LAKE RIVER 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 plan were prepared under the supervision and direction of the undersigned.

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ACRONYMS AND ABBREVIATIONS

Apex	Apex Laboratories
bml	below mudline
CAP	cleanup action plan
cm	centimeter(s)
COC	chain of custody
CUL	cleanup level
dioxins	polychlorinated dibenzo-p-dioxins and furans
Ecology	Washington State Department of Ecology
ISM	incremental sampling methodology
MFA	Maul Foster & Alongi, Inc.
ng/kg	nanograms per kilogram
the Port	Port of Ridgefield
PSEP	Puget Sound Estuary Program
PWT	Pacific Wood Treating Co.
QA/QC	quality assurance and quality control
REL	remediation level
SAP	sampling and analysis plan
TEQ	toxicity equivalent
USEPA	U.S. Environmental Protection Agency

1 INTRODUCTION

On behalf of the Port of Ridgefield (the Port), Maul Foster & Alongi, Inc. (MFA) has prepared this report to summarize Lake River post-remedy sediment monitoring results. Lake River is located offshore of the former Pacific Wood Treating Co. (PWT) site in Ridgefield, Washington (see Figure 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 remedial action for the Lake River portion of the former PWT site consisted of mechanical dredging and placement of an enhanced natural recovery sand layer and is described in the cleanup action plan (CAP) (Washington State Department of Ecology [Ecology], 2013). The remedy includes monitoring in Year 0 (2015 baseline sampling) to assess the efficacy of the remedial action and quantify the reduction in concentrations relative to the cleanup level (CUL) (Ecology, 2013).

This report provides the results of the Year 0 baseline environmental monitoring for Lake River, including sample 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, 2015). The SAP was developed to be generally consistent with current Puget Sound Estuary Program (PSEP) and U.S. Environmental Protection Agency (USEPA) protocols for sampling and analysis (PSEP, 1986, 1997a,b; USEPA, 1993) and standard USEPA methods based on USEPA test methods for evaluating solid waste, physical/chemical methods (also known as SW-846) requirements, as amended (USEPA, 1986). Sampling activities were consistent with guidance provided in Ecology's Sediment Cleanup Users Manual II (Ecology, 2015).

1.1 Background

The CAP identifies a remediation level (REL) and a CUL 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 (30 nanograms per kilogram [ng/kg] dioxin toxicity equivalent [TEQ]) were dredged and treated with a clean sand layer, whereas areas above the CUL (5 ng/kg dioxin TEQ), but below the REL, were treated with clean sand (see Figure 2). As specified in the CAP, the baseline monitoring described in this report assesses cleanup effectiveness, i.e., the reductions in dioxin TEQ concentrations relative to the CUL of 5 ng/kg dioxin TEQ. Monitoring efforts will be conducted in Years 2 (2017), 5 (2020), and 10 (2025) to quantify concentration trends over time (MFA, 2015).

2 SITE CONDITIONS

Lake River is a slow, flat slough of the Columbia River, hydraulically connected through a tide gate/flushing structure along the western shoreline of Vancouver Lake. 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 comprises 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. Subsurface sediment in Lake River varies. Generally, in the nearshore slope areas, the sediment is characterized as a fine sandy silt to a depth of approximately 5 feet below mudline (bml) that transitions to a fine to medium sand. Subsurface sediment in the channel areas of Lake River is generally very fine sandy silt from the length of the core up 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 SAMPLE PROGRAM

The incremental sampling methodology (ISM) was used to characterize the average concentration of dioxins in sediments. ISM characterizes the average concentration of contaminants in a predefined area termed a decision unit. Samples (called increments) were collected from multiple locations in a decision unit under evaluation. The increments were combined into one sample (called an ISM sample) and analyzed to obtain a representative average contaminant concentration for the entire decision unit. Replicates were collected to define variability due to sampling error or spatial heterogeneity. ISM obtains 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 decision unit sampled extends from the surface to 10 centimeters (cm) bml and is shown in Figure 3. Triplicate samples (ISM samples "A," "B," and "C") consisting of 30 increments each were collected to assess sample variability.

3.2 Sampling Methods

MFA conducted sediment sampling on June 20, 21, and 22, 2015. Figure 3 and Table 1 show and summarize sample stations, respectively. Sampling methods are described below.

Sediment increments were collected by a 1-inch-diameter, thin-walled, stainless steel sampling tube. The sampling tube was manually advanced to a depth greater than 10 cm. The sampling tube was withdrawn and the increment extruded, using a plunger, onto a clean work surface. The increment was measured and trimmed to 10 cm, and 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 3 kilograms per ISM sample, was collected to provide the overall mass required by the analytical laboratory.

A small vessel used a differential global positioning system to navigate to the locations shown on Figure 3. Locations were determined to an accuracy of ±3 meters. Horizontal coordinates were referenced to the Washington South State Plane HARN (NAD83). See Appendix A for photographs of sampling procedures and representative samples collected.

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 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., hand augers, incremental sampling equipment) used disposable, single-use paper towels that were 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.

An equipment rinsate blank collected from reusable equipment coming into direct contact with sediment samples (e.g., bowls and spoons) was submitted for analysis by the same methods used for the collected ISM samples.

Triplicate ISM samples were collected across the decision unit. To assess field variability, replicates were processed and analyzed consistent with the methods used for the primary sample.

3.4 Sample Transport

Samples for ISM processing and total organic carbon analysis were submitted to the Ecology-approved Apex Laboratories (Apex) of Tigard, Oregon. Following ISM processing, Apex submitted sample aliquots to the Ecology-approved Maxxam Laboratories of Mississauga, Ontario, for dioxin analysis. COC documentation was prepared at the time of sampling and was maintained throughout the sample handling and testing process; it is included in the laboratory analytical reports (see Appendix B).

3.5 Laboratory Chemical Sample Processing and Analysis

Prior to analysis, Apex processed the ISM samples, using SAP-identified ISM processing procedures. As part of the ISM processing, 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:

- Total organic carbon by PSEP/SM 5310B Modified
- Dioxins by USEPA Method 1613B

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

3.6 Data Reduction, Validation, and Reporting

The laboratory data produced were independently reviewed by MFA for data quality (see Appendix C). Analytical results were evaluated according to applicable sections of USEPA procedures (USEPA, 2010, 2014) and appropriate laboratory and method-specific guidelines (Apex, 2013; Maxxam, 2013; USEPA, 1986), and are reported consistent with recent dioxin data treatment guidance (Ecology, 2015). ISM sample replicates and a rinsate blank were assessed as part of the data validation. Rinsate blank results are provided in Appendix C. 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 and electronic formats.

4 RESULTS

Sediment sample results are provided in Table 2. All ISM dioxin TEQ concentrations are below the CUL of 5 ng/kg (also see Figure 3). Sample A (2.23 ng/kg) was slightly higher than Samples B and C (less than 1 ng/kg), and most dioxin congener results are at or near the estimated detection limits. Before the remedial action, dioxin TEQ concentrations in Lake River were as high as 910 ng/kg, and it was estimated that post-remedy concentrations would range up to 23 ng/kg (MFA, 2015) with an area-wide average concentration of approximately 4.4 ng/kg (MFA, 2013a). Based on the very low concentrations observed and an intensive sampling regime designed to obtain a representative average concentration for the remedy area, it is clear that a significant reduction due to dioxin mass removal and clean sand placement has been achieved. Sand placed is expected to continue to mix with the native underlying silt over time (i.e., via bioturbation or anthropogenic events), and upstream sediments will likely deposit in the remedy area. Some mixing due to remedy construction activities (e.g., barge drafting) likely has already occurred. Future monitoring events will assess whether and how these processes affect dioxin TEQ concentrations in the remedy area over time.

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 1
Sediment Sample Coordinates
Former PWT Site
Ridgefield, Washington

ID	Group	X Coordinates	Y Coordinates	Date Collected	Comments
0	A	1066581.599	184464.1236	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
1	A	1066678.216	184464.1236	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
2	A	1066533.29	184547.7963	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
3	A	1066484.982	184631.469	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
4	A	1066436.674	184715.1417	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
5	A	1066533.29	184715.1417	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
6	A	1066388.365	184798.8145	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
7	A	1066484.982	184798.8145	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
8	A	1066436.674	184882.4872	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
9	A	1066388.365	184966.1599	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
10	A	1066340.057	185049.8326	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
11	A	1066291.748	185133.5054	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
12	A	1066243.44	185217.1781	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
13	A	1066195.131	185300.8508	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
14	A	1066146.823	185384.5235	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
15	A	1066098.514	185468.1962	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
16	A	1066050.206	185551.869	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
17	A	1066146.823	185551.869	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
18	A	1066001.897	185635.5417	04/20/2015	Dark brownish-gray sand with trace dark brown silt, fine to coarse, no debris.
19	A	1066098.514	185635.5417	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
20	A	1065953.589	185719.2144	04/20/2015	Dark brownish-gray sand with trace dark brown silt, fine to coarse, no debris.
21	A	1065905.28	185802.8871	04/20/2015	Dark brownish-gray sand with trace dark brown silt, fine to coarse, no debris.
22	A	1065856.972	185886.5599	04/20/2015	Dark brownish-gray sand with trace dark brown silt, fine to coarse, no debris.
23	A	1065953.589	185886.5599	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
24	A	1065808.663	185970.2326	04/20/2015	Dark brownish-gray sand with trace dark brown silt, fine to coarse, no debris.
25	A	1065905.28	185970.2326	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
26	A	1065856.972	186053.9053	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
27	A	1065808.663	186137.578	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
28	A	1065808.663	186304.9235	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.

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Former PWT Site
Ridgefield, Washington

ID	Group	X Coordinates	Y Coordinates	Date Collected	Comments
29	A	1065856.972	186388.5962	04/20/2015	Dark brownish-gray sand, fine to coarse, no debris.
30	C	1066626.713	184448.3438	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
31	C	1066481.788	184532.0165	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
32	C	1066578.405	184532.0165	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
33	C	1066530.096	184615.6893	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
34	C	1066481.788	184699.362	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
35	C	1066433.479	184783.0347	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
36	C	1066385.171	184866.7074	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
37	C	1066481.788	184866.7074	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
38	C	1066336.862	184950.3802	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
39	C	1066433.479	184950.3802	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
40	C	1066385.171	185034.0529	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
41	C	1066336.862	185117.7256	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
42	C	1066288.554	185201.3983	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
43	C	1066240.245	185285.0711	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
44	C	1066191.937	185368.7438	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
45	C	1066047.012	185452.4165	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
46	C	1066143.628	185452.4165	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
47	C	1065998.703	185536.0892	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
48	C	1066095.32	185536.0892	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
49	C	1066047.012	185619.762	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
50	C	1065998.703	185703.4347	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
51	C	1065950.395	185787.1074	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
52	C	1065902.086	185870.7801	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
53	C	1065853.778	185954.4528	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
54	C	1065805.469	186038.1256	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
55	C	1065902.086	186038.1256	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
56	C	1065853.778	186121.7983	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
57	C	1065805.469	186205.471	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.

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Sediment Sample Coordinates
Former PWT Site
Ridgefield, Washington

ID	Group	X Coordinates	Y Coordinates	Date Collected	Comments
58	C	1065853.778	186289.1437	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
59	C	1065805.469	186372.8165	04/22/2015	Dark brownish-gray sand, fine to coarse, no debris.
60	B	1066528.528	184496.9058	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
61	B	1066625.145	184496.9058	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
62	B	1066480.219	184580.5785	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
63	B	1066528.528	184664.2512	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
64	B	1066480.219	184747.9239	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
65	B	1066431.911	184831.5967	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
66	B	1066383.602	184915.2694	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
67	B	1066335.294	184998.9421	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
68	B	1066286.985	185082.6148	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
69	B	1066238.677	185166.2876	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
70	B	1066190.368	185249.9603	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
71	B	1066286.985	185249.9603	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
72	B	1066142.06	185333.633	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
73	B	1066238.677	185333.633	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
74	B	1066093.751	185417.3057	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
75	B	1066190.368	185417.3057	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
76	B	1066045.443	185500.9784	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
77	B	1066142.06	185500.9784	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
78	B	1066093.751	185584.6512	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
79	B	1066045.443	185668.3239	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
80	B	1065997.134	185751.9966	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
81	B	1065948.826	185835.6693	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
82	B	1065900.518	185919.3421	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
83	B	1065852.209	186003.0148	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
84	B	1065803.901	186086.6875	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
85	B	1065900.518	186086.6875	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
86	B	1065852.209	186170.3602	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.

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Sediment Sample Coordinates
Former PWT Site
Ridgefield, Washington

ID	Group	X Coordinates	Y Coordinates	Date Collected	Comments
87	B	1065803.901	186254.033	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
88	B	1065852.209	186337.7057	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.
89	B	1066670.258	184431.4603	04/21/2015	Dark brownish-gray sand, fine to coarse, no debris.

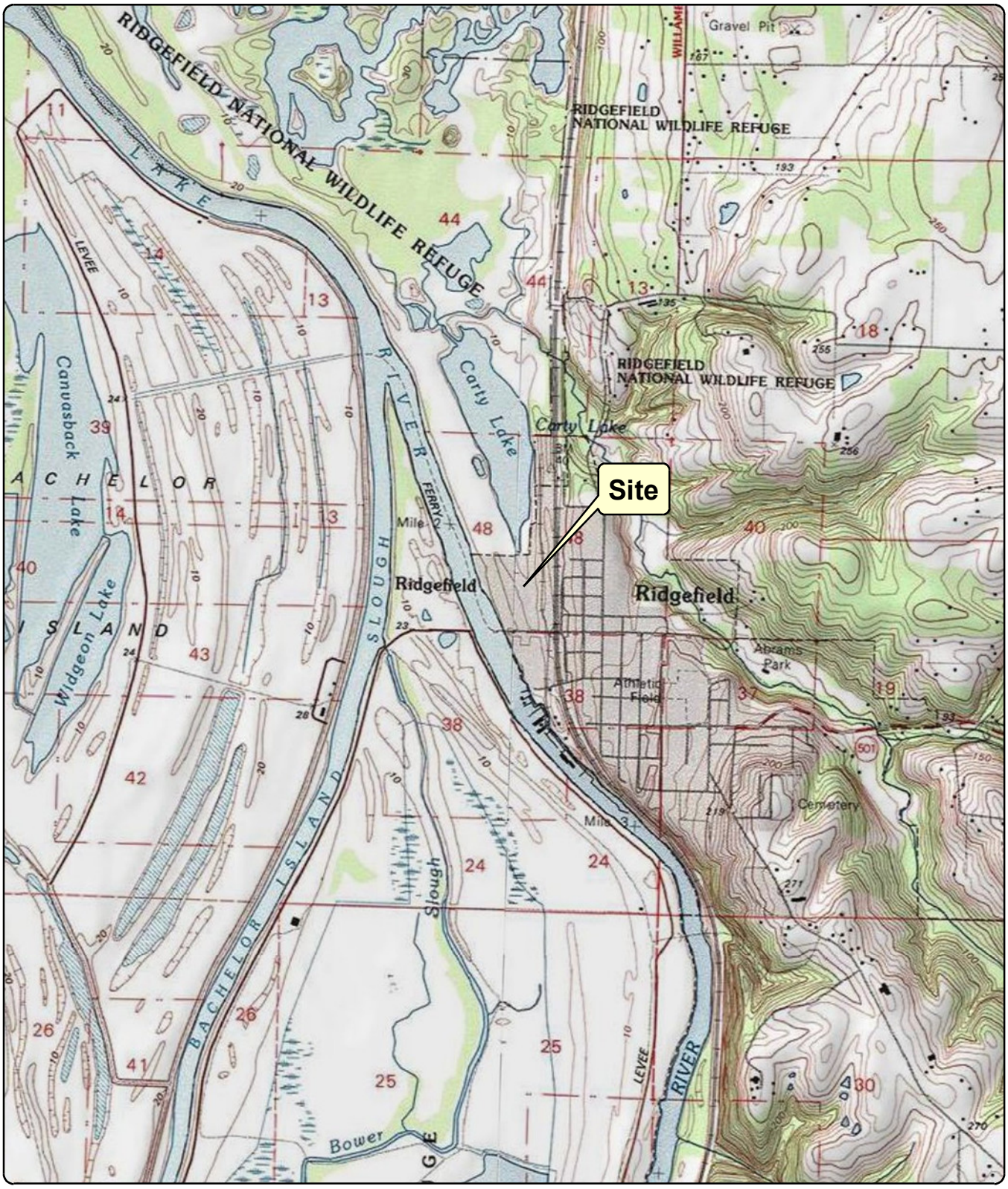
Table 2
Sediment Sample Results
Former PWT Site
Ridgefield, Washington

	Location	ISM Sample A	ISM Sample B	ISM Sample C
	Sample ID	ISM-A-150240	ISM-B-150421	ISM-C-150422
	Date Collected	04/20/2015	04/21/2015	04/22/2015
	Sample Type	ISM	ISM	ISM
	Start Depth (cm bml)	0	0	0
	End Depth (cm bml)	10	10	10
	Cleanup Level			
Dioxins and Furans (ng/kg)				
1,2,3,4,6,7,8-HpCDD	--	30.3	9.9	6.23
1,2,3,4,6,7,8-HpCDF	--	4.03	1.65	0.969 U
1,2,3,4,7,8,9-HpCDF	--	0.806 J	0.276 J	0.291 J
1,2,3,4,7,8-HxCDD	--	0.77 J	0.216 J	0.282 J
1,2,3,4,7,8-HxCDF	--	1.15	0.278 U	0.345 J
1,2,3,6,7,8-HxCDD	--	2.08	0.546 J	0.527 J
1,2,3,6,7,8-HxCDF	--	0.884 J	0.251 J	0.267 J
1,2,3,7,8,9-HxCDD	--	1.2	0.316 J	0.331 J
1,2,3,7,8,9-HxCDF	--	0.675 J	0.238 UJ	0.233 J
1,2,3,7,8-PeCDD	--	0.607 J	0.281 U	0.208 J
1,2,3,7,8-PeCDF	--	0.666 J	0.229 U	0.255 J
2,3,4,6,7,8-HxCDF	--	0.76 J	0.21 UJ	0.2 J
2,3,4,7,8-PeCDF	--	0.585 J	0.222 U	0.241 J
2,3,7,8-TCDD	--	0.218 J	0.117 U	0.166 U
2,3,7,8-TCDF	--	0.216 J	0.169 U	0.143 U
OCDD	--	264	76	53.1
OCDF	--	7.36	2.11	1.81 J
Total HpCDDs	--	54.3	18.1	11.9
Total HpCDFs	--	11.3	4.48	1.84
Total HxCDDs	--	7.75	2.29	2.05
Total HxCDFs	--	9.57	2.54	2.44
Total PeCDDs	--	0.607 J	0.281 U	0.208 J
Total PeCDFs	--	1.74	0.225 U	0.668 J
Total TCDDs	--	0.218	0.117 U	0.166 U
Total TCDFs	--	0.216	0.169 U	0.143 U
Total TEQ Mammals (U=1/2 EDL)	5	2.23	0.555	0.683
Conventionals (mg/kg)				
Total Organic Carbon	--	1200	740	660

Table 2
Sediment Sample Results
Former PWT Site
Ridgefield, Washington

NOTES:
-- = no value.
cm bml = centimeters below mudline.
EDL = estimated detection limit.
ISM = incremental sampling methodology.
J = Associated result is an estimated quantity.
mg/kg = milligrams per kilogram.
ng/kg = nanograms per kilogram.
PWT = Pacific Wood Treating Co.
TEQ = toxicity equivalent quotient.
U = Associated result is less than listed detection limit.

FIGURES



Source: Topographic Quadrangle obtained from ArcGIS Online Services/NGS-USGS TOPO! US 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 Company

Figure 1
Site Location

Former PWT Site
Ridgefield, Washington

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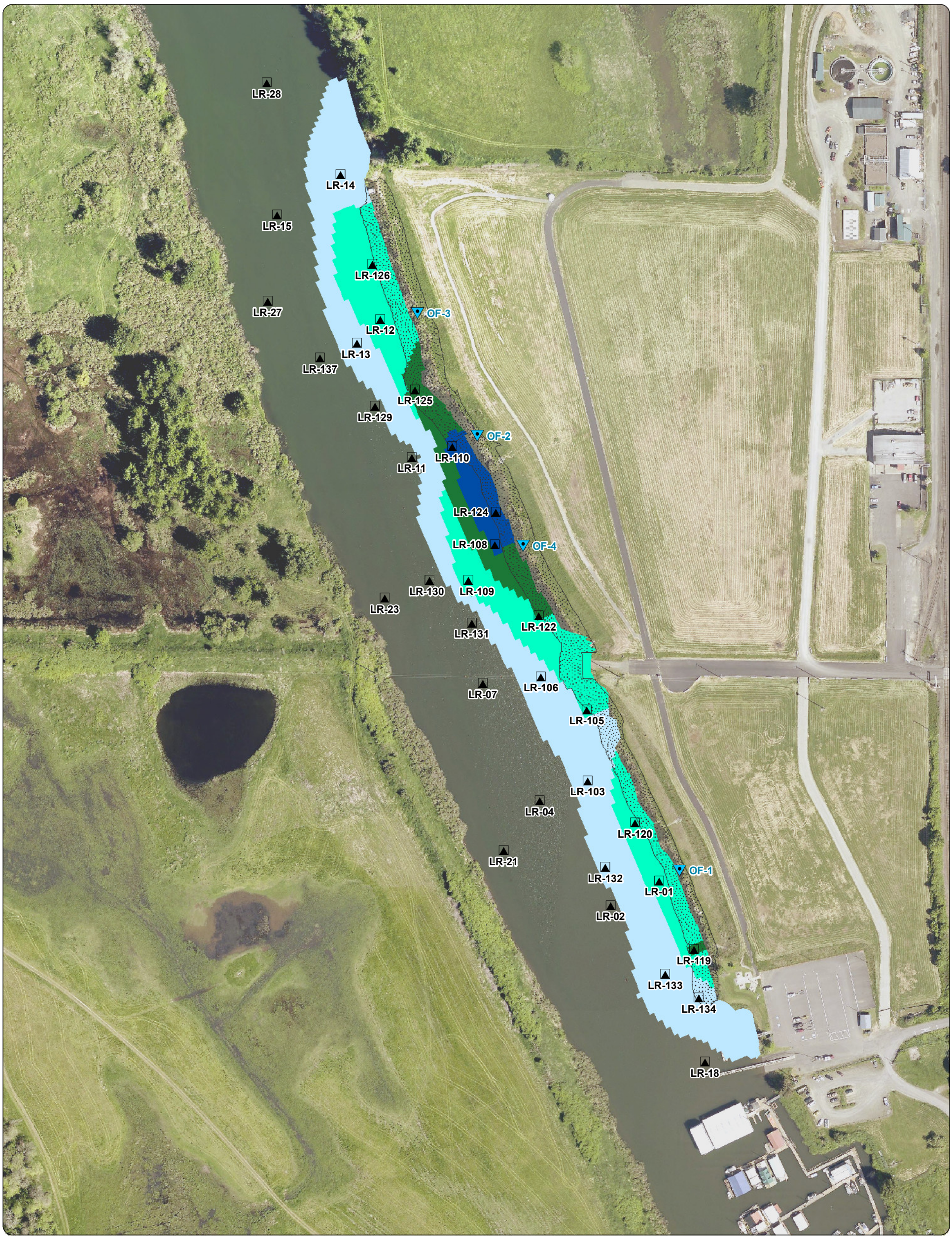
0 1,000 2,000
Feet

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.

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Legend

- Historical Outfall
- Surface Sediment Sample
- Fish Mix

Remedial Action Areas

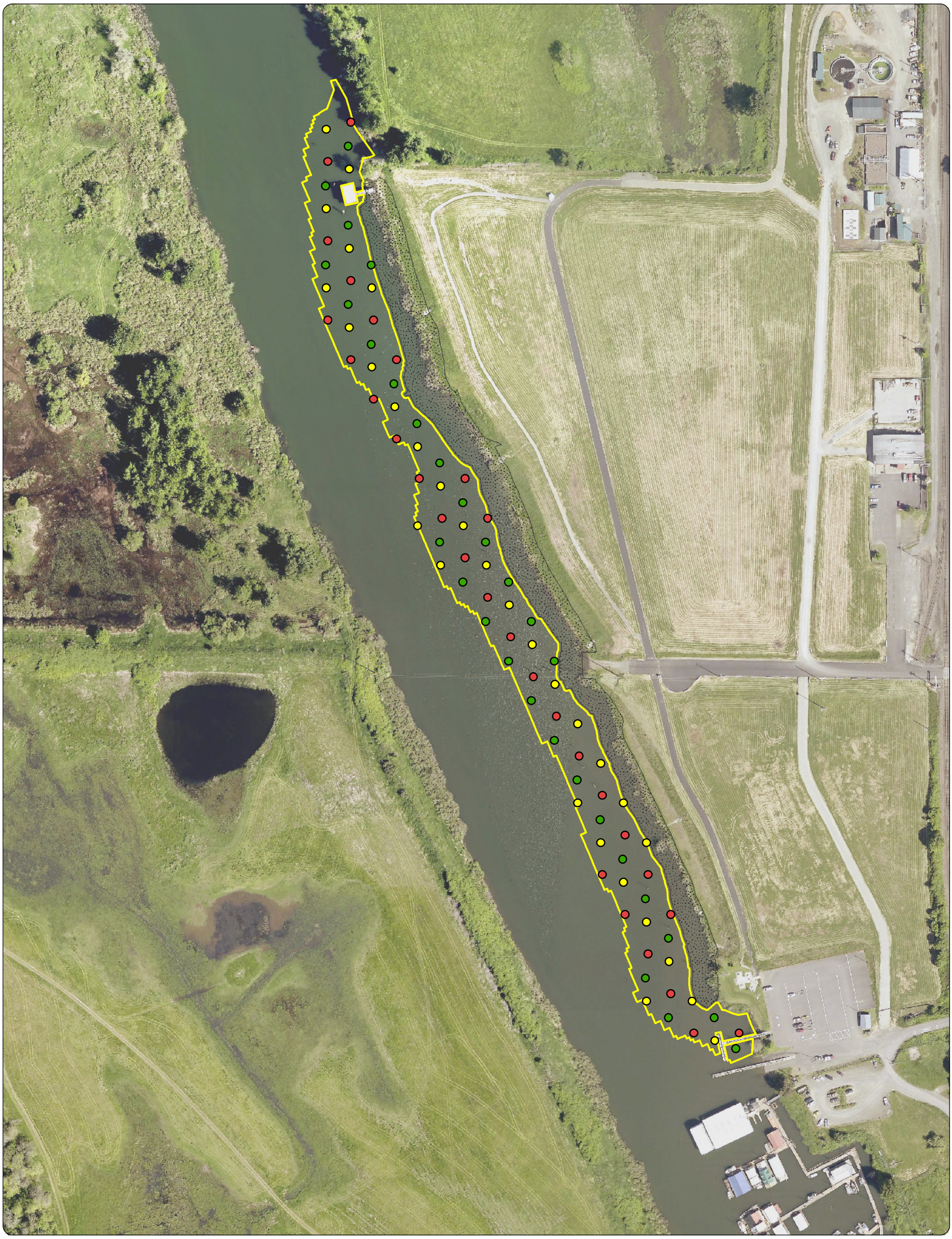
ENR Only | 1-ft Dredge | 2-ft Dredge | 3-ft Dredge

0 100 200
Feet

Figure 2
Lake River Remedy Area

Former PWT Site
Ridgefield, Washington

Path: X:\9003.01 Port of Ridgefield\40\Projects\06\Lake River SAP\Fig2_Lake River Remedy Area.mxd
Print Date: 6/29/2015
Approved By: mnovak
Produced By: rcallihan
Project: 9003.01.40/06



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

Notes:
1. PWT = Pacifc Wood Treating Co.
2. ISM = incremental sampling methodology.
3. Bankward sample locations extent was clipped to the extent of fish mix plus 5 feet riverward.
4. ng/kg = nanograms per kilogram
5. TEQ = toxicity equivalent

Total Dioxin TEQ	
Cleanup Level = 5 ng/kg	
ISM Sample A	2.23 ng/kg
ISM Sample B	0.555 ng/kg
ISM Sample C	0.683 ng/kg

Legend

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

Figure 3
Sample Locations and Results

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\Fig3_Sample Results.mxd
Print Date: 6/18/2015
Approved By: mnovak
Produced By: rcallihan
Project: 9003.01.40/06

APPENDIX A

PHOTO ARRAY

APPENDIX A—PHOTO ARRAY

Project Number: 9003.01.40
Location: 111 West Division Street
Ridgefield, Washington

Photo No. 1
Lake River looking north. April 20, 2015.

Photo No. 2
Sediment coring ISM sample A. April 20, 2015.

APPENDIX A—PHOTO ARRAY

Project Number: 9003.01.40
Location: 111 West Division Street
Ridgefield, Washington

Photo No. 3
Representative core from ISM sample B (1-inch-diameter). April 21, 2015. Top of mudline on right side of sample.

Photo No. 4
Representative core from ISM sample C (1-inch-diameter). April 22, 2015. Top of mudline on left side of sample.

APPENDIX A—PHOTO ARRAY

Project Number: 9003.01.40
Location: 111 West Division Street
Ridgefield, Washington

Photo No. 5
Decision-unit-dedicated
1-gallon sampling jar.
April 22, 2015.

APPENDIX B

ANALYTICAL REPORTS

Apex Labs

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323 Phone
503-718-0333 Fax

Wednesday, May 13, 2015

Madi Novak
Maul Foster & Alongi, INC.
2001 NW 19th Ave, STE 200
Portland, OR 97209

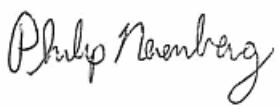
RE: Lake River-Sediment / 9003.01.40

Enclosed are the results of analyses for work order A5D0682, which was received by the laboratory on 4/22/2015 at 3:10:00PM.

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

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.

Apex Laboratories



Philip Nerenberg, Lab Director

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Apex Labs

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323 Phone
503-718-0333 Fax

Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	05/13/15 15:20

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ISM-A-150420-As Received	A5D0682-01	Sediment	04/20/15 16:00	04/22/15 15:10
ISM-A-150420-After ISM	A5D0682-02	Sediment	04/20/15 16:00	04/22/15 15:10
ISM-B-150421-As Received	A5D0682-03	Sediment	04/21/15 12:00	04/22/15 15:10
ISM-B-150421-After ISM	A5D0682-04	Sediment	04/21/15 12:00	04/22/15 15:10
ISM-C-150422-As Received	A5D0682-05	Sediment	04/22/15 12:20	04/22/15 15:10
ISM-C-150422-After ISM	A5D0682-06	Sediment	04/22/15 12:20	04/22/15 15:10

Apex Laboratories

Philip Nerenberg

Philip Nerenberg, Lab Director

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Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	05/13/15 15:20

ANALYTICAL SAMPLE RESULTS

Conventional Chemistry Parameters

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
ISM-A-150420-After ISM (A5D0682-02)			**Matrix: Sediment**					
Batch: 5040846								
Total Organic Carbon	**1200**	---	200	mg/kg	1	05/04/15 17:15	PSEP/SM 5310B MOD	
ISM-B-150421-After ISM (A5D0682-04)			**Matrix: Sediment**					
Batch: 5040846								
Total Organic Carbon	**740**	---	200	mg/kg	1	05/04/15 17:15	PSEP/SM 5310B MOD	
ISM-C-150422-After ISM (A5D0682-06)			**Matrix: Sediment**					
Batch: 5040846								
Total Organic Carbon	**660**	---	200	mg/kg	1	05/04/15 17:15	PSEP/SM 5310B MOD	

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Philip Nerenberg

Philip Nerenberg, Lab Director

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Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	05/13/15 15:20

ANALYTICAL SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
ISM-A-150420-As Received (A5D0682-01)			**Matrix: Sediment**		**Batch: 5040681**			
% Solids	**75.9**	---	1.00	% by Weight	1	04/27/15 09:44	EPA 8000C	Q-38
ISM-A-150420-After ISM (A5D0682-02)			**Matrix: Sediment**		**Batch: 5040757**			
% Solids	**99.5**	---	1.00	% by Weight	1	04/29/15 08:58	EPA 8000C	
ISM-B-150421-As Received (A5D0682-03)			**Matrix: Sediment**		**Batch: 5040681**			
% Solids	**76.5**	---	1.00	% by Weight	1	04/27/15 09:44	EPA 8000C	Q-38
ISM-B-150421-After ISM (A5D0682-04)			**Matrix: Sediment**		**Batch: 5040757**			
% Solids	**99.5**	---	1.00	% by Weight	1	04/29/15 08:58	EPA 8000C	
ISM-C-150422-As Received (A5D0682-05)			**Matrix: Sediment**		**Batch: 5040681**			
% Solids	**77.0**	---	1.00	% by Weight	1	04/27/15 09:44	EPA 8000C	Q-38
ISM-C-150422-After ISM (A5D0682-06)			**Matrix: Sediment**		**Batch: 5040757**			
% Solids	**99.6**	---	1.00	% by Weight	1	04/29/15 08:58	EPA 8000C	

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Philip Nerenberg

Philip Nerenberg, Lab Director

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Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	05/13/15 15:20

QUALITY CONTROL (QC) SAMPLE RESULTS

Conventional Chemistry Parameters

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5040846 - PSEP TOC							Soil					
Blank (5040846-BLK1)					Prepared: 04/30/15 11:24		Analyzed: 05/04/15 17:15					
PSEP/SM 5310B MOD												
Total Organic Carbon	ND	---	200	mg/kg	1	---	---	---	---	---	---	
LCS (5040846-BS1)					Prepared: 04/30/15 11:24		Analyzed: 05/04/15 17:15					
PSEP/SM 5310B MOD												
Total Organic Carbon	8900	---		mg/kg	1	10000	---	89	85-115%	---	---	
Duplicate (5040846-DUP1)					Prepared: 04/30/15 11:24		Analyzed: 05/04/15 17:15					
QC Source Sample: ISM-A-150420-After ISM (A5D0682-02)												
PSEP/SM 5310B MOD												
Total Organic Carbon	**1200**	---	200	mg/kg	1	---	1200	---	---	4	20%	
Duplicate (5040846-DUP2)					Prepared: 04/30/15 11:24		Analyzed: 05/04/15 17:15					
QC Source Sample: Other (A5D0719-02)												
PSEP/SM 5310B MOD												
Total Organic Carbon	**34000**	---	200	mg/kg	1	---	32000	---	---	7	20%	

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Philip Nerenberg

Philip Nerenberg, Lab Director

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Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	05/13/15 15:20

QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5040681 - Total Solids (Dry Weight)							**Soil**					
Duplicate (5040681-DUP1)					Prepared: 04/24/15 13:17		Analyzed: 04/27/15 09:44					
QC Source Sample: Other (A5D0651-01)												
EPA 8000C												
% Solids	**77.9**	---	1.00	% by Weight	1	---	75.7	---	---	3	20%	Q-38
Duplicate (5040681-DUP2)					Prepared: 04/24/15 13:17		Analyzed: 04/27/15 09:44					
QC Source Sample: Other (A5D0694-03)												
EPA 8000C												
% Solids	**92.3**	---	1.00	% by Weight	1	---	90.9	---	---	2	20%	Q-38
Duplicate (5040681-DUP3)					Prepared: 04/24/15 13:17		Analyzed: 04/27/15 09:44					
QC Source Sample: Other (A5D0694-12)												
EPA 8000C												
% Solids	**94.7**	---	1.00	% by Weight	1	---	94.8	---	---	0.1	20%	Q-38
Duplicate (5040681-DUP4)					Prepared: 04/24/15 13:17		Analyzed: 04/27/15 09:44					
QC Source Sample: Other (A5D0694-23)												
EPA 8000C												
% Solids	**86.1**	---	1.00	% by Weight	1	---	87.6	---	---	2	20%	Q-38
Duplicate (5040681-DUP5)					Prepared: 04/24/15 13:17		Analyzed: 04/27/15 09:44					
QC Source Sample: Other (A5D0706-05)												
EPA 8000C												
% Solids	**81.0**	---	1.00	% by Weight	1	---	80.6	---	---	0.5	20%	Q-38
Duplicate (5040681-DUP6)					Prepared: 04/24/15 13:18		Analyzed: 04/27/15 09:44					
QC Source Sample: Other (A5D0715-06)												
EPA 8000C												
% Solids	**89.0**	---	1.00	% by Weight	1	---	86.6	---	---	3	20%	Q-38
Duplicate (5040681-DUP7)					Prepared: 04/24/15 17:28		Analyzed: 04/27/15 09:44					
QC Source Sample: Other (A5D0724-01)												
EPA 8000C												
% Solids	**77.0**	---	1.00	% by Weight	1	---	77.2	---	---	0.3	20%	Q-38
Duplicate (5040681-DUP8)					Prepared: 04/24/15 17:28		Analyzed: 04/27/15 09:44					

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Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	05/13/15 15:20

QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5040681 - Total Solids (Dry Weight)							Soil					
Duplicate (5040681-DUP8)					Prepared: 04/24/15 17:28		Analyzed: 04/27/15 09:44					
QC Source Sample: Other (A5D0733-05)												
EPA 8000C												
% Solids	**78.9**	---	1.00	% by Weight	1	---	81.4	---	---	3	20%	Q-38
Duplicate (5040681-DUP9)					Prepared: 04/24/15 19:55		Analyzed: 04/27/15 09:44					
QC Source Sample: Other (A5D0742-01)												
EPA 8000C												
% Solids	**76.0**	---	1.00	% by Weight	1	---	75.6	---	---	0.5	20%	Q-38
Duplicate (5040681-DUPA)					Prepared: 04/24/15 19:55		Analyzed: 04/27/15 09:44					
QC Source Sample: Other (A5D0751-01)												
EPA 8000C												
% Solids	**90.7**	---	1.00	% by Weight	1	---	89.2	---	---	2	20%	Q-38
Duplicate (5040681-DUPB)					Prepared: 04/24/15 19:55		Analyzed: 04/27/15 09:44					
QC Source Sample: Other (A5D0753-01)												
EPA 8000C												
% Solids	**87.3**	---	1.00	% by Weight	1	---	88.0	---	---	0.8	20%	Q-38
Duplicate (5040681-DUPC)					Prepared: 04/24/15 19:55		Analyzed: 04/27/15 09:44					
QC Source Sample: Other (A5D0758-01)												
EPA 8000C												
% Solids	**73.6**	---	1.00	% by Weight	1	---	74.1	---	---	0.7	20%	Q-38
Batch 5040757 - Total Solids (Dry Weight)							Soil					
Duplicate (5040757-DUP1)					Prepared: 04/28/15 11:24		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0481-27)												
EPA 8000C												
% Solids	**92.3**	---	1.00	% by Weight	1	---	92.3	---	---	0	20%	
Duplicate (5040757-DUP2)					Prepared: 04/28/15 11:24		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0713-01)												
EPA 8000C												

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Philip Nerenberg, Lab Director

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12232 S.W. Garden Place
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503-718-0333 Fax

Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	05/13/15 15:20

QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5040757 - Total Solids (Dry Weight)							**Soil**					
Duplicate (5040757-DUP2)					Prepared: 04/28/15 11:24		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0713-01)												
% Solids	**46.5**	---	1.00	% by Weight	1	---	48.2	---	---	4	20%	
Duplicate (5040757-DUP3)					Prepared: 04/28/15 11:24		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0731-05)												
EPA 8000C												
% Solids	**79.7**	---	1.00	% by Weight	1	---	80.5	---	---	1	20%	
Duplicate (5040757-DUP4)					Prepared: 04/28/15 11:24		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0731-15)												
EPA 8000C												
% Solids	**93.2**	---	1.00	% by Weight	1	---	92.6	---	---	0.6	20%	
Duplicate (5040757-DUP5)					Prepared: 04/28/15 11:24		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0772-09)												
EPA 8000C												
% Solids	**94.2**	---	1.00	% by Weight	1	---	94.2	---	---	0	20%	
Duplicate (5040757-DUP6)					Prepared: 04/28/15 11:24		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0777-05)												
EPA 8000C												
% Solids	**92.5**	---	1.00	% by Weight	1	---	91.8	---	---	0.8	20%	
Duplicate (5040757-DUP7)					Prepared: 04/28/15 11:26		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0800-06)												
EPA 8000C												
% Solids	**77.5**	---	1.00	% by Weight	1	---	76.5	---	---	1	20%	
Duplicate (5040757-DUP8)					Prepared: 04/28/15 11:26		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0813-02)												
EPA 8000C												
% Solids	**89.0**	---	1.00	% by Weight	1	---	89.8	---	---	0.9	20%	
Duplicate (5040757-DUP9)					Prepared: 04/28/15 11:30		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0819-02)												

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Philip Nerenberg, Lab Director

Apex Labs

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323 Phone
503-718-0333 Fax

Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	05/13/15 15:20

QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5040757 - Total Solids (Dry Weight)							Soil					
Duplicate (5040757-DUP9)					Prepared: 04/28/15 11:30		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0819-02)												
EPA 8000C												
% Solids	**93.3**	---	1.00	% by Weight	1	---	92.7	---	---	0.6	20%	
Duplicate (5040757-DUPA)					Prepared: 04/28/15 15:57		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0833-02)												
EPA 8000C												
% Solids	**87.1**	---	1.00	% by Weight	1	---	87.3	---	---	0.2	20%	
Duplicate (5040757-DUPB)					Prepared: 04/28/15 16:48		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0842-02)												
EPA 8000C												
% Solids	**78.3**	---	1.00	% by Weight	1	---	78.4	---	---	0.1	20%	
Duplicate (5040757-DUPC)					Prepared: 04/28/15 19:25		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0845-03)												
EPA 8000C												
% Solids	**80.6**	---	1.00	% by Weight	1	---	80.2	---	---	0.5	20%	
Duplicate (5040757-DUPD)					Prepared: 04/28/15 19:25		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0845-11)												
EPA 8000C												
% Solids	**80.5**	---	1.00	% by Weight	1	---	81.9	---	---	2	20%	
Duplicate (5040757-DUPE)					Prepared: 04/28/15 19:25		Analyzed: 04/29/15 08:58					
QC Source Sample: Other (A5D0850-02)												
EPA 8000C												
% Solids	**89.0**	---	1.00	% by Weight	1	---	89.0	---	---	0	20%	

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

Philip Nerenberg, Lab Director

Apex Labs

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323 Phone
503-718-0333 Fax

Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	05/13/15 15:20

SAMPLE PREPARATION INFORMATION

Conventional Chemistry Parameters

Prep: PSEP TOC

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 5040846							
A5D0682-02	Sediment	PSEP/SM 5310B MOD	04/20/15 16:00	04/30/15 11:24	5g/5g	5g/5g	NA
A5D0682-04	Sediment	PSEP/SM 5310B MOD	04/21/15 12:00	04/30/15 11:24	5g/5g	5g/5g	NA
A5D0682-06	Sediment	PSEP/SM 5310B MOD	04/22/15 12:20	04/30/15 11:24	5g/5g	5g/5g	NA

Percent Dry Weight

Prep: Total Solids (Dry Weight)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 5040681							
A5D0682-01	Sediment	EPA 8000C	04/20/15 16:00	04/24/15 13:17	1N/A/1N/A	1N/A/1N/A	NA
A5D0682-03	Sediment	EPA 8000C	04/21/15 12:00	04/24/15 13:17	1N/A/1N/A	1N/A/1N/A	NA
A5D0682-05	Sediment	EPA 8000C	04/22/15 12:20	04/24/15 13:17	1N/A/1N/A	1N/A/1N/A	NA
Batch: 5040757							
A5D0682-02	Sediment	EPA 8000C	04/20/15 16:00	04/28/15 11:26	1N/A/1N/A	1N/A/1N/A	NA
A5D0682-04	Sediment	EPA 8000C	04/21/15 12:00	04/28/15 11:26	1N/A/1N/A	1N/A/1N/A	NA
A5D0682-06	Sediment	EPA 8000C	04/22/15 12:20	04/28/15 11:26	1N/A/1N/A	1N/A/1N/A	NA

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Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	05/13/15 15:20

Notes and Definitions

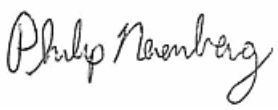
Qualifiers:

Q-38	Oven outside of control limits during drying step.

Notes and Conventions:

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. Results listed as 'wet' or without 'dry'designation are not dry weight corrected.
RPD	Relative Percent Difference
MDL	If MDL is not listed, data has been evaluated to the Method Reporting Limit only.
WMSC	Water Miscible Solvent Correction has been applied to Results and MRLs for volatiles soil samples per EPA 8000C.
Batch QC	In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) is analyzed to demonstrate accuracy and precision of the extraction and analysis.
Blank Policy	Apex assesses blank data for potential high bias down to a level equal to ½ the method reporting limit (MRL), except for conventional chemistry and HCID analyses which are assessed only to the MRL. Sample results flagged with a B or B-02 qualifier are potentially biased high if they 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. For accurate comparison of volatile results to the level found in the blank; water sample results should be divided by the dilution factor, and soil sample results should be divided by 1/50 of the sample dilution to account for the sample prep factor. Results qualified as reported below the MRL may include a potential high bias if associated with a B or B-02 qualified blank. B and B-02 qualifications are not applied to J qualified results reported below the MRL.
---	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).

Apex Laboratories



Philip Nerenberg, Lab Director

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Apex Labs

12232 S.W. Garden Place
Tigard, OR 97223
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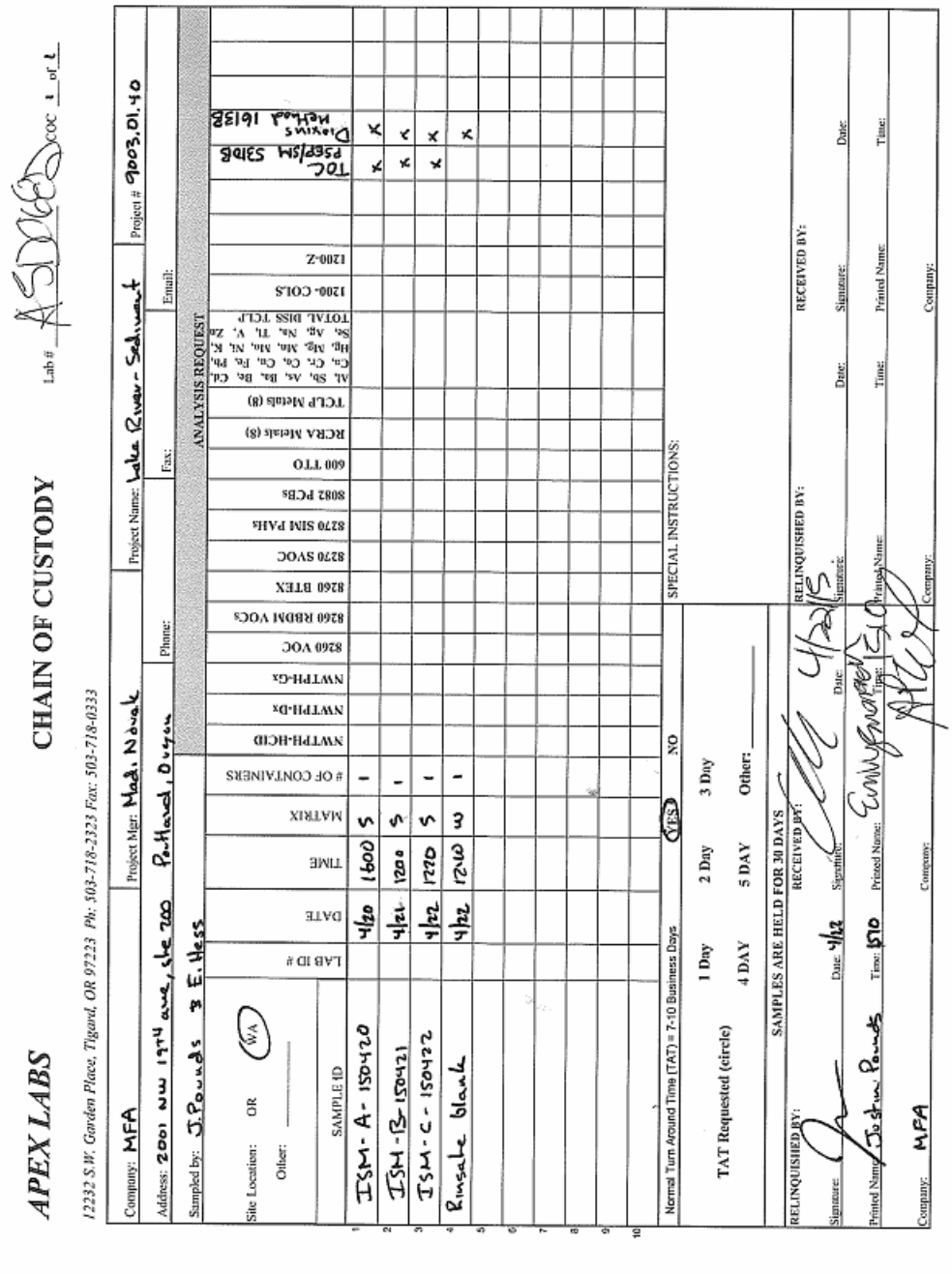
Maul Foster & Alongi, INC.	Project: **Lake River-Sediment**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	05/13/15 15:20



Apex Laboratories

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Philip Nerenberg

Philip Nerenberg, Lab Director

Maxxam
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Success Through Science®

Your Project #: A5D0682
Your C.O.C. #: NA

Attention:Philip Nerenberg

Apex Laboratories
12232 SW Garden Place
Tigard, OR
USA 97223

Report Date: 2015/05/12
Report #: R3425607
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B577839
Received: 2015/04/29, 13:40

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Dioxins/Furans in Soil (1613B) (1)	3	2015/05/03	2015/05/07	BRL SOP-00410	EPA 1613B m
Moisture	3	N/A	2015/05/01	CAM SOP-00445	Carter 2nd ed 51.2 m

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Dioxins/Furans in Water (1613B) (2)	1	2015/05/04	2015/05/05	BRL SOP-00410	EPA 1613B m

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Soils are reported on a dry weight basis unless otherwise specified.

Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.
(2) Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Melissa DiGrazia, Project Manager - ATUT
Email: MDiGrazia@maxxam.ca
Phone# (905) 817-5700

==========

Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
Client Project #: A5D0682

RESULTS OF ANALYSES OF SOIL

Maxxam ID		AEP635	AEP636	AEP637			
Sampling Date		2015/04/20 16:00	2015/04/21 12:00	2015/04/22 12:20			
COC Number		NA	NA	NA			
	Units	ISM-A-150420-AFTER ISM	ISM-B-150421-AFTER ISM	ISM-C-150422-AFTER ISM	RDL	MDL	QC Batch
Moisture	%	<1.0	2.3	1.3	1.0	0.040	4005942

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
Client Project #: A5D0682

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		AEP635							
Sampling Date		2015/04/20 16:00							
COC Number		NA				TOXIC EQUIVALENCY		# of	
	Units	ISM-A-150420-AFTER ISM	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	0.218	0.107	0.195	0.400	1.00	0.218		4010827
1,2,3,7,8-Penta CDD *	pg/g	0.607	0.205	0.974	0.400	1.00	0.607		4010827
1,2,3,4,7,8-Hexa CDD *	pg/g	0.770	0.130	0.974	0.400	0.100	0.0770		4010827
1,2,3,6,7,8-Hexa CDD *	pg/g	2.08	0.143	0.974	0.400	0.100	0.208		4010827
1,2,3,7,8,9-Hexa CDD *	pg/g	1.20	0.135	0.974	0.400	0.100	0.120		4010827
1,2,3,4,6,7,8-Hepta CDD *	pg/g	30.3	0.174	0.974	0.400	0.0100	0.303		4010827
Octa CDD *	pg/g	264	0.122	1.95	0.800	0.000300	0.0792		4010827
Total Tetra CDD *	pg/g	0.218	0.107	0.195	0.400			1	4010827
Total Penta CDD *	pg/g	0.607	0.205	0.974	0.400			1	4010827
Total Hexa CDD *	pg/g	7.75	0.138	0.974	0.400			6	4010827
Total Hepta CDD *	pg/g	54.3	0.174	0.974	0.400			2	4010827
2,3,7,8-Tetra CDF **	pg/g	0.216	0.141	0.195	0.400	0.100	0.0216		4010827
1,2,3,7,8-Penta CDF **	pg/g	0.666	0.122	0.974	0.400	0.0300	0.0200		4010827
2,3,4,7,8-Penta CDF **	pg/g	0.585	0.118	0.974	0.400	0.300	0.176		4010827
1,2,3,4,7,8-Hexa CDF **	pg/g	1.15	0.0997	0.974	0.400	0.100	0.115		4010827
1,2,3,6,7,8-Hexa CDF **	pg/g	0.884	0.104	0.974	0.400	0.100	0.0884		4010827
2,3,4,6,7,8-Hexa CDF **	pg/g	0.760	0.0952	0.974	0.400	0.100	0.0760		4010827
1,2,3,7,8,9-Hexa CDF **	pg/g	0.675	0.108	0.974	0.400	0.100	0.0675		4010827
1,2,3,4,6,7,8-Hepta CDF **	pg/g	4.03	0.138	0.974	0.400	0.0100	0.0403		4010827
1,2,3,4,7,8,9-Hepta CDF **	pg/g	0.806	0.144	0.974	0.400	0.0100	0.00806		4010827
Octa CDF **	pg/g	7.36	0.111	1.95	0.800	0.000300	0.00221		4010827
Total Tetra CDF **	pg/g	0.216	0.141	0.195	0.400			1	4010827
Total Penta CDF **	pg/g	1.74	0.120	0.974	0.400			3	4010827
Total Hexa CDF **	pg/g	9.57	0.101	0.974	0.400			9	4010827
Total Hepta CDF **	pg/g	11.3	0.141	0.974	0.400			3	4010827
TOTAL TOXIC EQUIVALENCY	pg/g						2.23		
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	74							4010827
C13-1234678 HeptaCDD *	%	59							4010827
C13-1234678 HeptaCDF **	%	60							4010827

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

** CDF = Chloro Dibenzo-p-Furan

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Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
Client Project #: A5D0682

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		AEP635							
Sampling Date		2015/04/20 16:00							
COC Number		NA				TOXIC EQUIVALENCY		# of	
	Units	ISM-A-150420-AFTER ISM	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-123478 HexaCDD *	%	61							4010827
C13-123478 HexaCDF **	%	65							4010827
C13-1234789 HeptaCDF **	%	63							4010827
C13-123678 HexaCDD *	%	60							4010827
C13-123678 HexaCDF **	%	65							4010827
C13-12378 PentaCDD *	%	67							4010827
C13-12378 PentaCDF **	%	66							4010827
C13-123789 HexaCDF **	%	68							4010827
C13-234678 HexaCDF **	%	56							4010827
C13-23478 PentaCDF **	%	73							4010827
C13-2378 TetraCDD *	%	51							4010827
C13-2378 TetraCDF **	%	55							4010827
C13-OCDD *	%	60							4010827

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

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Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
Client Project #: A5D0682

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		AEP636							
Sampling Date		2015/04/21 12:00							
COC Number		NA				TOXIC EQUIVALENCY		# of	
	Units	ISM-B-150421-AFTER ISM	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	<0.117	0.117	0.193	0.400	1.00	0.117		4010827
1,2,3,7,8-Penta CDD *	pg/g	<0.281	0.281	0.963	0.400	1.00	0.281		4010827
1,2,3,4,7,8-Hexa CDD *	pg/g	0.216	0.171	0.963	0.400	0.100	0.0216		4010827
1,2,3,6,7,8-Hexa CDD *	pg/g	0.546	0.188	0.963	0.400	0.100	0.0546		4010827
1,2,3,7,8,9-Hexa CDD *	pg/g	0.316	0.178	0.963	0.400	0.100	0.0316		4010827
1,2,3,4,6,7,8-Hepta CDD *	pg/g	9.90	0.326	0.963	0.400	0.0100	0.0990		4010827
Octa CDD *	pg/g	76.0	0.472	1.93	0.800	0.000300	0.0228		4010827
Total Tetra CDD *	pg/g	<0.117	0.117	0.193	0.400				4010827
Total Penta CDD *	pg/g	<0.281	0.281	0.963	0.400				4010827
Total Hexa CDD *	pg/g	2.29	0.181	0.963	0.400			5	4010827
Total Hepta CDD *	pg/g	18.1	0.326	0.963	0.400			2	4010827
2,3,7,8-Tetra CDF **	pg/g	<0.169	0.169	0.193	0.400	0.100	0.0169		4010827
1,2,3,7,8-Penta CDF **	pg/g	<0.229	0.229	0.963	0.400	0.0300	0.00687		4010827
2,3,4,7,8-Penta CDF **	pg/g	<0.222	0.222	0.963	0.400	0.300	0.0666		4010827
1,2,3,4,7,8-Hexa CDF **	pg/g	<0.278 (1)	0.278	0.963	0.400	0.100	0.0278		4010827
1,2,3,6,7,8-Hexa CDF **	pg/g	0.251	0.229	0.963	0.400	0.100	0.0251		4010827
2,3,4,6,7,8-Hexa CDF **	pg/g	<0.210	0.210	0.963	0.400	0.100	0.0210		4010827
1,2,3,7,8,9-Hexa CDF **	pg/g	<0.238	0.238	0.963	0.400	0.100	0.0238		4010827
1,2,3,4,6,7,8-Hepta CDF **	pg/g	1.65	0.150	0.963	0.400	0.0100	0.0165		4010827
1,2,3,4,7,8,9-Hepta CDF **	pg/g	0.276	0.156	0.963	0.400	0.0100	0.00276		4010827
Octa CDF **	pg/g	2.11	0.393	1.93	0.800	0.000300	0.000633		4010827
Total Tetra CDF **	pg/g	<0.169	0.169	0.193	0.400				4010827
Total Penta CDF **	pg/g	<0.225	0.225	0.963	0.400				4010827
Total Hexa CDF **	pg/g	2.54	0.224	0.963	0.400			4	4010827
Total Hepta CDF **	pg/g	4.48	0.153	0.963	0.400			3	4010827
TOTAL TOXIC EQUIVALENCY	pg/g						0.836		
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	64							4010827
C13-1234678 HeptaCDD *	%	52							4010827

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
Client Project #: A5D0682

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		AEP636							
Sampling Date		2015/04/21 12:00							
COC Number		NA				TOXIC EQUIVALENCY		# of	
	Units	ISM-B-150421-AFTER ISM	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDF **	%	57							4010827
C13-123478 HexaCDD *	%	62							4010827
C13-123478 HexaCDF **	%	68							4010827
C13-1234789 HeptaCDF **	%	52							4010827
C13-123678 HexaCDD *	%	61							4010827
C13-123678 HexaCDF **	%	68							4010827
C13-12378 PentaCDD *	%	52							4010827
C13-12378 PentaCDF **	%	57							4010827
C13-123789 HexaCDF **	%	63							4010827
C13-234678 HexaCDF **	%	47							4010827
C13-23478 PentaCDF **	%	50							4010827
C13-2378 TetraCDD *	%	48							4010827
C13-2378 TetraCDF **	%	46							4010827
C13-OCDD *	%	44							4010827

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

** CDF = Chloro Dibenzo-p-Furan

* CDD = Chloro Dibenzo-p-Dioxin

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Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
Client Project #: A5D0682

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		AEP637							
Sampling Date		2015/04/22 12:20							
COC Number		NA				TOXIC EQUIVALENCY		# of	
	Units	ISM-C-150422-AFTER ISM	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	<0.166	0.166	0.199	0.400	1.00	0.166		4010827
1,2,3,7,8-Penta CDD *	pg/g	0.208	0.111	0.996	0.400	1.00	0.208		4010827
1,2,3,4,7,8-Hexa CDD *	pg/g	0.282	0.121	0.996	0.400	0.100	0.0282		4010827
1,2,3,6,7,8-Hexa CDD *	pg/g	0.527	0.133	0.996	0.400	0.100	0.0527		4010827
1,2,3,7,8,9-Hexa CDD *	pg/g	0.331	0.125	0.996	0.400	0.100	0.0331		4010827
1,2,3,4,6,7,8-Hepta CDD *	pg/g	6.23	0.115	0.996	0.400	0.0100	0.0623		4010827
Octa CDD *	pg/g	53.1	0.118	1.99	0.800	0.000300	0.0159		4010827
Total Tetra CDD *	pg/g	<0.166	0.166	0.199	0.400				4010827
Total Penta CDD *	pg/g	0.208	0.111	0.996	0.400			1	4010827
Total Hexa CDD *	pg/g	2.05	0.128	0.996	0.400			5	4010827
Total Hepta CDD *	pg/g	11.9	0.115	0.996	0.400			2	4010827
2,3,7,8-Tetra CDF **	pg/g	<0.143	0.143	0.199	0.400	0.100	0.0143		4010827
1,2,3,7,8-Penta CDF **	pg/g	0.255	0.114	0.996	0.400	0.0300	0.00765		4010827
2,3,4,7,8-Penta CDF **	pg/g	0.241	0.111	0.996	0.400	0.300	0.0723		4010827
1,2,3,4,7,8-Hexa CDF **	pg/g	0.345	0.123	0.996	0.400	0.100	0.0345		4010827
1,2,3,6,7,8-Hexa CDF **	pg/g	0.267	0.128	0.996	0.400	0.100	0.0267		4010827
2,3,4,6,7,8-Hexa CDF **	pg/g	0.200	0.118	0.996	0.400	0.100	0.0200		4010827
1,2,3,7,8,9-Hexa CDF **	pg/g	0.233	0.133	0.996	0.400	0.100	0.0233		4010827
1,2,3,4,6,7,8-Hepta CDF **	pg/g	<0.969 (1)	0.969	0.996	0.400	0.0100	0.00969		4010827
1,2,3,4,7,8,9-Hepta CDF **	pg/g	0.291	0.119	0.996	0.400	0.0100	0.00291		4010827
Octa CDF **	pg/g	1.81	0.158	1.99	0.800	0.000300	0.000543		4010827
Total Tetra CDF **	pg/g	<0.143	0.143	0.199	0.400				4010827
Total Penta CDF **	pg/g	0.668	0.112	0.996	0.400			3	4010827
Total Hexa CDF **	pg/g	2.44	0.125	0.996	0.400			7	4010827
Total Hepta CDF **	pg/g	1.84	0.117	0.996	0.400			2	4010827
TOTAL TOXIC EQUIVALENCY	pg/g						0.778		
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	68							4010827
C13-1234678 HeptaCDD *	%	60							4010827

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
Client Project #: A5D0682

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		AEP637							
Sampling Date		2015/04/22 12:20							
COC Number		NA				**TOXIC EQUIVALENCY**		# of	
	Units	**ISM-C-150422-AFTER ISM**	**EDL**	**RDL**	**MDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
C13-1234678 HeptaCDF **	%	64							4010827
C13-123478 HexaCDD *	%	59							4010827
C13-123478 HexaCDF **	%	67							4010827
C13-1234789 HeptaCDF **	%	65							4010827
C13-123678 HexaCDD *	%	58							4010827
C13-123678 HexaCDF **	%	66							4010827
C13-12378 PentaCDD *	%	66							4010827
C13-12378 PentaCDF **	%	67							4010827
C13-123789 HexaCDF **	%	66							4010827
C13-234678 HexaCDF **	%	46							4010827
C13-23478 PentaCDF **	%	61							4010827
C13-2378 TetraCDD *	%	49							4010827
C13-2378 TetraCDF **	%	48							4010827
C13-OCDD *	%	64							4010827

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

** CDF = Chloro Dibenzo-p-Furan

* CDD = Chloro Dibenzo-p-Dioxin

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Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
Client Project #: A5D0682

DIOXINS AND FURANS BY HRMS (WATER)

Maxxam ID		AEP638							
Sampling Date		2015/04/22 12:10							
COC Number		NA				TOXIC EQUIVALENCY		# of	
	Units	RINSATE BLANK	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/L	<1.47	1.47	11.0	4.00	1.00	1.47		4008384
1,2,3,7,8-Penta CDD *	pg/L	<1.13	1.13	54.9	4.00	1.00	1.13		4008384
1,2,3,4,7,8-Hexa CDD *	pg/L	<1.16	1.16	54.9	4.00	0.100	0.116		4008384
1,2,3,6,7,8-Hexa CDD *	pg/L	<1.23	1.23	54.9	4.00	0.100	0.123		4008384
1,2,3,7,8,9-Hexa CDD *	pg/L	<1.13	1.13	54.9	4.00	0.100	0.113		4008384
1,2,3,4,6,7,8-Hepta CDD *	pg/L	<1.12	1.12	54.9	4.00	0.0100	0.0112		4008384
Octa CDD *	pg/L	5.41	1.18	110	8.00	0.000300	0.00162		4008384
Total Tetra CDD *	pg/L	<4.13 (1)	4.13	11.0	4.00				4008384
Total Penta CDD *	pg/L	<1.13	1.13	54.9	4.00				4008384
Total Hexa CDD *	pg/L	<5.86 (1)	5.86	54.9	4.00				4008384
Total Hepta CDD *	pg/L	<1.12	1.12	54.9	4.00				4008384
2,3,7,8-Tetra CDF **	pg/L	<1.15	1.15	11.0	4.00	0.100	0.115		4008384
1,2,3,7,8-Penta CDF **	pg/L	<1.14	1.14	54.9	4.00	0.0300	0.0342		4008384
2,3,4,7,8-Penta CDF **	pg/L	<1.14	1.14	54.9	4.00	0.300	0.342		4008384
1,2,3,4,7,8-Hexa CDF **	pg/L	<1.07	1.07	54.9	4.00	0.100	0.107		4008384
1,2,3,6,7,8-Hexa CDF **	pg/L	<1.11	1.11	54.9	4.00	0.100	0.111		4008384
2,3,4,6,7,8-Hexa CDF **	pg/L	<1.02	1.02	54.9	4.00	0.100	0.102		4008384
1,2,3,7,8,9-Hexa CDF **	pg/L	<1.18	1.18	54.9	4.00	0.100	0.118		4008384
1,2,3,4,6,7,8-Hepta CDF **	pg/L	<1.33	1.33	54.9	4.00	0.0100	0.0133		4008384
1,2,3,4,7,8,9-Hepta CDF **	pg/L	<1.10	1.10	54.9	4.00	0.0100	0.0110		4008384
Octa CDF **	pg/L	<1.19	1.19	110	8.00	0.000300	0.000357		4008384
Total Tetra CDF **	pg/L	<1.15	1.15	11.0	4.00				4008384
Total Penta CDF **	pg/L	<1.14	1.14	54.9	4.00				4008384
Total Hexa CDF **	pg/L	<1.09	1.09	54.9	4.00				4008384
Total Hepta CDF **	pg/L	<1.20	1.20	54.9	4.00				4008384
TOTAL TOXIC EQUIVALENCY	pg/L						3.92		
Surrogate Recovery (%)									
37CL4 2378 Tetra CDD *	%	87							4008384

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
Client Project #: A5D0682

DIOXINS AND FURANS BY HRMS (WATER)

Maxxam ID		AEP638							
Sampling Date		2015/04/22 12:10							
COC Number		NA				TOXIC EQUIVALENCY		# of	
	Units	RINSATE BLANK	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDD *	%	78							4008384
C13-1234678 HeptaCDF **	%	67							4008384
C13-123478 HexaCDD *	%	75							4008384
C13-123478 HexaCDF **	%	70							4008384
C13-1234789 HeptaCDF **	%	84							4008384
C13-123678 HexaCDD *	%	76							4008384
C13-123678 HexaCDF **	%	65							4008384
C13-12378 PentaCDD *	%	83							4008384
C13-12378 PentaCDF **	%	77							4008384
C13-123789 HexaCDF **	%	75							4008384
C13-234678 HexaCDF **	%	71							4008384
C13-23478 PentaCDF **	%	83							4008384
C13-2378 TetraCDD *	%	59							4008384
C13-2378 TetraCDF **	%	56							4008384
C13-OCDD *	%	86							4008384

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

** CDF = Chloro Dibenzo-p-Furan

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Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
Client Project #: A5D0682

TEST SUMMARY

Maxxam ID: AEP635
Sample ID: ISM-A-150420-AFTER ISM
Matrix: Soil

Collected: 2015/04/20
Shipped:
Received: 2015/04/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	4010827	2015/05/03	2015/05/07	Kay Shaw
Moisture	BAL	4005942	N/A	2015/05/01	Chun Yan

Maxxam ID: AEP636
Sample ID: ISM-B-150421-AFTER ISM
Matrix: Soil

Collected: 2015/04/21
Shipped:
Received: 2015/04/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	4010827	2015/05/03	2015/05/07	Kay Shaw
Moisture	BAL	4005942	N/A	2015/05/01	Chun Yan

Maxxam ID: AEP637
Sample ID: ISM-C-150422-AFTER ISM
Matrix: Soil

Collected: 2015/04/22
Shipped:
Received: 2015/04/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	4010827	2015/05/03	2015/05/07	Kay Shaw
Moisture	BAL	4005942	N/A	2015/05/01	Chun Yan

Maxxam ID: AEP638
Sample ID: RINSATE BLANK
Matrix: Water

Collected: 2015/04/22
Shipped:
Received: 2015/04/29

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Water (1613B)	HRMS/MS	4008384	2015/05/04	2015/05/05	Owen Cosby

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Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.3°C
Package 2	9.2°C

Results relate only to the items tested.

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Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
Client Project #: A5D0682

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
4005942	BOP	RPD - Sample/Sample Dup	Moisture	2015/05/01	1.1		%	20
4008384	OBC	Spiked Blank	37CL4 2378 Tetra CDD	2015/05/04		83	%	35 - 197
			C13-1234678 HeptaCDD	2015/05/04		100	%	23 - 140
			C13-1234678 HeptaCDF	2015/05/04		99	%	28 - 143
			C13-123478 HexaCDD	2015/05/04		97	%	32 - 141
			C13-123478 HexaCDF	2015/05/04		89	%	26 - 152
			C13-1234789 HeptaCDF	2015/05/04		111	%	28 - 143
			C13-123678 HexaCDD	2015/05/04		93	%	28 - 130
			C13-123678 HexaCDF	2015/05/04		93	%	26 - 123
			C13-12378 PentaCDD	2015/05/04		99	%	25 - 181
			C13-12378 PentaCDF	2015/05/04		92	%	24 - 185
			C13-123789 HexaCDF	2015/05/04		98	%	28 - 136
			C13-234678 HexaCDF	2015/05/04		90	%	29 - 147
			C13-23478 PentaCDF	2015/05/04		109	%	21 - 178
			C13-2378 TetraCDD	2015/05/04		77	%	24 - 164
			C13-2378 TetraCDF	2015/05/04		79	%	24 - 169
			C13-OCDD	2015/05/04		111	%	17 - 157
			2,3,7,8-Tetra CDD	2015/05/04		96	%	67 - 158
			1,2,3,7,8-Penta CDD	2015/05/04		107	%	25 - 181
			1,2,3,4,7,8-Hexa CDD	2015/05/04		102	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2015/05/04		98	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2015/05/04		88	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2015/05/04		101	%	70 - 140
			Octa CDD	2015/05/04		108	%	78 - 144
			2,3,7,8-Tetra CDF	2015/05/04		107	%	75 - 158
			1,2,3,7,8-Penta CDF	2015/05/04		101	%	80 - 134
			2,3,4,7,8-Penta CDF	2015/05/04		103	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2015/05/04		101	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2015/05/04		93	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2015/05/04		101	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2015/05/04		106	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2015/05/04		92	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2015/05/04		104	%	78 - 138
			Octa CDF	2015/05/04		111	%	63 - 170
4008384	OBC	Method Blank	37CL4 2378 Tetra CDD	2015/05/05		74	%	35 - 197
			C13-1234678 HeptaCDD	2015/05/05		94	%	23 - 140
			C13-1234678 HeptaCDF	2015/05/05		83	%	28 - 143
			C13-123478 HexaCDD	2015/05/05		89	%	32 - 141
			C13-123478 HexaCDF	2015/05/05		81	%	26 - 152
			C13-1234789 HeptaCDF	2015/05/05		95	%	28 - 143
			C13-123678 HexaCDD	2015/05/05		86	%	28 - 130
			C13-123678 HexaCDF	2015/05/05		77	%	26 - 123
			C13-12378 PentaCDD	2015/05/05		94	%	25 - 181
			C13-12378 PentaCDF	2015/05/05		86	%	24 - 185
			C13-123789 HexaCDF	2015/05/05		95	%	28 - 136
			C13-234678 HexaCDF	2015/05/05		82	%	29 - 147
			C13-23478 PentaCDF	2015/05/05		101	%	21 - 178
			C13-2378 TetraCDD	2015/05/05		77	%	24 - 164
			C13-2378 TetraCDF	2015/05/05		76	%	24 - 169
			C13-OCDD	2015/05/05		106	%	17 - 157
			2,3,7,8-Tetra CDD	2015/05/05	<1.19, EDL=1.19		pg/L	
			1,2,3,7,8-Penta CDD	2015/05/05	<1.19, EDL=1.19		pg/L	

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Maxxam Job #: B577839
Report Date: 2015/05/12

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
			1,2,3,4,7,8-Hexa CDD	2015/05/05	<1.12, EDL=1.12		pg/L	
			1,2,3,6,7,8-Hexa CDD	2015/05/05	<1.19, EDL=1.19		pg/L	
			1,2,3,7,8,9-Hexa CDD	2015/05/05	<1.09, EDL=1.09		pg/L	
			1,2,3,4,6,7,8-Hepta CDD	2015/05/05	<1.11, EDL=1.11		pg/L	
			Octa CDD	2015/05/05	1.62, EDL=1.17		pg/L	
			Total Tetra CDD	2015/05/05	<3.02, EDL=3.02 (1)		pg/L	
			Total Penta CDD	2015/05/05	<1.70, EDL=1.70 (1)		pg/L	
			Total Hexa CDD	2015/05/05	<4.11, EDL=4.11 (1)		pg/L	
			Total Hepta CDD	2015/05/05	<1.11, EDL=1.11		pg/L	
			2,3,7,8-Tetra CDF	2015/05/05	<1.17, EDL=1.17		pg/L	
			1,2,3,7,8-Penta CDF	2015/05/05	<1.12, EDL=1.12		pg/L	
			2,3,4,7,8-Penta CDF	2015/05/05	<1.11, EDL=1.11		pg/L	
			1,2,3,4,7,8-Hexa CDF	2015/05/05	<1.10, EDL=1.10		pg/L	
			1,2,3,6,7,8-Hexa CDF	2015/05/05	<1.14, EDL=1.14		pg/L	
			2,3,4,6,7,8-Hexa CDF	2015/05/05	<1.05, EDL=1.05		pg/L	
			1,2,3,7,8,9-Hexa CDF	2015/05/05	<1.21, EDL=1.21		pg/L	
			1,2,3,4,6,7,8-Hepta CDF	2015/05/05	<1.26, EDL=1.26		pg/L	
			1,2,3,4,7,8,9-Hepta CDF	2015/05/05	<1.03, EDL=1.03		pg/L	
			Octa CDF	2015/05/05	<1.18, EDL=1.18		pg/L	
			Total Tetra CDF	2015/05/05	<1.17, EDL=1.17		pg/L	
			Total Penta CDF	2015/05/05	<1.11, EDL=1.11		pg/L	
			Total Hexa CDF	2015/05/05	<1.12, EDL=1.12		pg/L	
			Total Hepta CDF	2015/05/05	<1.13, EDL=1.13		pg/L	
4010827	KKS	Spiked Blank	37CL4 2378 Tetra CDD	2015/05/06		59	%	35 - 197
			C13-1234678 HeptaCDD	2015/05/06		58	%	23 - 140
			C13-1234678 HeptaCDF	2015/05/06		58	%	28 - 143
			C13-123478 HexaCDD	2015/05/06		56	%	32 - 141
			C13-123478 HexaCDF	2015/05/06		59	%	26 - 152

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
			C13-1234789 HeptaCDF	2015/05/06		57	%	26 - 138
			C13-123678 HexaCDD	2015/05/06		53	%	28 - 130
			C13-123678 HexaCDF	2015/05/06		59	%	26 - 123
			C13-12378 PentaCDD	2015/05/06		56	%	25 - 181
			C13-12378 PentaCDF	2015/05/06		57	%	24 - 185
			C13-123789 HexaCDF	2015/05/06		59	%	29 - 147
			C13-234678 HexaCDF	2015/05/06		41	%	28 - 136
			C13-23478 PentaCDF	2015/05/06		53	%	21 - 178
			C13-2378 TetraCDD	2015/05/06		44	%	25 - 164
			C13-2378 TetraCDF	2015/05/06		41	%	24 - 169
			C13-OCDD	2015/05/06		62	%	17 - 157
			2,3,7,8-Tetra CDD	2015/05/06		111	%	67 - 158
			1,2,3,7,8-Penta CDD	2015/05/06		97	%	70 - 142
			1,2,3,4,7,8-Hexa CDD	2015/05/06		105	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2015/05/06		110	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2015/05/06		109	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2015/05/06		105	%	70 - 140
			Octa CDD	2015/05/06		102	%	78 - 144
			2,3,7,8-Tetra CDF	2015/05/06		109	%	75 - 158
			1,2,3,7,8-Penta CDF	2015/05/06		108	%	80 - 134
			2,3,4,7,8-Penta CDF	2015/05/06		95	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2015/05/06		108	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2015/05/06		112	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2015/05/06		109	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2015/05/06		105	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2015/05/06		112	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2015/05/06		110	%	78 - 138
			Octa CDF	2015/05/06		96	%	63 - 170
4010827	KKS	Method Blank	37CL4 2378 Tetra CDD	2015/05/07		70	%	35 - 197
			C13-1234678 HeptaCDD	2015/05/07		70	%	23 - 140
			C13-1234678 HeptaCDF	2015/05/07		76	%	28 - 143
			C13-123478 HexaCDD	2015/05/07		69	%	32 - 141
			C13-123478 HexaCDF	2015/05/07		78	%	26 - 152
			C13-1234789 HeptaCDF	2015/05/07		76	%	26 - 138
			C13-123678 HexaCDD	2015/05/07		69	%	28 - 130
			C13-123678 HexaCDF	2015/05/07		79	%	26 - 123
			C13-12378 PentaCDD	2015/05/07		67	%	25 - 181
			C13-12378 PentaCDF	2015/05/07		76	%	24 - 185
			C13-123789 HexaCDF	2015/05/07		76	%	29 - 147
			C13-234678 HexaCDF	2015/05/07		48	%	28 - 136
			C13-23478 PentaCDF	2015/05/07		62	%	21 - 178
			C13-2378 TetraCDD	2015/05/07		52	%	25 - 164
			C13-2378 TetraCDF	2015/05/07		48	%	24 - 169
			C13-OCDD	2015/05/07		76	%	17 - 157
			2,3,7,8-Tetra CDD	2015/05/07	<0.164, EDL=0.164		pg/g	
			1,2,3,7,8-Penta CDD	2015/05/07	<0.148, EDL=0.148		pg/g	
			1,2,3,4,7,8-Hexa CDD	2015/05/07	<0.104, EDL=0.104		pg/g	
			1,2,3,6,7,8-Hexa CDD	2015/05/07	<0.115, EDL=0.115		pg/g	
			1,2,3,7,8,9-Hexa CDD	2015/05/07	<0.108, EDL=0.108		pg/g	

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Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
Client Project #: A5D0682

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
			1,2,3,4,6,7,8-Hepta CDD	2015/05/07	0.227, EDL=0.116		pg/g	
			Octa CDD	2015/05/07	0.906, EDL=0.107		pg/g	
			Total Tetra CDD	2015/05/07	<0.164, EDL=0.164		pg/g	
			Total Penta CDD	2015/05/07	<0.148, EDL=0.148		pg/g	
			Total Hexa CDD	2015/05/07	<0.110, EDL=0.110		pg/g	
			Total Hepta CDD	2015/05/07	0.395, EDL=0.116		pg/g	
			2,3,7,8-Tetra CDF	2015/05/07	<0.141, EDL=0.141		pg/g	
			1,2,3,7,8-Penta CDF	2015/05/07	<0.155, EDL=0.155		pg/g	
			2,3,4,7,8-Penta CDF	2015/05/07	<0.151, EDL=0.151		pg/g	
			1,2,3,4,7,8-Hexa CDF	2015/05/07	<0.109, EDL=0.109		pg/g	
			1,2,3,6,7,8-Hexa CDF	2015/05/07	<0.113, EDL=0.113		pg/g	
			2,3,4,6,7,8-Hexa CDF	2015/05/07	0.106, EDL=0.104		pg/g	
			1,2,3,7,8,9-Hexa CDF	2015/05/07	0.140, EDL=0.118		pg/g	
			1,2,3,4,6,7,8-Hepta CDF	2015/05/07	<0.0975, EDL=0.0975 (1)		pg/g	
			1,2,3,4,7,8,9-Hepta CDF	2015/05/07	<0.111, EDL=0.111 (1)		pg/g	
			Octa CDF	2015/05/07	0.317, EDL=0.0986		pg/g	
			Total Tetra CDF	2015/05/07	<0.141, EDL=0.141		pg/g	
			Total Penta CDF	2015/05/07	<0.153, EDL=0.153		pg/g	
			Total Hexa CDF	2015/05/07	0.140, EDL=0.111		pg/g	
			Total Hepta CDF	2015/05/07	<0.109, EDL=0.109 (1)		pg/g	
4010827	KKS	RPD - Sample/Sample Dup	2,3,7,8-Tetra CDD	2015/05/07	NC		%	25
			1,2,3,7,8-Penta CDD	2015/05/07	NC		%	25
			1,2,3,4,7,8-Hexa CDD	2015/05/07	NC		%	25
			1,2,3,6,7,8-Hexa CDD	2015/05/07	4.7		%	25
			1,2,3,7,8,9-Hexa CDD	2015/05/07	NC		%	25
			1,2,3,4,6,7,8-Hepta CDD	2015/05/07	5.9		%	25
			Octa CDD	2015/05/07	4.3		%	25
			Total Tetra CDD	2015/05/07	NC		%	25
			Total Penta CDD	2015/05/07	NC		%	25
			Total Hexa CDD	2015/05/07	5.7		%	25
			Total Hepta CDD	2015/05/07	6.5		%	25
			2,3,7,8-Tetra CDF	2015/05/07	NC		%	25

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
			1,2,3,7,8-Penta CDF	2015/05/07	NC		%	25
			2,3,4,7,8-Penta CDF	2015/05/07	NC		%	25
			1,2,3,4,7,8-Hexa CDF	2015/05/07	NC		%	25
			1,2,3,6,7,8-Hexa CDF	2015/05/07	NC		%	25
			2,3,4,6,7,8-Hexa CDF	2015/05/07	NC		%	25
			1,2,3,7,8,9-Hexa CDF	2015/05/07	NC		%	25
			1,2,3,4,6,7,8-Hepta CDF	2015/05/07	5.1		%	25
			1,2,3,4,7,8,9-Hepta CDF	2015/05/07	NC		%	25
			Octa CDF	2015/05/07	6.9		%	25
			Total Tetra CDF	2015/05/07	54 (2)		%	25
			Total Penta CDF	2015/05/07	4.2		%	25
			Total Hexa CDF	2015/05/07	3.3		%	25
			Total Hepta CDF	2015/05/07	5.8		%	25

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

(2) Duplicate results exceeded RPD acceptance criteria. This may be due to sample heterogeneity.

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Maxxam Job #: B577839
Report Date: 2015/05/12

Apex Laboratories
Client Project #: A5D0682

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Branko Vrzic, A.SC.T., Senior Analyst, HRMS Services

Cristina Carriere, Scientific Services

Owen Cosby, BSc.C.Chem, Supervisor, HRMS Services

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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APPENDIX C

DATA VALIDATION MEMORANDUM

DATA QUALITY ASSURANCE/QUALITY CONTROL REVIEW

PROJECT NO. 9003.01.40 | MAY 14, 2015 | PORT OF RIDGEFIELD

This report summarizes the results of a data quality review conducted for sediment samples collected in Lake River offshore of the Port of Ridgefield. The samples were collected in April 2015 to evaluate post-remedial construction baseline conditions.

Maxxam Analytics International Corporation (Maxxam) and Apex Laboratories (Apex) performed the analyses. Maxxam report number B577839 was reviewed as well as Apex report number A5D0682. 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-recommended Standard Methods for the Examination of Water and Wastewater Method 5310B, after which the samples were submitted to Maxxam for analysis of chlorinated dibenzo-p-dioxins and dibenzofurans (dioxins/furans) by U.S. Environmental Protection Agency (USEPA) Method 1613B-Modified. The following samples were analyzed.

Report	Sample ID
B577839/A5D0682	ISM-A-150240
B577839/A5D0682	ISM-B-150421
B577839/A5D0682	ISM-C-150422
B577839/A5D0682	RINSATE BLANK

DATA QUALIFICATIONS

Analytical results were evaluated according to applicable sections of USEPA procedures (USEPA, 2010, 2014) and appropriate laboratory and method-specific guidelines (Maxxam, 2013; USEPA, 1986).

Dioxins/furans that were detected below the method reporting limit (MRL) and reported as an estimated maximum potential concentration (EMPC) were assigned a "U" qualifier by the laboratory (non-detect) at the reported EMPC value, resulting in an elevated estimated detection limit (EDL).

USEPA Method 1613B detections between the MRL and the EDL were qualified as estimates (J) by the reviewer.

The laboratory noted that the oven used to dry TOC samples was outside control limits. Therefore, data were not qualified.

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, the method blanks were associated with all samples prepared in the analytical batch. When an analyte was detected in a sample and in the associated method blank, and the sample result was greater than the method blank result, the sample result was qualified "J" as estimated if the sample concentration was less than five times the method blank concentration. The following sample results were qualified:

Sample	Analyte	Original Result (pg/g)	Qualified Result (pg/g)
ISM-A-150420	1,2,3,7,8,9 – Hexa CDF	0.675	0.675 J
ISM-B-150421	2,3,4,6,7,8 – Hexa CDF	0.210 U	0.210 UJ
ISM-B-150421	1,2,3,7,8,9 – Hexa CDF	0.238 U	0.238 UJ
ISM-C-150422	2,3,4,6,7,8 – Hexa CDF	0.200	0.200 J
ISM-C-150422	1,2,3,7,8,9 – Hexa CDF	0.233	0.233 J

pg/g = pictograms per gram.

Trip Blanks

Trip blanks were not required for this sampling event.

Equipment Rinsate Blanks

Equipment rinsate blanks were conducted for this sampling event. Octa-chlorinated dibenzo-p-dioxin was detected in the rinsate blank at a concentration significantly lower than in the sediment samples (see the attached table). No sample results were qualified because of equipment rinsate blank detections.

LABELED ANALOG STANDARD RECOVERY RESULTS

All USEPA Method 1613B samples were spiked with C13 labeled analog standards (surrogates) to evaluate and document data quality.

All surrogate recoveries were within acceptance limits.

LABORATORY DUPLICATE RESULTS

Duplicate results are used to evaluate laboratory precision. All duplicate samples were extracted and analyzed at the required frequency.

Maxxam noted one duplicate result that exceeded relative percent difference (RPD) acceptance limits by minor amounts because of sample heterogeneity. Data were not qualified as a result.

All other RPDs were within acceptance limits.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RESULTS

A laboratory control sample/laboratory control sample duplicate (LCS/LCSD) (sometimes called a spiked blank) 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 analytes were within acceptance limits for percent recovery.

ISM REPLICATE EVALUATION

Triplicate composite samples were collected and submitted to Maxxam. ISM replicate sets included samples ISM-A-150420, ISM-B-150421, and ISM-C-150422. All ISM replicate sample sets were submitted for dioxin/furan and TOC analysis. The relative standard deviations (RSDs) of the replicate sets were not calculated, as dioxin/furan congener and total results were generally between the EDL and the MRL, less than five times the MRL, or non-detect. RSDs were not calculated for TOC, as two of the three results were less than five times the MRL.

REPORTING LIMITS

Maxxam 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). Apex used routine MRLs.

DATA PACKAGE

The data packages were reviewed for transcription errors, omissions, and anomalies. None were found.

REFERENCES

Maxxam. 2013. Quality assurance manual. Maxxam Analytics International Corporation o/a Maxxam Analytics Inc., Mississauga, Ontario, Canada.

USEPA. 1986. Test methods for evaluating solid waste: physical/chemical methods. EPA-530/SW-846. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. September (revision 6, February 2007).

USEPA. 2010. USEPA contract laboratory program national functional guidelines for inorganic Superfund data review. EPA 540/R-10/011. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. January.

USEPA. 2014. R10 data validation and review guidelines for polychlorinated dibenzo-p-dioxin and polychlorinated dibenzofuran data (PCDD/PCDF) using Method 1613B, and SW846 Method 8290A. EPA-910-R-14-003. U.S. Environmental Protection Agency, Office of Environmental Assessment. May.

Table
Rinsate Blank Results
Former PWT Site
Ridgefield, Washington

Sample ID	RINSATE-SA
Date Collected	04/22/2015
Sample Type	Rinsate Blank
Start Depth	NA
End Depth	NA
Dioxins and Furans (pg/L)	
1,2,3,4,6,7,8-HpCDD	1.12 U
1,2,3,4,6,7,8-HpCDF	1.33 U
1,2,3,4,7,8,9-HpCDF	1.1 U
1,2,3,4,7,8-HxCDD	1.16 U
1,2,3,4,7,8-HxCDF	1.07 U
1,2,3,6,7,8-HxCDD	1.23 U
1,2,3,6,7,8-HxCDF	1.11 U
1,2,3,7,8,9-HxCDD	1.13 U
1,2,3,7,8,9-HxCDF	1.18 U
1,2,3,7,8-PeCDD	1.13 U
1,2,3,7,8-PeCDF	1.14 U
2,3,4,6,7,8-HxCDF	1.02 U
2,3,4,7,8-PeCDF	1.14 U
2,3,7,8-TCDD	1.47 U
2,3,7,8-TCDF	1.15 U
OCDD	5.41
OCDF	1.19 U
Total HpCDDs	1.12 U
Total HpCDFs	1.2 U
Total HxCDDs	5.86 U
Total HxCDFs	1.09 U
Total PeCDDs	1.13 U
Total PeCDFs	1.14 U
Total TCDDs	4.13 U
Total TCDFs	1.15 U

NOTES:
NA = not applicable.
pg/L = picograms per liter.
PWT = Pacific Wood Treating Co.
U = Associated result is less than listed detection limit.