rinsate Blank **Water** **Sampled: 12/04/20 15:30** (A0L0214-07)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	01/11/20 17:00	06/02/21 15:30	Cape Fear
Containers Supplied:			
(B)1 L Amber Glass - Non Preserved			
(C)1 L Amber Glass - Non Preserved			

Standard TAT

Released By — Date 12/10/20 — Received By: Fed Ex (Shipper) — Date

Released By: Fed Ex (Shipper) — Date — Received By: Cynde Larkins — Date: 14 Dec 20 @ 1032

temp = 3.0°C

Page 1 of 1

SAMPLE RECEIPT CHECKLIST

Cape Fear Analytical

Client: APEX	Work Order: 17497
Shipping Company: FedEx	Date/Time Received: 14DEC20 1032

Suspected Hazard Information	Yes	NA	No
Shipped as DOT Hazardous?			✓
Samples identified as Foreign Soil?			✓

DOE Site Sample Packages	Yes	NA	No*
Screened <0.5 mR/hr?		✓	
Samples < 2x background?		✓	

* Notify RSO of any responses in this column immediately.

Air Sample Receipt Specifics	Yes	NA	No
Air sample in shipment?			✓

Air Witness: _____

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: seals broken damaged container leaking container other(describe)
2	Custody seal/s present on cooler?			✓	Seal intact? Yes No
3	Chain of Custody documents included with shipment?	✓			
4	Samples requiring cold preservation within 0-6°C?	✓			Preservation Method: Temperature Blank present: (Yes) No ice bags (loose ice) blue ice dry ice none other (describe) 3.1° − 0.1 = 3.0°C
5	Aqueous samples found to have visible solids?			✓	Sample IDs, containers affected:
5	Samples requiring chemical preservation at proper pH?		✓		Sample IDs, containers affected and pH observed: pH = 7 on both If preservative added, Lot#:
7	Samples requiring preservation have no residual chlorine?	✓			Sample IDs, containers affected: If preservative added, Lot#:
8	Samples received within holding time?	✓			Sample IDs, tests affected:
9	Sample IDs on COC match IDs on containers?	✓			Sample IDs, containers affected:
10	Date & time of COC match date & time on containers?	✓			Sample IDs, containers affected:
11	Number of containers received match number indicated on COC?	✓			List type and number of containers / Sample IDs, containers affected: 3- 4oz. clear glass soil jars and 2- 1L NMAG bottles
12	COC form is properly signed in relinquished/received sections?	✓			

Comments:

High Resolution Dioxins and Furans Analysis

Case Narrative

HDOX Case Narrative
Apex Laboratories (APEX)
SDG A0L0214
Work Order 17497

Method/Analysis Information

Product:	**Dioxins/Furans by EPA Method 1613B**
Analytical Method:	EPA Method 1613B
Extraction Method:	SW846 3520C, SW846 3540C
Analytical Batch Number:	45635, 45603
Clean Up Batch Number:	45632, 45601
Extraction Batch Number:	45631, 45600

Sample Analysis

Samples were received at 3.0°C. (17497001,17497002,17497003,17497004). The following samples were analyzed using the analytical protocol as established in EPA Method 1613B:

Sample ID	Client ID
12028193	Method Blank (MB)
12028194	Laboratory Control Sample (LCS)
12028195	Laboratory Control Sample Duplicate (LCSD)
12028226	Method Blank (MB)
12028227	Laboratory Control Sample (LCS)
12028228	Laboratory Control Sample Duplicate (LCSD)
17497001	ISM-A-20201203--After Processing
17497002	ISM-B-20201204--After Processing
17497003	ISM-C-20201204--After Processing
17497004	Rinsate Blank

Samples 17497 001, 002 and 003 in this SDG were analyzed on a "dry weight" basis. Sample 17497 004 in this SDG was analyzed on an "as received" basis.

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by Cape Fear Analytical LLC (CFA) as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with CF-OA-E-002 REV# 18.

Raw data reports are processed and reviewed by the analyst using the TargetLynx software package.

Calibration Information

Initial Calibration
All initial calibration requirements have been met for this sample delivery group (SDG).

Continuing Calibration Verification (CCV) Requirements
All associated calibration verification standard(s) (CCV) met the acceptance criteria.

Quality Control (QC) Information

Certification Statement
The test results presented in this document are certified to meet all requirements of the 2009 TNI Standard.

Method Blank (MB) Statement
The MB(s) analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries
All surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Laboratory Control Sample Duplicate (LCSD) Recovery
The LCSD spike recoveries met the acceptance limits.

LCS/LCSD Relative Percent Difference (RPD) Statement
The RPD(s) between the LCS and LCSD met the acceptance limits.

QC Sample Designation
A sample of similar matrix, not associated with this SDG, was selected for analysis as the matrix spike and matrix spike duplicate. Batch 45603.

Technical Information

Receipt Temperature
Samples were received within temperature requirements.

Holding Time Specifications
CFA assigns holding times based on the associated methodology, which assigns the date and time from sample collection. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis
Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Nonconformance (NCR) Documentation
A NCR was not required for this SDG.

Manual Integrations
Certain standards and QC samples required manual integrations to correctly position the baseline as set in the calibration standard injections. Where manual integrations were performed, copies of all manual integration peak profiles are included in the raw data section of this fraction. Manual integrations were required for data files in this SDG.

Sample Preparation
No difficulties were encountered during sample preparation.

System Configuration

This analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
HRP750_2	Primary Dioxin Analysis	Dioxin Analysis	DB-5MS	60m x 0.25mm, 0.25um

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted: Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Sample Data Summary

Cape Fear Analytical, LLC
3306 Kitty Hawk Road Suite 120, Wilmington, NC 28405 - (910) 795-0421 - www.capefearanalytical.com

Qualifier Definition Report
for

APEX001 Apex Laboratories

Client SDG: A0L0214 CFA Work Order: 17497

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria
** Analyte is a surrogate compound
B The target analyte was detected in the associated blank.
J Value is estimated
K Estimated Maximum Possible Concentration
U Analyte was analyzed for, but not detected above the specified detection limit.

DL Indicates that sample is diluted.
RA Indicates that sample is re-analyzed without re-extraction.
RE Indicates that sample is re-extracted.

Review/Validation

Cape Fear Analytical requires all analytical data to be verified by a qualified data reviewer.

The following data validator verified the information presented in this case narrative:

Signature:  **Name: Erin Suhrie**

Date: 31 DEC 2020 **Title: Data Validator**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**17497001**	**Date Collected:**	**12/03/2020 14:45**	**Matrix:**	**SOIL**
Client Sample:	**1613B Soil**	**Date Received:**	**12/14/2020 10:32**	**%Moisture:**	**1.3**
Client ID:	**ISM-A-20201203--After Processing**			**Prep Basis:**	**Dry Weight**
Batch ID:	**45603**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/16/2020 20:12**	**Analyst:**	**MLL**	**Instrument:**	**HRP750**
Data File:	**A16DEC20A_2-7**			**Dilution:**	**1**
Prep Batch:	**45600**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-DEC-20**	**Prep Aliquot:**	**11.12 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.102	pg/g	0.102	0.912
40321-76-4	1,2,3,7,8-PeCDD	BJ	0.275	pg/g	0.141	4.56
39227-28-6	1,2,3,4,7,8-HxCDD	BJ	0.385	pg/g	0.188	4.56
57653-85-7	1,2,3,6,7,8-HxCDD	J	1.87	pg/g	0.181	4.56
19408-74-3	1,2,3,7,8,9-HxCDD	BJ	0.762	pg/g	0.188	4.56
35822-46-9	1,2,3,4,6,7,8-HpCDD		44.3	pg/g	0.485	4.56
3268-87-9	1,2,3,4,6,7,8,9-OCDD		370	pg/g	0.735	9.12
51207-31-9	2,3,7,8-TCDF	JK	0.232	pg/g	0.164	0.912
57117-41-6	1,2,3,7,8-PeCDF	J	0.281	pg/g	0.126	4.56
57117-31-4	2,3,4,7,8-PeCDF	BJK	0.381	pg/g	0.125	4.56
70648-26-9	1,2,3,4,7,8-HxCDF	BJ	0.685	pg/g	0.0930	4.56
57117-44-9	1,2,3,6,7,8-HxCDF	BJK	0.368	pg/g	0.0975	4.56
60851-34-5	2,3,4,6,7,8-HxCDF	BJ	0.540	pg/g	0.104	4.56
72918-21-9	1,2,3,7,8,9-HxCDF	BJ	0.392	pg/g	0.141	4.56
67562-39-4	1,2,3,4,6,7,8-HpCDF		7.65	pg/g	0.166	4.56
55673-89-7	1,2,3,4,7,8,9-HpCDF	BJ	0.627	pg/g	0.277	4.56
39001-02-0	1,2,3,4,6,7,8,9-OCDF		16.2	pg/g	0.339	9.12
41903-57-5	Total TeCDD	U	0.102	pg/g	0.102	0.912
36088-22-9	Total PeCDD	BJ	0.733	pg/g	0.141	4.56
34465-46-8	Total HxCDD	J	10.1	pg/g	0.181	4.56
37871-00-4	Total HpCDD		87.5	pg/g	0.485	4.56
30402-14-3	Total TeCDF	BJK	1.09	pg/g	0.164	0.912
30402-15-4	Total PeCDF	BJK	3.67	pg/g	0.0478	4.56
55684-94-1	Total HxCDF	BJK	12.1	pg/g	0.0930	4.56
38998-75-3	Total HpCDF	J	25.3	pg/g	0.166	4.56
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		1.56	pg/g		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		1.61	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		157	182	pg/g	85.9	(25%-164%)
13C-1,2,3,7,8-PeCDD		158	182	pg/g	86.5	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		146	182	pg/g	80.0	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		140	182	pg/g	76.9	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		144	182	pg/g	79.0	(23%-140%)
13C-OCDD		199	365	pg/g	54.6	(17%-157%)
13C-2,3,7,8-TCDF		146	182	pg/g	79.9	(24%-169%)
13C-1,2,3,7,8-PeCDF		163	182	pg/g	89.7	(24%-185%)
13C-2,3,4,7,8-PeCDF		157	182	pg/g	86.4	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		146	182	pg/g	80.1	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		137	182	pg/g	75.2	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		137	182	pg/g	75.1	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		139	182	pg/g	76.3	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**17497001**	**Date Collected:**	**12/03/2020 14:45**	**Matrix:**	**SOIL**
Client Sample:	**1613B Soil**	**Date Received:**	**12/14/2020 10:32**	**%Moisture:**	**1.3**
Client ID:	**ISM-A-20201203--After Processing**			**Prep Basis:**	**Dry Weight**
Batch ID:	**45603**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/16/2020 20:12**	**Analyst:**	**MLL**	**Instrument:**	**HRP750**
Data File:	**A16DEC20A_2-7**			**Dilution:**	**1**
Prep Batch:	**45600**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-DEC-20**	**Prep Aliquot:**	**11.12 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		137	182	pg/g	75.3	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		122	182	pg/g	66.7	(26%-138%)
37Cl-2,3,7,8-TCDD		15.5	18.2	pg/g	84.8	(35%-197%)

Comments:

B **The target analyte was detected in the associated blank.**
J **Value is estimated**
K **Estimated Maximum Possible Concentration**
U **Analyte was analyzed for, but not detected above the specified detection limit.**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**17497002**	**Date Collected:**	**12/04/2020 15:30**	**Matrix:**	**SOIL**
Client Sample:	**1613B Soil**	**Date Received:**	**12/14/2020 10:32**	**%Moisture:**	**.9**
Client ID:	**ISM-B-20201204--After Processing**			**Prep Basis:**	**Dry Weight**
Batch ID:	**45603**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/16/2020 21:00**	**Analyst:**	**MLL**	**Instrument:**	**HRP750**
Data File:	**A16DEC20A_2-8**			**Dilution:**	**1**
Prep Batch:	**45600**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-DEC-20**	**Prep Aliquot:**	**11.16 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.0950	pg/g	0.0950	0.904
40321-76-4	1,2,3,7,8-PeCDD	U	0.145	pg/g	0.145	4.52
39227-28-6	1,2,3,4,7,8-HxCDD	BJ	0.369	pg/g	0.140	4.52
57653-85-7	1,2,3,6,7,8-HxCDD	J	2.57	pg/g	0.148	4.52
19408-74-3	1,2,3,7,8,9-HxCDD	BJ	0.868	pg/g	0.146	4.52
35822-46-9	1,2,3,4,6,7,8-HpCDD		60.2	pg/g	0.559	4.52
3268-87-9	1,2,3,4,6,7,8,9-OCDD		467	pg/g	0.933	9.04
51207-31-9	2,3,7,8-TCDF	JK	0.298	pg/g	0.177	0.904
57117-41-6	1,2,3,7,8-PeCDF	J	0.320	pg/g	0.124	4.52
57117-31-4	2,3,4,7,8-PeCDF	BJK	0.497	pg/g	0.117	4.52
70648-26-9	1,2,3,4,7,8-HxCDF	BJ	1.03	pg/g	0.136	4.52
57117-44-9	1,2,3,6,7,8-HxCDF	BJ	0.532	pg/g	0.145	4.52
60851-34-5	2,3,4,6,7,8-HxCDF	BJK	0.572	pg/g	0.148	4.52
72918-21-9	1,2,3,7,8,9-HxCDF	BJ	0.550	pg/g	0.206	4.52
67562-39-4	1,2,3,4,6,7,8-HpCDF		10.4	pg/g	0.156	4.52
55673-89-7	1,2,3,4,7,8,9-HpCDF	BJ	0.646	pg/g	0.262	4.52
39001-02-0	1,2,3,4,6,7,8,9-OCDF		18.3	pg/g	0.373	9.04
41903-57-5	Total TeCDD	U	0.0950	pg/g	0.0950	0.904
36088-22-9	Total PeCDD	BJ	0.874	pg/g	0.145	4.52
34465-46-8	Total HxCDD	JK	11.1	pg/g	0.140	4.52
37871-00-4	Total HpCDD		107	pg/g	0.559	4.52
30402-14-3	Total TeCDF	BJK	0.738	pg/g	0.177	0.904
30402-15-4	Total PeCDF	BJK	4.29	pg/g	0.0485	4.52
55684-94-1	Total HxCDF	JK	18.7	pg/g	0.136	4.52
38998-75-3	Total HpCDF	J	35.5	pg/g	0.156	4.52
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		1.70	pg/g		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		1.82	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		160	181	pg/g	88.4	(25%-164%)
13C-1,2,3,7,8-PeCDD		177	181	pg/g	97.6	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		141	181	pg/g	78.1	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		140	181	pg/g	77.4	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		140	181	pg/g	77.4	(23%-140%)
13C-OCDD		195	362	pg/g	53.8	(17%-157%)
13C-2,3,7,8-TCDF		143	181	pg/g	78.8	(24%-169%)
13C-1,2,3,7,8-PeCDF		180	181	pg/g	99.5	(24%-185%)
13C-2,3,4,7,8-PeCDF		174	181	pg/g	96.0	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		144	181	pg/g	79.5	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		133	181	pg/g	73.7	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		134	181	pg/g	74.3	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		134	181	pg/g	74.1	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**17497002**	**Date Collected:**	**12/04/2020 15:30**	**Matrix:**	**SOIL**
Client Sample:	**1613B Soil**	**Date Received:**	**12/14/2020 10:32**	**%Moisture:**	**.9**
Client ID:	**ISM-B-20201204--After Processing**			**Prep Basis:**	**Dry Weight**
Batch ID:	**45603**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/16/2020 21:00**	**Analyst:**	**MLL**	**Instrument:**	**HRP750**
Data File:	**A16DEC20A_2-8**			**Dilution:**	**1**
Prep Batch:	**45600**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-DEC-20**	**Prep Aliquot:**	**11.16 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		135	181	pg/g	74.6	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		119	181	pg/g	65.9	(26%-138%)
37Cl-2,3,7,8-TCDD		16.6	18.1	pg/g	91.6	(35%-197%)

Comments:

B **The target analyte was detected in the associated blank.**
J **Value is estimated**
K **Estimated Maximum Possible Concentration**
U **Analyte was analyzed for, but not detected above the specified detection limit.**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**17497003**	**Date Collected:**	**12/04/2020 12:00**	**Matrix:**	**SOIL**
Client Sample:	**1613B Soil**	**Date Received:**	**12/14/2020 10:32**	**%Moisture:**	**1**
Client ID:	**ISM-C-20201204--After Processing**			**Prep Basis:**	**Dry Weight**
Batch ID:	**45603**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/16/2020 21:49**	**Analyst:**	**MLL**	**Instrument:**	**HRP750**
Data File:	**A16DEC20A_2-9**			**Dilution:**	**1**
Prep Batch:	**45600**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-DEC-20**	**Prep Aliquot:**	**11.39 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.0833	pg/g	0.0833	0.887
40321-76-4	1,2,3,7,8-PeCDD	BJK	0.287	pg/g	0.131	4.43
39227-28-6	1,2,3,4,7,8-HxCDD	BJ	0.459	pg/g	0.190	4.43
57653-85-7	1,2,3,6,7,8-HxCDD	J	2.48	pg/g	0.190	4.43
19408-74-3	1,2,3,7,8,9-HxCDD	BJ	1.01	pg/g	0.193	4.43
35822-46-9	1,2,3,4,6,7,8-HpCDD		61.6	pg/g	0.465	4.43
3268-87-9	1,2,3,4,6,7,8,9-OCDD		484	pg/g	1.07	8.87
51207-31-9	2,3,7,8-TCDF	JK	0.285	pg/g	0.159	0.887
57117-41-6	1,2,3,7,8-PeCDF	J	0.303	pg/g	0.0881	4.43
57117-31-4	2,3,4,7,8-PeCDF	BJ	0.491	pg/g	0.0885	4.43
70648-26-9	1,2,3,4,7,8-HxCDF	BJ	1.11	pg/g	0.0936	4.43
57117-44-9	1,2,3,6,7,8-HxCDF	BJ	0.521	pg/g	0.0995	4.43
60851-34-5	2,3,4,6,7,8-HxCDF	BJ	0.661	pg/g	0.108	4.43
72918-21-9	1,2,3,7,8,9-HxCDF	BJ	0.509	pg/g	0.148	4.43
67562-39-4	1,2,3,4,6,7,8-HpCDF		10.4	pg/g	0.171	4.43
55673-89-7	1,2,3,4,7,8,9-HpCDF	BJ	0.686	pg/g	0.284	4.43
39001-02-0	1,2,3,4,6,7,8,9-OCDF		15.8	pg/g	0.403	8.87
41903-57-5	Total TeCDD	J	0.103	pg/g	0.0833	0.887
36088-22-9	Total PeCDD	JK	2.07	pg/g	0.131	4.43
34465-46-8	Total HxCDD	JK	14.6	pg/g	0.190	4.43
37871-00-4	Total HpCDD		117	pg/g	0.465	4.43
30402-14-3	Total TeCDF	BJK	1.00	pg/g	0.159	0.887
30402-15-4	Total PeCDF	JK	5.27	pg/g	0.0509	4.43
55684-94-1	Total HxCDF	J	18.2	pg/g	0.0936	4.43
38998-75-3	Total HpCDF	J	32.5	pg/g	0.171	4.43
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		2.02	pg/g		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		2.06	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		152	177	pg/g	85.8	(25%-164%)
13C-1,2,3,7,8-PeCDD		152	177	pg/g	85.9	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		143	177	pg/g	80.5	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		141	177	pg/g	79.8	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		140	177	pg/g	78.9	(23%-140%)
13C-OCDD		193	355	pg/g	54.4	(17%-157%)
13C-2,3,7,8-TCDF		143	177	pg/g	80.6	(24%-169%)
13C-1,2,3,7,8-PeCDF		162	177	pg/g	91.1	(24%-185%)
13C-2,3,4,7,8-PeCDF		152	177	pg/g	85.7	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		148	177	pg/g	83.2	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		139	177	pg/g	78.3	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		138	177	pg/g	77.8	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		136	177	pg/g	76.6	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**17497003**	**Date Collected:**	**12/04/2020 12:00**	**Matrix:**	**SOIL**
Client Sample:	**1613B Soil**	**Date Received:**	**12/14/2020 10:32**	**%Moisture:**	**1**
Client ID:	**ISM-C-20201204--After Processing**			**Prep Basis:**	**Dry Weight**
Batch ID:	**45603**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/16/2020 21:49**	**Analyst:**	**MLL**	**Instrument:**	**HRP750**
Data File:	**A16DEC20A_2-9**			**Dilution:**	**1**
Prep Batch:	**45600**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-DEC-20**	**Prep Aliquot:**	**11.39 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		137	177	pg/g	77.4	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		122	177	pg/g	68.6	(26%-138%)
37Cl-2,3,7,8-TCDD		14.6	17.7	pg/g	82.3	(35%-197%)

Comments:

B **The target analyte was detected in the associated blank.**
J **Value is estimated**
K **Estimated Maximum Possible Concentration**
U **Analyte was analyzed for, but not detected above the specified detection limit.**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**17497004**	**Date Collected:**	**12/04/2020 15:30**	**Matrix:**	**WATER**
Client Sample:	**1613B Water**	**Date Received:**	**12/14/2020 10:32**		
Client ID:	**Rinsate Blank**			**Prep Basis:**	**As Received**
Batch ID:	**45635**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/29/2020 00:48**	**Analyst:**	**CLP**	**Instrument:**	**HRP750**
Data File:	**A28DEC20D-12**			**Dilution:**	**1**
Prep Batch:	**45631**	**Prep Method:**	**SW846 3520C**		
Prep Date:	**17-DEC-20**	**Prep Aliquot:**	**1044.8 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	1.32	pg/L	1.32	9.57
40321-76-4	1,2,3,7,8-PeCDD	U	1.11	pg/L	1.11	47.9
39227-28-6	1,2,3,4,7,8-HxCDD	U	1.41	pg/L	1.41	47.9
57653-85-7	1,2,3,6,7,8-HxCDD	U	1.29	pg/L	1.29	47.9
19408-74-3	1,2,3,7,8,9-HxCDD	U	1.36	pg/L	1.36	47.9
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	2.18	pg/L	2.18	47.9
3268-87-9	1,2,3,4,6,7,8,9-OCDD	U	2.93	pg/L	2.93	95.7
51207-31-9	2,3,7,8-TCDF	U	1.28	pg/L	1.28	9.57
57117-41-6	1,2,3,7,8-PeCDF	U	0.599	pg/L	0.599	47.9
57117-31-4	2,3,4,7,8-PeCDF	U	0.599	pg/L	0.599	47.9
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.674	pg/L	0.674	47.9
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.693	pg/L	0.693	47.9
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.741	pg/L	0.741	47.9
72918-21-9	1,2,3,7,8,9-HxCDF	U	1.00	pg/L	1.00	47.9
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	0.724	pg/L	0.724	47.9
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	1.34	pg/L	1.34	47.9
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	2.83	pg/L	2.83	95.7
41903-57-5	Total TeCDD	U	1.32	pg/L	1.32	9.57
36088-22-9	Total PeCDD	U	1.11	pg/L	1.11	47.9
34465-46-8	Total HxCDD	U	1.29	pg/L	1.29	47.9
37871-00-4	Total HpCDD	U	2.18	pg/L	2.18	47.9
30402-14-3	Total TeCDF	U	1.28	pg/L	1.28	9.57
30402-15-4	Total PeCDF	U	0.599	pg/L	0.599	47.9
55684-94-1	Total HxCDF	U	0.674	pg/L	0.674	47.9
38998-75-3	Total HpCDF	U	0.724	pg/L	0.724	47.9
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		0.000	pg/L		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		1.76	pg/L		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1480	1910	pg/L	77.2	(25%-164%)
13C-1,2,3,7,8-PeCDD		1470	1910	pg/L	76.9	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		1240	1910	pg/L	65.0	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		1300	1910	pg/L	67.7	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		1230	1910	pg/L	64.2	(23%-140%)
13C-OCDD		2330	3830	pg/L	60.8	(17%-157%)
13C-2,3,7,8-TCDF		1470	1910	pg/L	76.9	(24%-169%)
13C-1,2,3,7,8-PeCDF		1470	1910	pg/L	76.5	(24%-185%)
13C-2,3,4,7,8-PeCDF		1450	1910	pg/L	75.9	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		1230	1910	pg/L	64.0	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		1240	1910	pg/L	64.7	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		1240	1910	pg/L	64.9	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		1240	1910	pg/L	65.0	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**17497004**	**Date Collected:**	**12/04/2020 15:30**	**Matrix:**	**WATER**
Client Sample:	**1613B Water**	**Date Received:**	**12/14/2020 10:32**		
Client ID:	**Rinsate Blank**			**Prep Basis:**	**As Received**
Batch ID:	**45635**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/29/2020 00:48**	**Analyst:**	**CLP**	**Instrument:**	**HRP750**
Data File:	**A28DEC20D-12**			**Dilution:**	**1**
Prep Batch:	**45631**	**Prep Method:**	**SW846 3520C**		
Prep Date:	**17-DEC-20**	**Prep Aliquot:**	**1044.8 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		1170	1910	pg/L	61.0	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		1140	1910	pg/L	59.4	(26%-138%)
37Cl-2,3,7,8-TCDD		152	191	pg/L	79.3	(35%-197%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Quality Control Summary

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: A0L0214

Matrix Type: LIQUID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12028227	LCS for batch 45631	13C-2,3,7,8-TCDD		74.9	(20%-175%)
		13C-1,2,3,7,8-PeCDD		71.9	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		62.3	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		65.5	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		64.0	(22%-166%)
		13C-OCDD		65.7	(13%-199%)
		13C-2,3,7,8-TCDF		71.3	(22%-152%)
		13C-1,2,3,7,8-PeCDF		69.6	(21%-192%)
		13C-2,3,4,7,8-PeCDF		68.4	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		61.5	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		60.8	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		61.9	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		63.3	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		58.4	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		58.8	(20%-186%)
		37Cl-2,3,7,8-TCDD		78.8	(31%-191%)
12028228	LCSD for batch 45631	13C-2,3,7,8-TCDD		87.1	(20%-175%)
		13C-1,2,3,7,8-PeCDD		86.1	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		74.4	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		77.4	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		73.3	(22%-166%)
		13C-OCDD		76.9	(13%-199%)
		13C-2,3,7,8-TCDF		85.4	(22%-152%)
		13C-1,2,3,7,8-PeCDF		84.9	(21%-192%)
		13C-2,3,4,7,8-PeCDF		84.2	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		73.3	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		72.9	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		72.7	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		72.0	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		66.4	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		69.1	(20%-186%)
		37Cl-2,3,7,8-TCDD		83.2	(31%-191%)
12028226	MB for batch 45631	13C-2,3,7,8-TCDD		77.9	(25%-164%)
		13C-1,2,3,7,8-PeCDD		74.8	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		65.8	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		69.4	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		67.3	(23%-140%)
		13C-OCDD		61.0	(17%-157%)
		13C-2,3,7,8-TCDF		79.6	(24%-169%)
		13C-1,2,3,7,8-PeCDF		74.8	(24%-185%)
		13C-2,3,4,7,8-PeCDF		75.1	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		63.7	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		64.8	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		65.3	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		67.1	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		63.3	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		60.1	(26%-138%)
		37Cl-2,3,7,8-TCDD		82.0	(35%-197%)
17497004	Rinsate Blank	13C-2,3,7,8-TCDD		77.2	(25%-164%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: A0L0214

Matrix Type: LIQUID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
17497004	Rinsate Blank	13C-1,2,3,7,8-PeCDD		76.9	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		65.0	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		67.7	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		64.2	(23%-140%)
		13C-OCDD		60.8	(17%-157%)
		13C-2,3,7,8-TCDF		76.9	(24%-169%)
		13C-1,2,3,7,8-PeCDF		76.5	(24%-185%)
		13C-2,3,4,7,8-PeCDF		75.9	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		64.0	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		64.7	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		64.9	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		65.0	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		61.0	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		59.4	(26%-138%)
		37Cl-2,3,7,8-TCDD		79.3	(35%-197%)

* Recovery outside Acceptance Limits
# Column to be used to flag recovery values
D Sample Diluted

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: A0L0214

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12028194	LCS for batch 45600	13C-2,3,7,8-TCDD		91.3	(20%-175%)
		13C-1,2,3,7,8-PeCDD		92.0	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		82.4	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		87.5	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		62.8	(22%-166%)
		13C-OCDD		37.6	(13%-199%)
		13C-2,3,7,8-TCDF		85.6	(22%-152%)
		13C-1,2,3,7,8-PeCDF		94.0	(21%-192%)
		13C-2,3,4,7,8-PeCDF		92.0	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		83.4	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		83.0	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		80.7	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		78.9	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		71.9	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		52.5	(20%-186%)
		37Cl-2,3,7,8-TCDD		88.6	(31%-191%)
12028195	LCSD for batch 45600	13C-2,3,7,8-TCDD		88.1	(20%-175%)
		13C-1,2,3,7,8-PeCDD		79.4	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		80.6	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		83.8	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		75.3	(22%-166%)
		13C-OCDD		46.4	(13%-199%)
		13C-2,3,7,8-TCDF		85.6	(22%-152%)
		13C-1,2,3,7,8-PeCDF		86.8	(21%-192%)
		13C-2,3,4,7,8-PeCDF		81.0	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		81.4	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		80.8	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		80.3	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		79.0	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		77.2	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		61.6	(20%-186%)
		37Cl-2,3,7,8-TCDD		85.8	(31%-191%)
12028193	MB for batch 45600	13C-2,3,7,8-TCDD		95.4	(25%-164%)
		13C-1,2,3,7,8-PeCDD		89.4	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		88.2	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		88.7	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		78.3	(23%-140%)
		13C-OCDD		43.0	(17%-157%)
		13C-2,3,7,8-TCDF		84.6	(24%-169%)
		13C-1,2,3,7,8-PeCDF		95.9	(24%-185%)
		13C-2,3,4,7,8-PeCDF		90.6	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		91.5	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		89.3	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		85.3	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		81.8	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		79.7	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		63.5	(26%-138%)
		37Cl-2,3,7,8-TCDD		88.7	(35%-197%)
17497001	ISM-A-20201203--After Processing	13C-2,3,7,8-TCDD		85.9	(25%-164%)

Surrogate Recovery Report

SDG Number: A0L0214

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
17497001	ISM-A-20201203--After Processing	13C-1,2,3,7,8-PeCDD		86.5	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		80.0	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		76.9	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		79.0	(23%-140%)
		13C-OCDD		54.6	(17%-157%)
		13C-2,3,7,8-TCDF		79.9	(24%-169%)
		13C-1,2,3,7,8-PeCDF		89.7	(24%-185%)
		13C-2,3,4,7,8-PeCDF		86.4	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		80.1	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		75.2	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		75.1	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		76.3	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		75.3	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		66.7	(26%-138%)
		37Cl-2,3,7,8-TCDD		84.8	(35%-197%)
17497002	ISM-B-20201204--After Processing	13C-2,3,7,8-TCDD		88.4	(25%-164%)
		13C-1,2,3,7,8-PeCDD		97.6	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		78.1	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		77.4	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		77.4	(23%-140%)
		13C-OCDD		53.8	(17%-157%)
		13C-2,3,7,8-TCDF		78.8	(24%-169%)
		13C-1,2,3,7,8-PeCDF		99.5	(24%-185%)
		13C-2,3,4,7,8-PeCDF		96.0	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		79.5	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		73.7	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		74.3	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		74.1	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		74.6	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		65.9	(26%-138%)
		37Cl-2,3,7,8-TCDD		91.6	(35%-197%)
17497003	ISM-C-20201204--After Processing	13C-2,3,7,8-TCDD		85.8	(25%-164%)
		13C-1,2,3,7,8-PeCDD		85.9	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		80.5	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		79.8	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		78.9	(23%-140%)
		13C-OCDD		54.4	(17%-157%)
		13C-2,3,7,8-TCDF		80.6	(24%-169%)
		13C-1,2,3,7,8-PeCDF		91.1	(24%-185%)
		13C-2,3,4,7,8-PeCDF		85.7	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		83.2	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		78.3	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		77.8	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		76.6	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		77.4	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		68.6	(26%-138%)
		37Cl-2,3,7,8-TCDD		82.3	(35%-197%)

* Recovery outside Acceptance Limits

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: A0L0214

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits

* Recovery outside Acceptance Limits
# Column to be used to flag recovery values
D Sample Diluted

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: A0L0214 **Sample Type:** Laboratory Control Sample

Client ID: LCS for batch 45600 **Matrix:** SOIL

Lab Sample ID: 12028194

Instrument: HRP750 **Analysis Date:** 12/16/2020 15:21 **Dilution:** 1

Analyst: MLL **Prep Batch ID:** 45600

Batch ID: 45603

CAS No.		Parmname	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits
1746-01-6	LCS	2,3,7,8-TCDD	20.0	19.5	97.6	67-158
40321-76-4	LCS	1,2,3,7,8-PeCDD	100	102	102	70-142
39227-28-6	LCS	1,2,3,4,7,8-HxCDD	100	101	101	70-164
57653-85-7	LCS	1,2,3,6,7,8-HxCDD	100	101	101	76-134
19408-74-3	LCS	1,2,3,7,8,9-HxCDD	100	98.7	98.7	64-162
35822-46-9	LCS	1,2,3,4,6,7,8-HpCDD	100	95.8	95.8	70-140
3268-87-9	LCS	1,2,3,4,6,7,8,9-OCDD	200	189	94.7	78-144
51207-31-9	LCS	2,3,7,8-TCDF	20.0	19.3	96.3	75-158
57117-41-6	LCS	1,2,3,7,8-PeCDF	100	99.6	99.6	80-134
57117-31-4	LCS	2,3,4,7,8-PeCDF	100	102	102	68-160
70648-26-9	LCS	1,2,3,4,7,8-HxCDF	100	96.7	96.7	72-134
57117-44-9	LCS	1,2,3,6,7,8-HxCDF	100	101	101	84-130
60851-34-5	LCS	2,3,4,6,7,8-HxCDF	100	96.7	96.7	70-156
72918-21-9	LCS	1,2,3,7,8,9-HxCDF	100	95.2	95.2	78-130
67562-39-4	LCS	1,2,3,4,6,7,8-HpCDF	100	99.4	99.4	82-122
55673-89-7	LCS	1,2,3,4,7,8,9-HpCDF	100	93.7	93.7	78-138
39001-02-0	LCS	1,2,3,4,6,7,8,9-OCDF	200	173	86.5	63-170

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: A0L0214 **Sample Type:** Laboratory Control Sample Duplicate

Client ID: LCSD for batch 45600 **Matrix:** SOIL

Lab Sample ID: 12028195

Instrument: HRP750 **Analysis Date:** 12/16/2020 16:09 **Dilution:** 1

Analyst: MLL **Prep Batch ID:** 45600

Batch ID: 45603

CAS No.		Parmname	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
1746-01-6	LCSD	2,3,7,8-TCDD	20.0	18.9	94.5	67-158	3.14	0-20
40321-76-4	LCSD	1,2,3,7,8-PeCDD	100	106	106	70-142	3.47	0-20
39227-28-6	LCSD	1,2,3,4,7,8-HxCDD	100	101	101	70-164	0.360	0-20
57653-85-7	LCSD	1,2,3,6,7,8-HxCDD	100	103	103	76-134	1.78	0-20
19408-74-3	LCSD	1,2,3,7,8,9-HxCDD	100	102	102	64-162	3.17	0-20
35822-46-9	LCSD	1,2,3,4,6,7,8-HpCDD	100	95.3	95.3	70-140	0.561	0-20
3268-87-9	LCSD	1,2,3,4,6,7,8,9-OCDD	200	190	94.9	78-144	0.280	0-20
51207-31-9	LCSD	2,3,7,8-TCDF	20.0	19.0	95.2	75-158	1.22	0-20
57117-41-6	LCSD	1,2,3,7,8-PeCDF	100	96.6	96.6	80-134	3.13	0-20
57117-31-4	LCSD	2,3,4,7,8-PeCDF	100	105	105	68-160	3.15	0-20
70648-26-9	LCSD	1,2,3,4,7,8-HxCDF	100	97.6	97.6	72-134	0.972	0-20
57117-44-9	LCSD	1,2,3,6,7,8-HxCDF	100	100	100	84-130	0.943	0-20
60851-34-5	LCSD	2,3,4,6,7,8-HxCDF	100	97.9	97.9	70-156	1.22	0-20
72918-21-9	LCSD	1,2,3,7,8,9-HxCDF	100	96.2	96.2	78-130	1.03	0-20
67562-39-4	LCSD	1,2,3,4,6,7,8-HpCDF	100	97.5	97.5	82-122	1.95	0-20
55673-89-7	LCSD	1,2,3,4,7,8,9-HpCDF	100	96.5	96.5	78-138	2.94	0-20
39001-02-0	LCSD	1,2,3,4,6,7,8,9-OCDF	200	173	86.4	63-170	0.0613	0-20

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: A0L0214 **Sample Type:** Laboratory Control Sample

Client ID: LCS for batch 45631 **Matrix:** WATER

Lab Sample ID: 12028227

Instrument: HRP750 **Analysis Date:** 12/28/2020 16:45 **Dilution:** 1

Analyst: CLP **Prep Batch ID:** 45631

Batch ID: 45635

CAS No.		Parmname	Amount Added pg/L	Spike Conc. pg/L	Recovery %	Acceptance Limits
1746-01-6	LCS	2,3,7,8-TCDD	200	174	87.1	67-158
40321-76-4	LCS	1,2,3,7,8-PeCDD	1000	968	96.8	70-142
39227-28-6	LCS	1,2,3,4,7,8-HxCDD	1000	941	94.1	70-164
57653-85-7	LCS	1,2,3,6,7,8-HxCDD	1000	959	95.9	74-134
19408-74-3	LCS	1,2,3,7,8,9-HxCDD	1000	963	96.3	64-162
35822-46-9	LCS	1,2,3,4,6,7,8-HpCDD	1000	932	93.2	70-140
3268-87-9	LCS	1,2,3,4,6,7,8,9-OCDD	2000	1780	88.8	78-144
51207-31-9	LCS	2,3,7,8-TCDF	200	172	85.8	75-158
57117-41-6	LCS	1,2,3,7,8-PeCDF	1000	926	92.6	80-134
57117-31-4	LCS	2,3,4,7,8-PeCDF	1000	962	96.2	68-160
70648-26-9	LCS	1,2,3,4,7,8-HxCDF	1000	915	91.5	72-134
57117-44-9	LCS	1,2,3,6,7,8-HxCDF	1000	943	94.3	84-130
60851-34-5	LCS	2,3,4,6,7,8-HxCDF	1000	915	91.5	70-156
72918-21-9	LCS	1,2,3,7,8,9-HxCDF	1000	912	91.2	78-130
67562-39-4	LCS	1,2,3,4,6,7,8-HpCDF	1000	893	89.3	82-122
55673-89-7	LCS	1,2,3,4,7,8,9-HpCDF	1000	911	91.1	78-138
39001-02-0	LCS	1,2,3,4,6,7,8,9-OCDF	2000	1660	83.2	63-170

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: A0L0214 **Sample Type:** Laboratory Control Sample Duplicate

Client ID: LCSD for batch 45631 **Matrix:** WATER

Lab Sample ID: 12028228

Instrument: HRP750 **Analysis Date:** 12/28/2020 17:34 **Dilution:** 1

Analyst: CLP **Prep Batch ID:** 45631

Batch ID: 45635

CAS No.		Parmname	Amount Added pg/L	Spike Conc. pg/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
1746-01-6	LCSD	2,3,7,8-TCDD	200	177	88.6	67-158	1.74	0-20
40321-76-4	LCSD	1,2,3,7,8-PeCDD	1000	966	96.6	70-142	0.256	0-20
39227-28-6	LCSD	1,2,3,4,7,8-HxCDD	1000	946	94.6	70-164	0.528	0-20
57653-85-7	LCSD	1,2,3,6,7,8-HxCDD	1000	966	96.6	74-134	0.735	0-20
19408-74-3	LCSD	1,2,3,7,8,9-HxCDD	1000	956	95.6	64-162	0.813	0-20
35822-46-9	LCSD	1,2,3,4,6,7,8-HpCDD	1000	932	93.2	70-140	0.0107	0-20
3268-87-9	LCSD	1,2,3,4,6,7,8,9-OCDD	2000	1780	89	78-144	0.276	0-20
51207-31-9	LCSD	2,3,7,8-TCDF	200	175	87.3	75-158	1.68	0-20
57117-41-6	LCSD	1,2,3,7,8-PeCDF	1000	922	92.2	80-134	0.381	0-20
57117-31-4	LCSD	2,3,4,7,8-PeCDF	1000	969	96.9	68-160	0.719	0-20
70648-26-9	LCSD	1,2,3,4,7,8-HxCDF	1000	906	90.6	72-134	0.951	0-20
57117-44-9	LCSD	1,2,3,6,7,8-HxCDF	1000	944	94.4	84-130	0.0806	0-20
60851-34-5	LCSD	2,3,4,6,7,8-HxCDF	1000	901	90.1	70-156	1.56	0-20
72918-21-9	LCSD	1,2,3,7,8,9-HxCDF	1000	926	92.6	78-130	1.47	0-20
67562-39-4	LCSD	1,2,3,4,6,7,8-HpCDF	1000	871	87.1	82-122	2.46	0-20
55673-89-7	LCSD	1,2,3,4,7,8,9-HpCDF	1000	904	90.4	78-138	0.774	0-20
39001-02-0	LCSD	1,2,3,4,6,7,8,9-OCDF	2000	1670	83.7	63-170	0.562	0-20

Method Blank Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Matrix:**	**SOIL**
Client ID:	**MB for batch 45600**	**Instrument ID:**	**HRP750**	**Data File:**	**A16DEC20A_2-3**
Lab Sample ID:	**12028193**	**Prep Date:**	**15-DEC-20**	**Analyzed:**	**12/16/20 16:57**
Column:					

This method blank applies to the following samples and quality control samples:

	Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01	LCS for batch 45600	12028194	A16DEC20A_2-1	12/16/20	1521
02	LCSD for batch 45600	12028195	A16DEC20A_2-2	12/16/20	1609
03	ISM-A-20201203--After Processing	17497001	A16DEC20A_2-7	12/16/20	2012
04	ISM-B-20201204--After Processing	17497002	A16DEC20A_2-8	12/16/20	2100
05	ISM-C-20201204--After Processing	17497003	A16DEC20A_2-9	12/16/20	2149

Method Blank Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Matrix:**	**WATER**
Client ID:	**MB for batch 45631**	**Instrument ID:**	**HRP750**	**Data File:**	**A28DEC20D-4**
Lab Sample ID:	**12028226**	**Prep Date:**	**17-DEC-20**	**Analyzed:**	**12/28/20 18:22**
Column:					

This method blank applies to the following samples and quality control samples:

	Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01	LCS for batch 45631	12028227	A28DEC20D-2	12/28/20	1645
02	LCSD for batch 45631	12028228	A28DEC20D-3	12/28/20	1734
03	Rinsate Blank	17497004	A28DEC20D-12	12/29/20	0048

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**12028193**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 45600**				
Client ID:	**MB for batch 45600**			**Prep Basis:**	**As Received**
Batch ID:	**45603**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/16/2020 16:57**	**Analyst:**	**MLL**	**Instrument:**	**HRP750**
Data File:	**A16DEC20A_2-3**			**Dilution:**	**1**
Prep Batch:	**45600**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-DEC-20**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.111	pg/g	0.111	1.00
40321-76-4	1,2,3,7,8-PeCDD	J	0.112	pg/g	0.0932	5.00
39227-28-6	1,2,3,4,7,8-HxCDD	J	0.232	pg/g	0.160	5.00
57653-85-7	1,2,3,6,7,8-HxCDD	JK	0.172	pg/g	0.150	5.00
19408-74-3	1,2,3,7,8,9-HxCDD	JK	0.246	pg/g	0.157	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	0.340	pg/g	0.216	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD	J	0.946	pg/g	0.694	10.0
51207-31-9	2,3,7,8-TCDF	U	0.148	pg/g	0.148	1.00
57117-41-6	1,2,3,7,8-PeCDF	U	0.116	pg/g	0.116	5.00
57117-31-4	2,3,4,7,8-PeCDF	JK	0.152	pg/g	0.107	5.00
70648-26-9	1,2,3,4,7,8-HxCDF	JK	0.344	pg/g	0.101	5.00
57117-44-9	1,2,3,6,7,8-HxCDF	J	0.208	pg/g	0.104	5.00
60851-34-5	2,3,4,6,7,8-HxCDF	J	0.222	pg/g	0.108	5.00
72918-21-9	1,2,3,7,8,9-HxCDF	JK	0.262	pg/g	0.166	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF	JK	0.618	pg/g	0.144	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF	J	0.294	pg/g	0.258	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF	J	0.742	pg/g	0.518	10.0
41903-57-5	Total TeCDD	U	0.111	pg/g	0.111	1.00
36088-22-9	Total PeCDD	J	0.112	pg/g	0.0932	5.00
34465-46-8	Total HxCDD	JK	0.650	pg/g	0.150	5.00
37871-00-4	Total HpCDD	JK	0.570	pg/g	0.216	5.00
30402-14-3	Total TeCDF	J	0.154	pg/g	0.148	1.00
30402-15-4	Total PeCDF	JK	0.504	pg/g	0.0706	5.00
55684-94-1	Total HxCDF	JK	1.25	pg/g	0.101	5.00
38998-75-3	Total HpCDF	JK	0.912	pg/g	0.144	5.00
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		0.339	pg/g		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		0.404	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		191	200	pg/g	95.4	(25%-164%)
13C-1,2,3,7,8-PeCDD		179	200	pg/g	89.4	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		176	200	pg/g	88.2	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		177	200	pg/g	88.7	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		157	200	pg/g	78.3	(23%-140%)
13C-OCDD		172	400	pg/g	43.0	(17%-157%)
13C-2,3,7,8-TCDF		169	200	pg/g	84.6	(24%-169%)
13C-1,2,3,7,8-PeCDF		192	200	pg/g	95.9	(24%-185%)
13C-2,3,4,7,8-PeCDF		181	200	pg/g	90.6	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		183	200	pg/g	91.5	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		179	200	pg/g	89.3	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		171	200	pg/g	85.3	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		164	200	pg/g	81.8	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**12028193**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 45600**				
Client ID:	**MB for batch 45600**			**Prep Basis:**	**As Received**
Batch ID:	**45603**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/16/2020 16:57**	**Analyst:**	**MLL**	**Instrument:**	**HRP750**
Data File:	**A16DEC20A_2-3**			**Dilution:**	**1**
Prep Batch:	**45600**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-DEC-20**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		159	200	pg/g	79.7	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		127	200	pg/g	63.5	(26%-138%)
37Cl-2,3,7,8-TCDD		17.7	20.0	pg/g	88.7	(35%-197%)

Comments:

J **Value is estimated**

K **Estimated Maximum Possible Concentration**

U **Analyte was analyzed for, but not detected above the specified detection limit.**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**12028194**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 45600**				
Client ID:	**LCS for batch 45600**			**Prep Basis:**	**As Received**
Batch ID:	**45603**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/16/2020 15:21**	**Analyst:**	**MLL**	**Instrument:**	**HRP750**
Data File:	**A16DEC20A_2-1**			**Dilution:**	**1**
Prep Batch:	**45600**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-DEC-20**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		19.5	pg/g	0.133	1.00
40321-76-4	1,2,3,7,8-PeCDD		102	pg/g	0.230	5.00
39227-28-6	1,2,3,4,7,8-HxCDD		101	pg/g	0.464	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		101	pg/g	0.452	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		98.7	pg/g	0.464	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		95.8	pg/g	0.658	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		189	pg/g	1.34	10.0
51207-31-9	2,3,7,8-TCDF		19.3	pg/g	0.151	1.00
57117-41-6	1,2,3,7,8-PeCDF		99.6	pg/g	0.286	5.00
57117-31-4	2,3,4,7,8-PeCDF		102	pg/g	0.262	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		96.7	pg/g	0.586	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		101	pg/g	0.570	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		96.7	pg/g	0.646	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		95.2	pg/g	0.920	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		99.4	pg/g	0.372	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		93.7	pg/g	0.810	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		173	pg/g	1.40	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		183	200	pg/g	91.3	(20%-175%)
13C-1,2,3,7,8-PeCDD		184	200	pg/g	92.0	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		165	200	pg/g	82.4	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		175	200	pg/g	87.5	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		126	200	pg/g	62.8	(22%-166%)
13C-OCDD		150	400	pg/g	37.6	(13%-199%)
13C-2,3,7,8-TCDF		171	200	pg/g	85.6	(22%-152%)
13C-1,2,3,7,8-PeCDF		188	200	pg/g	94.0	(21%-192%)
13C-2,3,4,7,8-PeCDF		184	200	pg/g	92.0	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		167	200	pg/g	83.4	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		166	200	pg/g	83.0	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		161	200	pg/g	80.7	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		158	200	pg/g	78.9	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		144	200	pg/g	71.9	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		105	200	pg/g	52.5	(20%-186%)
37Cl-2,3,7,8-TCDD		17.7	20.0	pg/g	88.6	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**12028195**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 45600**				
Client ID:	**LCSD for batch 45600**			**Prep Basis:**	**As Received**
Batch ID:	**45603**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/16/2020 16:09**	**Analyst:**	**MLL**	**Instrument:**	**HRP750**
Data File:	**A16DEC20A_2-2**			**Dilution:**	**1**
Prep Batch:	**45600**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-DEC-20**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		18.9	pg/g	0.113	1.00
40321-76-4	1,2,3,7,8-PeCDD		106	pg/g	0.200	5.00
39227-28-6	1,2,3,4,7,8-HxCDD		101	pg/g	0.406	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		103	pg/g	0.406	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		102	pg/g	0.412	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		95.3	pg/g	0.616	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		190	pg/g	1.53	10.0
51207-31-9	2,3,7,8-TCDF		19.0	pg/g	0.160	1.00
57117-41-6	1,2,3,7,8-PeCDF		96.6	pg/g	0.248	5.00
57117-31-4	2,3,4,7,8-PeCDF		105	pg/g	0.250	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		97.6	pg/g	0.502	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		100	pg/g	0.512	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		97.9	pg/g	0.534	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		96.2	pg/g	0.776	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		97.5	pg/g	0.428	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		96.5	pg/g	0.874	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		173	pg/g	1.27	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		176	200	pg/g	88.1	(20%-175%)
13C-1,2,3,7,8-PeCDD		159	200	pg/g	79.4	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		161	200	pg/g	80.6	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		168	200	pg/g	83.8	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		151	200	pg/g	75.3	(22%-166%)
13C-OCDD		186	400	pg/g	46.4	(13%-199%)
13C-2,3,7,8-TCDF		171	200	pg/g	85.6	(22%-152%)
13C-1,2,3,7,8-PeCDF		174	200	pg/g	86.8	(21%-192%)
13C-2,3,4,7,8-PeCDF		162	200	pg/g	81.0	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		163	200	pg/g	81.4	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		162	200	pg/g	80.8	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		161	200	pg/g	80.3	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		158	200	pg/g	79.0	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		154	200	pg/g	77.2	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		123	200	pg/g	61.6	(20%-186%)
37Cl-2,3,7,8-TCDD		17.2	20.0	pg/g	85.8	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**12028226**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 45631**				
Client ID:	**MB for batch 45631**			**Prep Basis:**	**As Received**
Batch ID:	**45635**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/28/2020 18:22**	**Analyst:**	**CLP**	**Instrument:**	**HRP750**
Data File:	**A28DEC20D-4**			**Dilution:**	**1**
Prep Batch:	**45631**	**Prep Method:**	**SW846 3520C**		
Prep Date:	**17-DEC-20**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	1.26	pg/L	1.26	10.0
40321-76-4	1,2,3,7,8-PeCDD	U	0.828	pg/L	0.828	50.0
39227-28-6	1,2,3,4,7,8-HxCDD	U	1.38	pg/L	1.38	50.0
57653-85-7	1,2,3,6,7,8-HxCDD	U	1.37	pg/L	1.37	50.0
19408-74-3	1,2,3,7,8,9-HxCDD	U	1.39	pg/L	1.39	50.0
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	1.82	pg/L	1.82	50.0
3268-87-9	1,2,3,4,6,7,8,9-OCDD	JK	3.92	pg/L	3.28	100
51207-31-9	2,3,7,8-TCDF	U	1.22	pg/L	1.22	10.0
57117-41-6	1,2,3,7,8-PeCDF	U	0.990	pg/L	0.990	50.0
57117-31-4	2,3,4,7,8-PeCDF	U	0.978	pg/L	0.978	50.0
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.980	pg/L	0.980	50.0
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.996	pg/L	0.996	50.0
60851-34-5	2,3,4,6,7,8-HxCDF	U	1.03	pg/L	1.03	50.0
72918-21-9	1,2,3,7,8,9-HxCDF	U	1.46	pg/L	1.46	50.0
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	1.18	pg/L	1.18	50.0
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	1.72	pg/L	1.72	50.0
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	2.86	pg/L	2.86	100
41903-57-5	Total TeCDD	U	1.26	pg/L	1.26	10.0
36088-22-9	Total PeCDD	U	0.828	pg/L	0.828	50.0
34465-46-8	Total HxCDD	U	1.37	pg/L	1.37	50.0
37871-00-4	Total HpCDD	U	1.82	pg/L	1.82	50.0
30402-14-3	Total TeCDF	U	1.22	pg/L	1.22	10.0
30402-15-4	Total PeCDF	U	0.978	pg/L	0.978	50.0
55684-94-1	Total HxCDF	U	0.980	pg/L	0.980	50.0
38998-75-3	Total HpCDF	U	1.18	pg/L	1.18	50.0
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		0.00118	pg/L		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		1.72	pg/L		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1560	2000	pg/L	77.9	(25%-164%)
13C-1,2,3,7,8-PeCDD		1500	2000	pg/L	74.8	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		1320	2000	pg/L	65.8	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		1390	2000	pg/L	69.4	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		1350	2000	pg/L	67.3	(23%-140%)
13C-OCDD		2440	4000	pg/L	61.0	(17%-157%)
13C-2,3,7,8-TCDF		1590	2000	pg/L	79.6	(24%-169%)
13C-1,2,3,7,8-PeCDF		1500	2000	pg/L	74.8	(24%-185%)
13C-2,3,4,7,8-PeCDF		1500	2000	pg/L	75.1	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		1270	2000	pg/L	63.7	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		1300	2000	pg/L	64.8	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		1310	2000	pg/L	65.3	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		1340	2000	pg/L	67.1	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**12028226**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 45631**				
Client ID:	**MB for batch 45631**			**Prep Basis:**	**As Received**
Batch ID:	**45635**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/28/2020 18:22**	**Analyst:**	**CLP**	**Instrument:**	**HRP750**
Data File:	**A28DEC20D-4**			**Dilution:**	**1**
Prep Batch:	**45631**	**Prep Method:**	**SW846 3520C**		
Prep Date:	**17-DEC-20**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		1270	2000	pg/L	63.3	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		1200	2000	pg/L	60.1	(26%-138%)
37Cl-2,3,7,8-TCDD		164	200	pg/L	82.0	(35%-197%)

Comments:

J Value is estimated

K Estimated Maximum Possible Concentration

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**12028227**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 45631**				
Client ID:	**LCS for batch 45631**			**Prep Basis:**	**As Received**
Batch ID:	**45635**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/28/2020 16:45**	**Analyst:**	**CLP**	**Instrument:**	**HRP750**
Data File:	**A28DEC20D-2**			**Dilution:**	**1**
Prep Batch:	**45631**	**Prep Method:**	**SW846 3520C**		
Prep Date:	**17-DEC-20**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		174	pg/L	2.50	10.0
40321-76-4	1,2,3,7,8-PeCDD		968	pg/L	3.90	50.0
39227-28-6	1,2,3,4,7,8-HxCDD		941	pg/L	7.26	50.0
57653-85-7	1,2,3,6,7,8-HxCDD		959	pg/L	6.76	50.0
19408-74-3	1,2,3,7,8,9-HxCDD		963	pg/L	7.08	50.0
35822-46-9	1,2,3,4,6,7,8-HpCDD		932	pg/L	9.50	50.0
3268-87-9	1,2,3,4,6,7,8,9-OCDD		1780	pg/L	19.7	100
51207-31-9	2,3,7,8-TCDF		172	pg/L	2.62	10.0
57117-41-6	1,2,3,7,8-PeCDF		926	pg/L	3.98	50.0
57117-31-4	2,3,4,7,8-PeCDF		962	pg/L	3.90	50.0
70648-26-9	1,2,3,4,7,8-HxCDF		915	pg/L	7.60	50.0
57117-44-9	1,2,3,6,7,8-HxCDF		943	pg/L	7.84	50.0
60851-34-5	2,3,4,6,7,8-HxCDF		915	pg/L	8.02	50.0
72918-21-9	1,2,3,7,8,9-HxCDF		912	pg/L	11.6	50.0
67562-39-4	1,2,3,4,6,7,8-HpCDF		893	pg/L	8.48	50.0
55673-89-7	1,2,3,4,7,8,9-HpCDF		911	pg/L	13.7	50.0
39001-02-0	1,2,3,4,6,7,8,9-OCDF		1660	pg/L	12.6	100

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1500	2000	pg/L	74.9	(20%-175%)
13C-1,2,3,7,8-PeCDD		1440	2000	pg/L	71.9	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		1250	2000	pg/L	62.3	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		1310	2000	pg/L	65.5	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		1280	2000	pg/L	64.0	(22%-166%)
13C-OCDD		2630	4000	pg/L	65.7	(13%-199%)
13C-2,3,7,8-TCDF		1430	2000	pg/L	71.3	(22%-152%)
13C-1,2,3,7,8-PeCDF		1390	2000	pg/L	69.6	(21%-192%)
13C-2,3,4,7,8-PeCDF		1370	2000	pg/L	68.4	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		1230	2000	pg/L	61.5	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		1220	2000	pg/L	60.8	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		1240	2000	pg/L	61.9	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		1270	2000	pg/L	63.3	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		1170	2000	pg/L	58.4	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		1180	2000	pg/L	58.8	(20%-186%)
37Cl-2,3,7,8-TCDD		158	200	pg/L	78.8	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A0L0214**	**Client:**	**APEX001**	**Project:**	**APEX00320**
Lab Sample ID:	**12028228**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 45631**				
Client ID:	**LCSD for batch 45631**			**Prep Basis:**	**As Received**
Batch ID:	**45635**	**Method:**	**EPA Method 1613B**		
Run Date:	**12/28/2020 17:34**	**Analyst:**	**CLP**	**Instrument:**	**HRP750**
Data File:	**A28DEC20D-3**			**Dilution:**	**1**
Prep Batch:	**45631**	**Prep Method:**	**SW846 3520C**		
Prep Date:	**17-DEC-20**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		177	pg/L	1.59	10.0
40321-76-4	1,2,3,7,8-PeCDD		966	pg/L	2.22	50.0
39227-28-6	1,2,3,4,7,8-HxCDD		946	pg/L	5.32	50.0
57653-85-7	1,2,3,6,7,8-HxCDD		966	pg/L	5.06	50.0
19408-74-3	1,2,3,7,8,9-HxCDD		956	pg/L	5.26	50.0
35822-46-9	1,2,3,4,6,7,8-HpCDD		932	pg/L	9.10	50.0
3268-87-9	1,2,3,4,6,7,8,9-OCDD		1780	pg/L	18.9	100
51207-31-9	2,3,7,8-TCDF		175	pg/L	1.85	10.0
57117-41-6	1,2,3,7,8-PeCDF		922	pg/L	3.52	50.0
57117-31-4	2,3,4,7,8-PeCDF		969	pg/L	3.26	50.0
70648-26-9	1,2,3,4,7,8-HxCDF		906	pg/L	5.98	50.0
57117-44-9	1,2,3,6,7,8-HxCDF		944	pg/L	5.92	50.0
60851-34-5	2,3,4,6,7,8-HxCDF		901	pg/L	6.16	50.0
72918-21-9	1,2,3,7,8,9-HxCDF		926	pg/L	9.04	50.0
67562-39-4	1,2,3,4,6,7,8-HpCDF		871	pg/L	6.40	50.0
55673-89-7	1,2,3,4,7,8,9-HpCDF		904	pg/L	10.1	50.0
39001-02-0	1,2,3,4,6,7,8,9-OCDF		1670	pg/L	13.3	100

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1740	2000	pg/L	87.1	(20%-175%)
13C-1,2,3,7,8-PeCDD		1720	2000	pg/L	86.1	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		1490	2000	pg/L	74.4	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		1550	2000	pg/L	77.4	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		1470	2000	pg/L	73.3	(22%-166%)
13C-OCDD		3070	4000	pg/L	76.9	(13%-199%)
13C-2,3,7,8-TCDF		1710	2000	pg/L	85.4	(22%-152%)
13C-1,2,3,7,8-PeCDF		1700	2000	pg/L	84.9	(21%-192%)
13C-2,3,4,7,8-PeCDF		1680	2000	pg/L	84.2	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		1470	2000	pg/L	73.3	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		1460	2000	pg/L	72.9	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		1450	2000	pg/L	72.7	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		1440	2000	pg/L	72.0	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		1330	2000	pg/L	66.4	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		1380	2000	pg/L	69.1	(20%-186%)
37Cl-2,3,7,8-TCDD		166	200	pg/L	83.2	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

APPENDIX B

DATA VALIDATION MEMORANDUM

DATA QUALITY ASSURANCE/QUALITY CONTROL REVIEW

PROJECT NO. 9003.01.56 | JANUARY 11, 2021 | PORT OF RIDGEFIELD

Maul Foster & Alongi, Inc., conducted an independent review of the quality of analytical results for sediment monitoring samples collected in Lake River, located offshore of the former Pacific Wood Treating Co. site in Ridgefield, Washington. The samples were collected on December 3 and 4, 2020.

Apex Laboratories, LLC (Apex) and Cape Fear Analytical, LLC (CF) performed the analyses. Apex report A0L0214 and CF report WO17497 were reviewed; CF report WO17497 was appended to report A0L0214. The samples were collected using incremental sampling methodology (ISM) and were first processed at Apex. Apex analyzed the prepared samples for total organic carbon (TOC) by Puget Sound Estuary Program (PSEP)–recommended Standard Methods for the Examination of Water and Wastewater Method 5310B modified, after which the samples were submitted to CF for analysis of chlorinated dibenzo-p-dioxins and dibenzofurans (dioxins/furans) by U.S. Environmental Protection Agency (EPA) Method 1613B. An equipment rinsate blank was also submitted to Apex for SM 5310C TOC analysis and to CF for EPA Method 1613B analysis. The following samples were analyzed.

Samples Analyzed
Report A0L0214/WO17497
ISM-A-20201203
ISM-B-20201204
ISM-C-20201204
Rinsate Blank

DATA QUALIFICATIONS

Analytical results were evaluated according to applicable sections of EPA procedures (EPA, 2016, 2017) and appropriate laboratory and method-specific guidelines (Apex, 2019; CF, 2020; EPA, 1986).

EPA Method 1613B dioxin/furan results that had been reported as estimated maximum potential concentrations (EMPCs) were qualified by the reviewer with "U," as non-detect at the reported value.

EPA Method 1613B results reported by CF as EMPCs that were also associated with method blank detections requiring qualification are discussed in the method blank section of this validation report and are not discussed in the EMPC qualification tables below.

EPA Method 1613B total homolog results flagged as EMPCs by the laboratory were qualified by the reviewer with "UJ," as non-detect with an estimated detection limit (EDL), at the

reported concentration when all associated congeners were reported by the laboratory either as EMPCs or non-detect. However, when one or more associated congener was reported as a detection without an EMPC qualifier, the total homolog result was qualified by the reviewer with "J," as estimated. EPA Method 1613B EMPC results were qualified by the reviewer as follows:

Report	Sample	Component	Original Result (pg/g)	Qualified Result (pg/g)
WO17497	ISM-A-20201203	2,3,7,8-TCDF	0.232 JK	0.232 UJ
		Total TCDF	1.09 JK	1.09 UJ
		Total PeCDF	3.67 JK	3.67 J
		Total HxCDF	12.1 JK	12.1 J
	ISM-B-20201204	2,3,7,8-TCDF	0.298 JK	0.298 UJ
		Total HxCDD	11.1 JK	11.1 J
		Total PeCDF	4.29 JK	4.29 J
		Total HxCDF	18.7 JK	18.7 J
	ISM-C-20201204	2,3,7,8-TCDF	0.285 JK	0.285 UJ
		Total PeCDD	2.07 JK	2.07 UJ
		Total HxCDD	14.6 JK	14.6 J
		Total TCDF	1.00 JK	1.00 UJ
		Total PeCDF	5.27 JK	5.27 J

NOTES:
J = result is estimated value.
JK = result is an estimated value and an estimated maximum potential concentration.
pg/g = picograms per gram.
UJ = result is non-detect with an estimated detection limit.

Data validation procedures were modified, as appropriate, to accommodate quality-control requirements for methods not specifically addressed by the EPA procedures (e.g., PSEP/SM 5310B).

The data are considered acceptable for their intended use, with the appropriate data qualifiers assigned.

HOLDING TIMES, PRESERVATION, AND SAMPLE STORAGE

Holding Times

Extractions and analyses were performed within the recommended holding time criteria.

Preservation and Sample Storage

The samples were preserved and stored appropriately.

BLANKS

Method Blanks

Laboratory method blank analyses were performed at the required frequencies. For purposes of data qualification, laboratory method blanks were associated with all samples prepared in an analytical batch. Where an analyte was detected in a sample and in the associated method blank, the sample result was qualified if the concentration was less than five times the method blank concentration.

According to report WO17497, the EPA Method 1613B batch 45600 method blank had several dioxin/furan congener and homolog detections between the EDL and the method reporting limit (MRL). CF also flagged some method blank detections as EMPCs. Associated sample results less than five times the method blank concentrations have been qualified as follows:

Report	Sample	Component	Method Blank Result (pg/g)	Original Result (pg/g)	Qualified Result (pg/g)
WO17497	ISM-A-20201203	1,2,3,7,8-PeCDD	0.112 J	0.275 J	0.275 UJ
		1,2,3,4,7,8-HxCDD	0.232 J	0.385 J	0.385 UJ
		1,2,3,7,8,9-HxCDD	0.246 JK	0.762 J	0.762 UJ
		2,3,4,7,8-PeCDF	0.152 JK	0.381 JK	0.381 UJ
		1,2,3,4,7,8-HxCDF	0.344 JK	0.685 J	0.685 UJ
		1,2,3,6,7,8-HxCDF	0.208 J	0.368 JK	0.368 UJ
		2,3,4,6,7,8-HxCDF	0.222 J	0.540 J	0.540 UJ
		1,2,3,7,8,9-HxCDF	0.262 JK	0.392 J	0.392 UJ
		1,2,3,4,7,8,9-HpCDF	0.294 J	0.627 J	0.627 UJ
	ISM-B-20201204	1,2,3,4,7,8-HxCDD	0.232 J	0.369 J	0.369 UJ
		1,2,3,7,8,9-HxCDD	0.246 JK	0.868 J	0.868 UJ
		2,3,4,7,8-PeCDF	0.152 JK	0.497 JK	0.497 UJ
		1,2,3,4,7,8-HxCDF	0.344 JK	1.03 J	1.03 UJ
		1,2,3,6,7,8-HxCDF	0.208 J	0.532 J	0.532 UJ
		2,3,4,6,7,8-HxCDF	0.222 J	0.572 JK	0.572 UJ
		1,2,3,7,8,9-HxCDF	0.262 JK	0.550 J	0.550 UJ
		1,2,3,4,7,8,9-HpCDF	0.294 J	0.646 J	0.646 UJ
		Total TCDF	0.154 J	0.738 JK	0.738 UJ

Report	Sample	Component	Method Blank Result (pg/g)	Original Result (pg/g)	Qualified Result (pg/g)
	ISM-C-20201204	1,2,3,7,8-PeCDD	0.112 J	0.287 JK	0.287 UJ
		1,2,3,4,7,8-HxCDD	0.232 J	0.459 J	0.459 UJ
		1,2,3,7,8,9-HxCDD	0.246 JK	1.01 J	1.01 UJ
		2,3,4,7,8-PeCDF	0.152 JK	0.491 J	0.491 UJ
		1,2,3,4,7,8-HxCDF	0.344 JK	1.11 J	1.11 UJ
		1,2,3,6,7,8-HxCDF	0.208 J	0.521 J	0.521 UJ
		2,3,4,6,7,8-HxCDF	0.222 J	0.661 J	0.661 UJ
		1,2,3,7,8,9-HxCDF	0.262 JK	0.509 J	0.509 UJ
		1,2,3,4,7,8,9-HpCDF	0.294 J	0.686 J	0.686 UJ

NOTES:
J = result is estimated.
JK = result is estimated and is an estimated maximum potential concentration.
pg/g = picograms per gram.
UJ = result is non-detect with an estimated detection limit.

According to report WO17497, the EPA Method 1613B batch 45631 method blank had a detection of 1,2,3,4,6,7,8,9-OCDD between the EDL and the MRL. The associated sample result was non-detect; thus, qualification was not required.

Trip Blanks

Trip blanks were not required for this sampling event.

Equipment Rinsate Blanks

An equipment rinsate blank (Rinsate Blank) was submitted for SM 5310C and EPA Method 1613B analysis. The equipment rinsate blank was non-detect to the MRL for SM 5310C and non-detect to EDLs for all EPA Method 1613B analytes.

LABELED ANALOG STANDARD RECOVERY RESULTS

All EPA Method 1613B samples were spiked with C13-labeled analog standards (surrogates) to evaluate and document data recovery. All surrogate recoveries were within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

Matrix spike/matrix spike duplicate (MS/MSD) results are used to evaluate laboratory precision and accuracy. All MS samples were extracted and analyzed at the required frequency. MSD results were not reported.

According to report A0L0214, the SM 5310C batch 0120274 MS exceeded the upper percent recovery acceptance limit of 114 percent for TOC, at 116 percent. The MS was prepared with

a sample from an unrelated project, and the associated sample was non-detect; thus, qualification was not required.

LABORATORY DUPLICATE RESULTS

Duplicate results are used to evaluate laboratory precision. All duplicate samples were extracted and analyzed at the required frequency. Laboratory duplicate results within five times the MRL were not evaluated for precision. All laboratory duplicate relative percent differences (RPDs) were within acceptance limits.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RESULTS

A laboratory control sample/laboratory control sample duplicate (LCS/LCSD) is spiked with target analytes to provide information on laboratory precision and accuracy. The LCS/LCSD samples were extracted and analyzed at the required frequency. All LCS/LCSD results were within acceptance limits for percent recovery and RPD.

ISM REPLICATE EVALUATION

Triplicate ISM samples were collected and submitted to Apex and CF for TOC and dioxin/furan analysis, respectively (ISM-A-20201203, ISM-B-20201204, and ISM-C-20201204). The relative standard deviations (RSDs) of dioxin/furan and TOC results were calculated when all three results were detected. RSDs were not calculated when results were non-detect or qualified as U because of EMPCs. When RSDs exceeded 35 percent, ISM replicate results were qualified with J as estimated.

RSDs were 20 percent for TOC and ranged from 6.5 percent to 22.5 percent for detected dioxin/furan congeners and homologs. No qualification was required.

CONTINUING CALIBRATION VERIFICATION RESULTS

Continuing calibration verification (CCV) results are used to demonstrate instrument precision and accuracy through the end of the sample batch. Apex and CF did not report CCV results.

REPORTING LIMITS

CF and Apex used routine MRLs and EDLs for non-detect results. MRLs and EDLs were adjusted for samples requiring dilutions because of high analyte concentrations, matrix interferences, or ratio criteria exceedances (resulting in EMPCs).

DATA PACKAGE

The data packages were reviewed for transcription errors, omissions, and anomalies.

All ISM sample names reported by Apex were appended with "--After Processing" to indicate ISM sample processing, or with "--As Received" to indicate the original unprocessed sample. For brevity, samples are referenced in this validation memorandum by the original sample name.

Apex indicated in the report A0L0214 cooler receipt form that sample collection date and time were not recorded on sample containers and that the sample names recorded on the sample containers did not match the names recorded on the chain of custody. The reviewer confirmed that sample "ISMA" was matched to "ISM-A-20201203," "ISMB" was matched to "ISM-B-20201204," "ISMC" was matched to "ISM-C-20201204," and "Rinsate" was matched to "Rinsate Blank."

No additional issues were found.

REFERENCES

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EPA. 2016. EPA contract laboratory program, national functional guidelines for high resolution Superfund methods data review. EPA 542-B-16-001. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. April.

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