CARTY LAKE 2019 SEDIMENT MONITORING REPORT

FORMER PACIFIC WOOD TREATING CORPORATION 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
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
ISM	incremental sampling methodology
MFA	Maul Foster & Alongi, Inc.
ng/kg	nanograms per kilogram
the Port	Port of Ridgefield
PWT	Pacific Wood Treating Corporation
QA/QC	quality assurance and quality control
REL	remediation level
RNWR	Ridgefield National Wildlife Refuge
SAP	sampling and analysis plan
TEQ	toxicity equivalent
TOC	total organic carbon
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 for Carty Lake post-remedy sediment monitoring results. Carty Lake is located in the Ridgefield National Wildlife Refuge (RNWR), adjacent to the former Pacific Wood Treating Corporation (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 Millers' Landing.

On November 5, 2013, the Port entered into a Consent Decree with the State of Washington requiring remedial action to address contaminated sediments in Carty Lake. The selected remedial action was substantively completed in 2014 and consisted of sediment excavation, placement of a clean sand cap layer, and stabilization of a treated-wood bulkhead as described in the cleanup action plan (CAP) (Ecology, 2013). In addition, the CAP specifies institutional controls to limit fishing in the lake. The remedy includes post-remedial monitoring, which will assess the efficacy of the remedial action and quantify the reduction in concentrations relative to the cleanup level (CUL) (Ecology, 2013).

The Consent Decree requires a comprehensive operations and maintenance plan that summarizes requirements for inspection and maintenance of former PWT site cleanup actions; includes actions required to operate and maintain equipment, structures, or other remedial systems (including management and maintenance of soil caps); and describes compliance monitoring plans. This report provides the results of the post-remedy confirmation monitoring, including sampling methodology and analysis, quality assurance protocols, and laboratory analytical results and interpretation. Sampling and reporting were conducted in accordance with the Washington State Department of Ecology (Ecology)-approved sampling and analysis plan (SAP) (MFA, 2015), with any exceptions noted in this report.

1.1 Background

The CAP identifies remediation levels (RELs) based on risk-based ecological factors and a CUL for polychlorinated dibenzo-p-dioxins and furans (collectively referred to as dioxins) in Carty Lake sediments (see Table 1-1).[1] As described in the Carty Lake Engineering Design Report (MFA, 2014), areas in the southern end of Carty Lake that exceeded RELs were excavated and treated with a clean sand layer (see Figure 1-2). The planned post-excavation surface was well-characterized prior to finalizing the project design, and the excavation prism was conservatively designed to remove contaminants. In April 2019, five years after completion of the remedy, confirmation monitoring was conducted in surface sediments to quantify the long-term effectiveness of the cleanup action, i.e., the reductions in dioxin concentrations relative to the CUL of 5 nanograms per kilogram (ng/kg) dioxin toxicity equivalent (TEQ).

[1] RELs protective of ecological resources are congener-specific; the CUL is based on human health considerations and is evaluated as a dioxin TEQ.

2 SITE CONDITIONS

Carty Lake is a 52-acre lake in the RNWR Carty Unit. The National Wetlands Inventory classifies much of Carty Lake as a lacustrine, limnetic, unconsolidated bottom, permanently tidal. The remedy area is in the southern end; this area is a shallow, open water body with a fringe of emergent wetland (Category II lake-fringe) (MFA, 2013). During most of the year, Carty Lake has no outlet. During the rainy season, Gee Creek and Carty Lake can be hydraulically connected at the lake's northern end. Water levels range from 3 to 10 feet, varying seasonally, and are generally higher during winter and spring and lower during summer and fall. Water fluctuations are muted relative to Lake River, with increases and decreases occurring more gradually because there is no direct connection with the Columbia River.

Carty Lake features a low-energy, depositional environment. Percent fines in Carty Lake are generally over 75 percent fines. Carty Lake's hydraulic exchange with other surface water bodies is limited to unusually high water events outside of seasonal variability. Further, given that human access to Carty Lake is limited and boat access is restricted, anthropogenic high-velocity events are not expected.

3 SAMPLING PROGRAM

The incremental sampling methodology (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) and 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 area-wide 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 across the entire remedy area, from the surface of the sediment to 10 centimeters (cm) below the mudline (as described in Section 1.1 and 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. Increment locations 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. Three sets of 30 locations each (A, B, and C) were assigned for collection of the triplicate composite increment samples A, B, and C. Increment locations

are shown on Figure 3-1. Subsequent monitoring events, if necessary, will be collected at sampling location A.

All ISM samples were analyzed for dioxins and total organic carbon (TOC).

3.2 Sampling Methods

MFA conducted sediment sampling on April 2 and 3, 2019. Figure 3-1 and Table 3-1 show and summarize sampling stations, respectively.

Surface sediment increments were collected using a 1-inch-diameter, thin-walled, stainless steel sampling tube. The sampling tube was manually advanced to below 10 cm. The sampling tube was withdrawn, and the increment was extruded onto a clean work surface. The increment was measured, trimmed to approximately 10 cm, and placed in the laboratory-supplied sampling container. If increment recovery was poor at certain locations, the increment was either discarded and resampled within a few feet of the original location or a second increment was collected. Some locations could not be accessed via boat because water levels were too low. These locations were accessed by foot from shore, and the 1-inch-diameter, thin-walled, stainless steel sampling tube was used to retrieve the sample. Approximately 100 grams per increment were collected to provide the overall mass required by the analytical laboratory, for a total of approximately 3 kilograms per ISM sample.

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). 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, with chain of custody (COC) documentation, before submittal 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). Nondisposable sampling equipment (i.e., incremental sampling equipment) were decontaminated using 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.

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.

An equipment rinsate blank collected from decontaminated reusable equipment (e.g., bowls and spoons) that came into direct contact with sediment samples was analyzed and showed that no sediment sample results required qualification.

3.4 Sample Transport

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

3.5 Laboratory Chemical Sample Processing 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 obtain a representative subsample and improve analyte extraction efficiency. Each sample was sieved using an American Society for Testing and Materials No. 10 (2-millimeter) sieve. Once the sample was dried and sieved, the laboratory performed the "one-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 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 (USEPA) Method 1613B

Laboratory QA/QC requirements were maintained using standard USEPA methods, based on USEPA test methods for evaluating solid waste and 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; USEPA, 1986), and are reported consistent with recent dioxin data treatment guidance (Ecology, 2015). ISM sample replicates were assessed as part of the data validation. Sample results were qualified appropriately to reflect any criteria not satisfied during these 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 April 2019 sediment monitoring results are provided in Table 4-1. Each ISM dioxin TEQ concentration is below the CUL of 5 ng/kg, and most dioxin congener results are at or near the estimated detection limits. This demonstrates that the Carty Lake remedial action has been effective and that the targeted risk reduction has been achieved.

Before the remedial action, dioxin TEQ concentrations in Carty Lake were as high as 1,400 ng/kg, and it was estimated that post-remedy concentrations would range up to 60 ng/kg, following excavation and the placement of an approximately 1-foot-thick, clean sand layer (MFA, 2014). The 2019 average ISM concentration is well below these projection and is well below the CUL of 5 ng/kg.

The CAP calls for one long-term effectiveness monitoring event, which was conducted in 2019 and is described in this report. The CAP further states that additional sampling after 2019 could be conducted (e.g., in consideration of eliminating institutional controls and to evaluate concentration trends) but does not require additional monitoring event(s). The sampling regime was designed to obtain a representative average concentration for the remedy area and shows that 1) a significant reduction due to dioxin mass removal and clean sand placement has been achieved and 2) that the cleanup goal has been met. At this time, no further sediment monitoring events are proposed since sediment conditions are not expected to change appreciably. The placed clean sand was observed during sampling and is expected to remain in place: Carty Lake is a low-energy environment and significant deposition from other areas of the lake is not expected; no propwash (or other significant anthropogenic disturbances) occurs in the remedy area; and the clean sand was placed on a dense clay layer and significant mixing with this layer is not expected. Future sediment monitoring will be conducted, if determined necessary for evaluating whether institutional controls on fishing need to remain in place.

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 1-1
Sediment Performance Standards
Former PWT Site
Ridgefield, Washington

Analyte	Performance Standards (ng/kg)
Cleanup Level	
Dioxin TEQ	5.0E+00
Remediation Levels	
2,3,7,8-TCDD	3.3E+00
1,2,3,7,8-PeCDD	9.8E+01
1,2,3,4,7,8-HxCDD	2.0E+02
1,2,3,6,7,8-HxCDD	1.2E+03
1,2,3,7,8,9-HxCDD	1.2E+03
1,2,3,4,6,7,8-HpCDD	3.1E+05
OCDD	1.0E+07
2,3,7,8-TCDF	8.6E+01
1,2,3,7,8-PeCDF	5.5E+02
2,3,4,7,8-PeCDF	6.5E+00
1,2,3,4,7,8-HxCDF	9.8E+02
1,2,3,6,7,8-HxCDF	9.8E+02
1,2,3,7,8,9-HxCDF	9.8E+02
2,3,4,6,7,8-HxCDF	9.8E+02
1,2,3,4,6,7,8-HpCDF	2.5E+05
1,2,3,4,7,8,9-HpCDF	2.5E+05
OCDF	1.0E+07

NOTES:
ng/kg = nanograms per kilogram.
TEQ = toxicity equivalent.

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

Increment Number	Group	Sampler	Date Collected	Time Collected	Comments
1	A	BEH/MVP	04/02/2019	11:03	SAND (SP): dark gray; 100% sand, medium; trace gravel, fine, subangular
1	B	BEH/MVP	04/02/2019	11:12	SAND (SP): dark gray; 90% sand, medium; 10% gravel, fine, subrounded
1	C	BEH/MVP	04/02/2019	10:57	SAND (SP): dark gray; 100% sand, medium
2	A	BEH/MVP	04/02/2019	11:17	SAND (SP): dark gray; 95% sand, medium; 5% gravel, fine, subrounded
2	B	BEH/MVP	04/02/2019	11:22	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium
2	C	BEH/MVP	04/02/2019	11:27	SAND (SP): dark gray; 95% sand, medium; 5% gravel, fine, subrounded
3	A	BEH/MVP	04/02/2019	11:41	SAND (SP): dark gray; 95% sand, medium; 5% gravel, fine, subrounded
3	B	BEH/MVP	04/02/2019	11:37	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium; trace organic debris
3	C	BEH/MVP	04/02/2019	11:33	SAND (SP): dark gray; 95% sand, medium; 5% gravel, fine, subrounded
4	A	BEH/MVP	04/02/2019	13:36	SAND (SP): dark gray; 5% fines, low plasticity; 90% sand, medium; 5% gravel, fine, subrounded
4	B	BEH/MVP	04/02/2019	12:09	SAND (SP): dark gray; 95% sand, medium; 5% gravel, fine, subrounded; trace organic debris
4	C	BEH/MVP	04/02/2019	12:02	SAND (SP): dark gray; 95% sand, medium; 5% gravel, fine, subrounded; trace organic debris
5	A	BEH/MVP	04/02/2019	14:03	SAND (SP): dark gray; 5% fines, low plasticity: 95% sand, medium
5	B	BEH/MVP	04/02/2019	14:18	SAND (SP): dark gray; 5% fines, low plasticity: 95% sand, medium
5	C	BEH/MVP	04/02/2019	13:57	SAND (SP): dark gray; 5% fines, low plasticity; 90% sand, medium to coarse; 5% gravel, fine
6	A	BEH/MVP	04/03/2019	9:31	SAND (SP): dark gray; 10% fines, low plasticity; 90% sand, medium to coarse;; trace woody debris
6	B	BEH/MVP	04/03/2019	13:05	SAND (SP): dark gray; 5% fined, low plasticity; 95% sand, medium to coarse
6	C	BEH/MVP	04/02/2019	14:33	SAND (SP): dark gray; 95% sand, medium to coarse; 5% gravel, fine, subrounded
7	A	BEH/MVP	04/03/2019	9:47	SAND (SP): dark gray; 95% sand, medium to coarse; 5% gravel, fine, subrounded
7	B	BEH/MVP	04/03/2019	13:02	SAND (SP): dark gray; 95% sand, medium to coarse; 5% gravel, fine, subrounded
7	C	BEH/MVP	04/03/2019	14:50	SAND (SP): dark gray; 95% sand, medium to coarse; 5% gravel, fine, subrounded
8	A	BEH/MVP	04/02/2019	12:19	SAND (SP): dark gray/brown; 5% fines, low plasticity; 90% sand, medium; 5% gravel, fine, subrounded; trace organics
8	B	BEH/MVP	04/03/2019	13:00	SAND (SP): dark gray; 100% sand, medium to coarse
8	C	BEH/MVP	04/03/2019	14:47	SAND (SP): dark gray; 95% sand, medium to coarse; 5% gravel, fine, subrounded
9	A	BEH/MVP	04/03/2019	10:07	SAND (SP): dark gray; 10% fines, low plasticity; 90% sand, medium to coarse
9	B	BEH/MVP	04/03/2019	12:48	SAND (SP): dark gray; 10% fines, low plasticity; 90% sand, medium to coarse
9	C	BEH/MVP	04/03/2019	14:34	SAND (SP): dark gray; 10% fines, low plasticity; 90% sand, medium to coarse
10	A	BEH/MVP	04/03/2019	10:03	SAND (SP): dark gray; 95% sand, medium to coarse; 5% gravel, fine, subrounded; trace fines, low plasticity
10	B	BEH/MVP	04/02/2019	13:52	SAND (SP): dark gray; 95% sand, medium to coarse; 5% gravel, fine, subrounded
10	C	BEH/MVP	04/02/2019	13:39	SAND (SP): dark gray/brown; 5% fines, low plasticity; 90% sand, medium; 5% gravel, fine, subrounded
11	A	BEH/MVP	04/03/2019	9:57	SAND (SP): dark gray; 10% fines, low plasticity; 90% sand, medium to coarse
11	B	BEH/MVP	04/03/2019	12:51	SAND (SP): dark gray; 100% sand, medium to coarse
11	C	BEH/MVP	04/03/2019	14:40	SAND (SP); dark gray; 95% sand, medium to coarse; 5% gravel, fine, subrounded
12	A	BEH/MVP	04/03/2019	9:53	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium to coarse
12	B	BEH/MVP	04/03/2019	12:55	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium to coarse
12	C	BEH/MVP	04/03/2019	14:43	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium to coarse
13	A	BEH/MVP	04/03/2019	10:11	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium to coarse
13	B	BEH/MVP	04/03/2019	12:38	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium to coarse
13	C	BEH/MVP	04/03/2019	14:25	SAND (SP): dark gray; 100% sand, medium to coarse

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

Increment Number	Group	Sampler	Date Collected	Time Collected	Comments
14	A	BEH/MVP	04/03/2019	10:17	SAND (SP): dark gray; 95% sand, medium to coarse; 5% gravel, fine, subrounded
14	B	BEH/MVP	04/03/2019	12:43	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium to coarse
14	C	BEH/MVP	04/03/2019	14:28	SAND (SP): dark gray; 10% fines, medium plasticity; 90% sand, medium to coarse
15	A	BEH/MVP	04/02/2019	17:04	SAND (SP): dark gray; 10% fines, medium plasticity; 90% sand, medium to coarse
15	B	BEH/MVP	04/02/2019	16:56	SAND (SP): dark gray; 10% fines, low plasticity; 90% sand, medium
15	C	BEH/MVP	04/02/2019	16:38	SAND (SP): dark gray; 95% sand, medium; 5% gravel, fine, subrounded; trace organic debris
16	A	BEH/MVP	04/03/2019	10:29	SAND (SP): dark gray/brown; 5% fines, low plasticity; 95% sand, medium; trace woody debris
16	B	BEH/MVP	04/02/2019	12:40	SAND (SP): dark gray/brown; 5% fines, low plasticity; 90% sand, medium; 5% gravel, fine; trace organic debris
16	C	BEH/MVP	04/02/2019	12:47	SAND (SP): dark gray;/brown; 95% sand, medium; 5% gravel, fine, subrounded; trace organic debris
17	A	BEH/MVP	04/03/2019	10:23	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium
17	B	BEH/MVP	04/03/2019	12:33	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium
17	C	BEH/MVP	04/03/2019	14:20	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium
18	A	BEH/MVP	04/02/2019	15:36	SAND (SP): dark gray; 5% fines, low plasticity; 90% sand, medium; 5% gravel, fine, subrounded
18	B	BEH/MVP	04/02/2019	15:32	SAND (SP): dark gray; 5% fines, low plasticity; 90% sand, medium; 5% gravel, fine, subrounded
18	C	BEH/MVP	04/02/2019	15:24	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium; trace organic debris
19	A	BEH/MVP	04/02/2019	12:55	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium; trace organic debris
19	B	BEH/MVP	04/02/2019	16:27	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium
19	C	BEH/MVP	04/02/2019	16:10	SAND (SP): dark gray; 10% fines, low plasticity; 90% sand, medium
20	A	BEH/MVP	04/03/2019	9:17	SAND (SP): dark gray; 10% fines, low plasticity; 90% sand, medium
20	B	BEH/MVP	04/03/2019	12:25	SAND (SP): dark gray; 10% fines, low plasticity; 90% sand, medium; woody debris
20	C	BEH/MVP	04/03/2019	14:08	SAND (SP): dark dray; 5% fines, low plasticity; 95% sand, medium
21	A	BEH/MVP	04/02/2019	15:14	SAND (SP): dark gray/brown; 10% fines, low plasticity; 90% sand, medium; trace organic debris
21	B	BEH/MVP	04/03/2019	12:30	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium; trace woody debris
21	C	BEH/MVP	04/03/2019	14:15	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium to coarse; trace woody debris
22	A	BEH/MVP	04/02/2019	15:57	SAND (SP): dark gray/brown; 10% fines, low plasticity; 90% sand, medium to coarse
22	B	BEH/MVP	04/02/2019	13:05	SAND (SP): dark gray/brown; 5% fines, low plasticity; 90% sand, medium to coarse; 5% gravel, fine, subrounded, trace organic debris
22	C	BEH/MVP	04/02/2019	15:41	SAND (SP): dark gray/brown; 5% fines, low plasticity; 90% sand, medium to coarse; 5% gravel, fine, subrounded, trace organic debris
23	A	BEH/MVP	04/03/2019	10:37	SAND (SP): dark gray/brow~~w~~n; 5% fines, low plasticity; 95% sand, medium
23	B	BEH/MVP	04/03/2019	12:21	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium
23	C	BEH/MVP	04/03/2019	14:04	SAND (SP): dark gray; 95% sand, medium to coarse; 5% gravel, fine, subrounded; trace woody debris
24	A	BEH/MVP	04/03/2019	10:42	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium to coarse
24	B	BEH/MVP	04/03/2019	12:17	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium
24	C	BEH/MVP	04/03/2019	14:10	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium to coarse
25	A	BEH/MVP	04/03/2019	10:51	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium
25	B	BEH/MVP	04/03/2019	12:05	SAND (SP): dark gray; 100% sand, medium to coarse; trace woody debris
25	C	BEH/MVP	04/03/2019	14:01	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium
26	A	BEH/MVP	04/03/2019	10:45	SAND (SP): dark gray; 100% sand, medium to coarse; trace woody debris
26	B	BEH/MVP	04/03/2019	12:07	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium; trace woody debris
26	C	BEH/MVP	04/03/2019	13:58	SAND (SP): dark gray; 95% sand, medium to coarse; 5% gravel, medium, subrounded

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

Increment Number	Group	Sampler	Date Collected	Time Collected	Comments
27	A	BEH/MVP	04/03/2019	10:57	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium to coarse; trace woody debris
27	B	BEH/MVP	04/03/2019	12:13	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium to coarse; trace roots
27	C	BEH/MVP	04/03/2019	13:54	SAND (SP): dark gray/brown; 5% fines, low plasticity; 95% sand, medium to coarse
28	A	BEH/MVP	04/03/2019	11:02	SAND (SP): dark gray; 5% fines, low plasticity; 90% sand, medium to coarse; 5% gravel, medium, rounded
28	B	BEH/MVP	04/03/2019	11:50	SAND (SP): dark gray; 95% sand, medium to coarse; 5% gravel, medium, subrounded
28	C	BEH/MVP	04/03/2019	13:50	SAND (SP): dark gray; 95% sand, medium to coarse; 5% gravel, medium, subrounded
29	A	BEH/MVP	04/03/2019	11:08	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium
29	B	BEH/MVP	04/03/2019	12:00	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium to coarse
29	C	BEH/MVP	04/03/2019	13:47	SAND (SP): dark gray; 10% fines, medium plasticity; 90% sand, medium
30	A	BEH/MVP	04/02/2019	10:50	SAND (SP): dark gray; 100% sand, medium
30	B	BEH/MVP	04/03/2019	11:52	SAND (SP): dark gray; 5% fines, low plasticity; 95% sand, medium
30	C	BEH/MVP	04/02/2019	10:25	SAND (SP): grayish brown; 5% fines, low plasticity; 95% sand; trace woody debris

NOTES:
BEH = Brooke Harmon.
MVP = Meaghan Pollock.
PWT = Pacific Wood Treating Corporation.

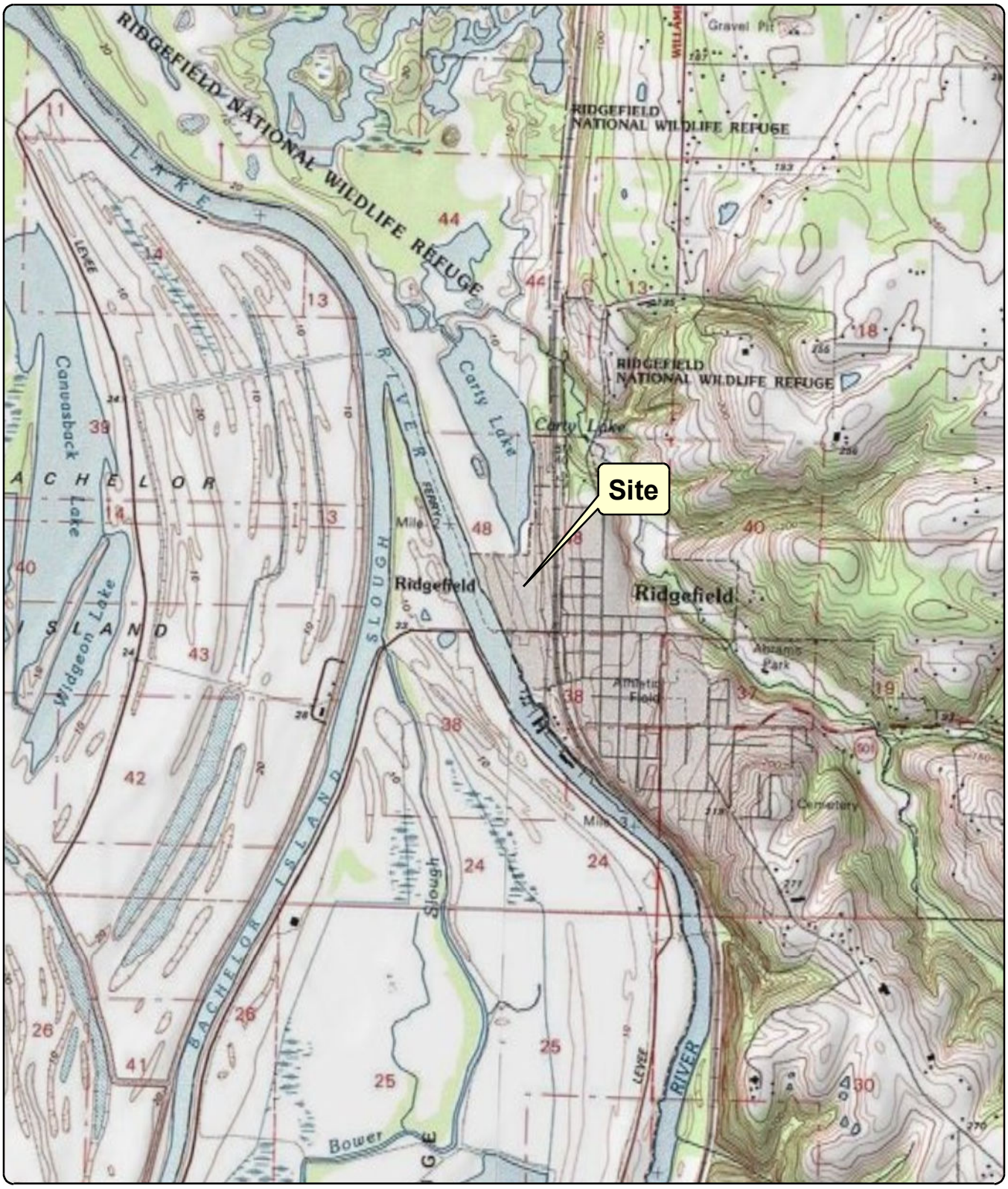
Table 4-1
Sediment Sample Results
Former PWT Site
Ridgefield, Washington

	Location	ISM Sample A	ISM Sample B	ISM Sample C
	Sample ID	ISM-A-190403	ISM-B-190403	ISM-C-190403
	Date Collected	04/03/2019	04/03/2019	04/03/2019
	Sample Type	ISM	ISM	ISM
	Collection Depth (cm bml)	0-10	0-10	0-10
	Cleanup Level			
Dioxins and Furans (pg/g)				
1,2,3,4,6,7,8-HpCDD	--	59.5	49.1	59.2
1,2,3,4,6,7,8-HpCDF	--	7.88	7.03	8.39
1,2,3,4,7,8,9-HpCDF	--	0.496 J	0.479 J	0.573 UJ
1,2,3,4,7,8-HxCDD	--	0.507 J	0.428 J	0.593 UJ
1,2,3,4,7,8-HxCDF	--	1.06 UJ	1 UJ	1.03 J
1,2,3,6,7,8-HxCDD	--	2.04 J	1.92 J	1.99 J
1,2,3,6,7,8-HxCDF	--	0.624 J	0.4 J	0.39 J
1,2,3,7,8,9-HxCDD	--	1.04 UJ	1.08 J	1.16 UJ
1,2,3,7,8,9-HxCDF	--	0.5 U	0.292 UJ	0.406 U
1,2,3,7,8-PeCDD	--	0.284 U	0.301 U	0.282 U
1,2,3,7,8-PeCDF	--	0.389 UJ	0.343 J	0.288 J
2,3,4,6,7,8-HxCDF	--	0.564 J	0.489 UJ	0.597 UJ
2,3,4,7,8-PeCDF	--	0.49 J	0.384 J	0.547 J
2,3,7,8-TCDD	--	0.161 U	0.25 J	0.212 U
2,3,7,8-TCDF	--	0.317 J	0.262 U	0.272 U
OCDD	--	493	400	465
OCDF	--	18.2	16.2	18.1
Total HpCDDs	--	133 J	95.9 J	114 J
Total HpCDFs	--	24.3 J	20.7 J	23.9 J
Total HxCDDs	--	16 J	13.5 J	15.2 J
Total HxCDFs	--	13.3 J	11.3 J	12.4 J
Total PeCDDs	--	1.47 UJ	1.08 J	1.1 UJ
Total PeCDFs	--	4.81 J	4.34 J	4.9 J
Total TCDDs	--	0.702 UJ	0.887 J	0.346 J
Total TCDFs	--	0.933 J	0.9 UJ	0.635 UJ
Total TEQ Mammals (U=1/2 EDL)	5	1.74	1.7	1.74
Conventionals (mg/kg)				
Total Organic Carbon	--	6800	6400	7000

Table 4-1
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.
pg/g = picograms per gram.
PWT = Pacific Wood Treating Corporation.
TEQ = toxicity equivalent quotient.
U = associated result is not detected at the EDL.
UJ = associated result is not detected at the EDL and is an estimated quantity.

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

Figure 1-1
Site Location

Former PWT Site
Ridgefield, Washington

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0 990 1,980
Feet

Path: X:\9003.01 Port of Ridgefield\401\Projects\06\Lake River Initial Design Report\Fig1-1_Site Location.mxd
Print Date: 4/19/2013
Approved By: J. King
Produced By: D. Coe/ W. Coffey
Project: 9003.01.20

Source: Aerial photograph (2014) obtained from Clark County GIS. Site features and boundaries provided through surveys conducted by Minister & Glaeser Surveying in 2014 and 2015. All features are approximate.

Legend

- Ordinary High Water
- Fish-Mix Rock
- Bank
- Excavation Extent
- Former Berm (Approximate)

Figure 1-2
Carty Lake Remedy Location

Former PWT Site
Ridgefield, Washington

0 50 100
Feet

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Path: X:\9003.01 Port of Ridgefield\40\Projects\06\Long Term Monitoring SAP - Carty Lake\Fig1-2_RemedyArea.mxd
Print Date: 6/12/2015
Approved By: P. Wiescher
Produced By: jschane
Project: 9003.01.40

Path: X:\9003.01 Port of Ridgefield\40\Projects\06\Long Term Monitoring SAP - Carty Lake\Fig3-1_Carty Lake Sample Locations.mxd

Print Date: 5/18/2015

Approved By: P. Wiescher

Produced By: jschane

Project: 9003.01.40

Source: Aerial photograph obtained from ESRI, Inc. ArcGIS Online (2010). Site features and boundaries provided through surveys conducted by Minister & Glaeser Surveying in 2014 and 2015. All features are approximate.

Legend

- Incremental Sample Location A
- Incremental Sample Location B
- Incremental Sample Location C
- Ordinary High Water
- Decision Unit
- Excavation Extent
- Bank
- Fish-Mix Rock

Figure 3-1
Carty Lake
Sample Locations

Former PWT Site
Ridgefield, Washington

0 20 40
Feet

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APPENDIX A

PHOTO ARRAY

Appendix A – Photo Array

Project Name: Carty Lake Sediment Confirmation Sampling
Project Number: 9003.01.40
Location: 111 West Division Street
Ridgefield, Washington

Photo No. 1.

Description
Representative core from incremental sampling methodology (ISM) sample B. Homogenous medium sand and fine gravel. April 2, 2019.

Photo No. 2.

Description
Representative core from ISM sample B. Fines present at top of core, transitioning to medium/coarse sand. April 3, 2019.

Appendix A – Photo Array

Project Name: Carty Lake Sediment Confirmation Sampling
Project Number: 9003.01.40
Location: 111 West Division Street
Ridgefield, Washington

Photo No. 3.

Description
Sample retrieval. April 2, 2019.

Photo No. 4.

Description
Carty Lake, looking east. April 2, 2019.

Appendix A – Photo Array

Project Name: Carty Lake Sediment Confirmation Sampling
Project Number: 9003.01.40
Location: 111 West Division Street
Ridgefield, Washington

Photo No. 5.

Description
Representative core from ISM sample A. Fines transitioning to medium sand. April 2, 2019.

APPENDIX B
ANALYTICAL REPORTS

Apex Laboratories, LLC

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Thursday, May 2, 2019

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

RE: A9D0307 - Carty Lake - 9003.01.40

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 A9D0307, which was received by the laboratory on 4/4/2019 at 2:33:00PM.

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 final reporting, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Default Cooler	2.7 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

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

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Maul Foster & Alongi, INC.	Project: **Carty Lake**	
2001 NW 19th Ave, STE 200	Project Number: **9003.01.40**	**Report ID:**
Portland, OR 97209	Project Manager: **Phil Wiescher**	**A9D0307 - 05 02 19 1530**

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ISM-A-190403 - As Received	A9D0307-01	Soil	04/03/19 11:08	04/04/19 14:33
ISM-A-190403 - After Processing	A9D0307-02	Soil	04/03/19 11:08	04/04/19 14:33
ISM-B-190403 - As Received	A9D0307-03	Soil	04/03/19 12:55	04/04/19 14:33
ISM-B-190403 - After Processing	A9D0307-04	Soil	04/03/19 12:55	04/04/19 14:33
ISM-C-190403 - As Received	A9D0307-05	Soil	04/03/19 14:50	04/04/19 14:33
ISM-C-190403 - After Processing	A9D0307-06	Soil	04/03/19 14:50	04/04/19 14:33
Rinsate Blank	A9D0307-07	Water	04/02/19 17:30	04/04/19 14:33

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EPA ID: OR01039

Maul Foster & Alongi, INC.	Project: **Carty Lake**	
2001 NW 19th Ave, STE 200	Project Number: **9003.01.40**	**Report ID:**
Portland, OR 97209	Project Manager: **Phil Wiescher**	**A9D0307 - 05 02 19 1530**

ANALYTICAL SAMPLE RESULTS

Demand Parameters

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
ISM-A-190403 - After Processing (A9D0307-02)				**Matrix: Soil**				
Batch: 9040867								
Total Organic Carbon	**6800**	---	200	mg/kg	1	04/15/19	SM 5310 B MOD	
ISM-B-190403 - After Processing (A9D0307-04)				**Matrix: Soil**				
Batch: 9040867								
Total Organic Carbon	**6400**	---	200	mg/kg	1	04/15/19	SM 5310 B MOD	
ISM-C-190403 - After Processing (A9D0307-06)				**Matrix: Soil**				
Batch: 9040867								
Total Organic Carbon	**7000**	---	200	mg/kg	1	04/15/19	SM 5310 B MOD	

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Maul Foster & Alongi, INC.	Project: **Carty Lake**	
2001 NW 19th Ave, STE 200	Project Number: **9003.01.40**	**Report ID:**
Portland, OR 97209	Project Manager: **Phil Wiescher**	**A9D0307 - 05 02 19 1530**

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 9040867 - PSEP TOC							**Soil**					
Blank (9040867-BLK1)			Prepared: 04/12/19 16:22		Analyzed: 04/15/19 08:14							
SM 5310 B MOD												
Total Organic Carbon	ND	---	200	mg/kg	1	---	---	---	---	---	---	
Blank (9040867-BLK2)			Prepared: 04/12/19 16:22		Analyzed: 04/15/19 08:14							
SM 5310 B MOD												
Total Organic Carbon	ND	---	200	mg/kg	1	---	---	---	---	---	---	A-01
LCS (9040867-BS1)			Prepared: 04/12/19 16:22		Analyzed: 04/15/19 08:14							
SM 5310 B MOD												
Total Organic Carbon	9300	---		mg/kg	1	10000	---	93	90-110%	---	---	
Duplicate (9040867-DUP1)			Prepared: 04/12/19 16:22		Analyzed: 04/15/19 08:14							
QC Source Sample: ISM-A-190403 - After Processing (A9D0307-02)												
SM 5310 B MOD												
Total Organic Carbon	**6600**	---	200	mg/kg	1	---	6800	---	---	3	20%	

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2001 NW 19th Ave, STE 200	Project Number: **9003.01.40**	**Report ID:**
Portland, OR 97209	Project Manager: **Phil Wiescher**	**A9D0307 - 05 02 19 1530**

SAMPLE PREPARATION INFORMATION

Demand Parameters

Prep: PSEP TOC

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 9040867							
A9D0307-02	Soil	SM 5310 B MOD	04/03/19 11:08	04/12/19 16:22	5g/5g	5g/5g	NA
A9D0307-04	Soil	SM 5310 B MOD	04/03/19 12:55	04/12/19 16:22	5g/5g	5g/5g	NA
A9D0307-06	Soil	SM 5310 B MOD	04/03/19 14:50	04/12/19 16:22	5g/5g	5g/5g	NA

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EPA ID: OR01039

Maul Foster & Alongi, INC.	Project: **Carty Lake**	
2001 NW 19th Ave, STE 200	Project Number: **9003.01.40**	**Report ID:**
Portland, OR 97209	Project Manager: **Phil Wiescher**	**A9D0307 - 05 02 19 1530**

QUALIFIER DEFINITIONS

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

Apex Laboratories

A-01	puck mill grind blank

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2001 NW 19th Ave, STE 200	Project Number: **9003.01.40**	**Report ID:**
Portland, OR 97209	Project Manager: **Phil Wiescher**	**A9D0307 - 05 02 19 1530**

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

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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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

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2001 NW 19th Ave, STE 200	Project Number: **9003.01.40**	**Report ID:**
Portland, OR 97209	Project Manager: **Phil Wiescher**	**A9D0307 - 05 02 19 1530**

LABORATORY ACCREDITATION INFORMATION

TNI 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

Philip Nerenberg, Lab Director

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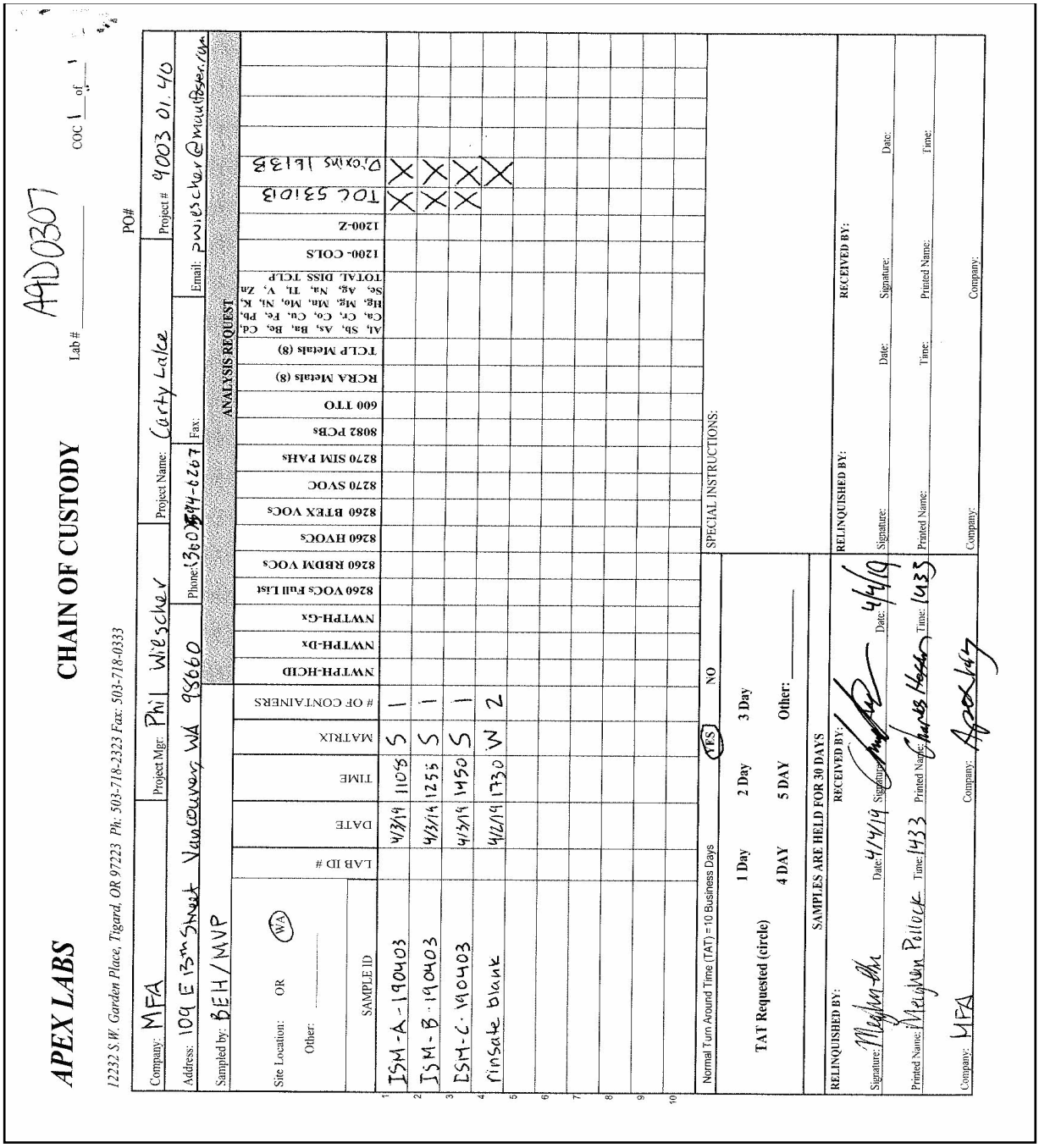
Apex Laboratories, LLC
12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Maul Foster & Alongi, INC.	Project: **Carty Lake**	
2001 NW 19th Ave, STE 200	Project Number: **9003.01.40**	**Report ID:**
Portland, OR 97209	Project Manager: **Phil Wiescher**	**A9D0307 - 05 02 19 1530**



APEX LABS
12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

CHAIN OF CUSTODY

Lab # A9D0307 COC 1 of 1

Company: MFA | Project Mgr: Phil Wiescher | Project Name: Carty Lake | Project # 9003.01.40
Address: 109 E 13th Street Vancouver WA 98660 | Phone: 360-694-6267 | Fax: | Email: pwiescher@mfa-inc.com
Sampled by: BEH/MVP | PO#

Site Location: OR (WA) Other:

ANALYSIS REQUEST

	SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 VOCs Full List	8260 RBDM VOCs	8260 HVOCs	8260 BTEX VOCs	8270 SVOC	8270 SIM PAHs	8082 PCBs	600 TTO	RCRA Metals (8)	TCLP Metals (8)	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	1200- COLS	1200-Z	TOC 53103	Dioxins 16138
1	ISM-A-190403		4/3/19	1105	S	1																X	X
2	ISM-B-190403		4/3/19	1255	S	1																X	X
3	ISM-C-190403		4/3/19	1450	S	1																X	X
4	Rinsate Blank		4/2/19	1730	W	2																	
5																							
6																							
7																							
8																							
9																							
10																							

Normal Turn Around Time (TAT) = 10 Business Days (YES) NO

SPECIAL INSTRUCTIONS:

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

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY:
Signature: Meghan Pellegrini Date: 4/4/19 Time: 1433
Printed Name: Meghan Pellegrini
Company: MFA

RECEIVED BY:
Signature: Date: 4/4/19 Time: 1433
Printed Name: Chris Hogan
Company: Apex Labs

RELINQUISHED BY:
Signature: Date: Time:
Printed Name:
Company:

RECEIVED BY:
Signature: Date: Time:
Printed Name:
Company:

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.

Apex Laboratories, LLC
12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Maul Foster & Alongi, INC.	Project: **Carty Lake**	
2001 NW 19th Ave, STE 200	Project Number: **9003.01.40**	**Report ID:**
Portland, OR 97209	Project Manager: **Phil Wiescher**	**A9D0307 - 05 02 19 1530**

APEX LABS COOLER RECEIPT FORM

Client: MFA Element WO#: A9 D0307

Project/Project #: Carty Lake 9003.01.40

Delivery Info:

Date/time received: 4/4/19 @ 1433 By: CFH

Delivered by: Apex X Client ___ ESS ___ FedEx ___ UPS ___ Swift ___ Senvoy ___ SDS ___ Other ___

Cooler Inspection Date/time inspected: 4/4/19 @ 1610 By: CFH

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)	2.7						
Received on ice? (Y/N)	Y						
Temp. blanks? (Y/N)	Y						
Ice type: (Gel/Real/Other)	Gel/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: 4/4/19 @ 16:50 By: TAG

All samples intact? Yes X No ___ Comments:

Bottle labels/COCs agree? Yes X No ___ Comments:

COC/container discrepancies form initiated? Yes ___ No ___ NA 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 ___ No ___ NA X pH appropriate? Yes ___ No ___ NA X

Comments:

Additional information:

Labeled by: KF Witness: X Cooler Inspected by: TAG See Project Contact Form: Y

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

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

May 02, 2019

Ms. Lisa Domenighini
Apex Laboratories
12232 S.W. Garden Place
Portland, Oregon 97223

Re: 2018 DXN & PCB IDIQ
Work Order: 14833
SDG: A9D0307

Dear Ms. Domenighini:

Cape Fear Analytical LLC (CFA) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on April 16, 2019. 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

CFA WO#14833

Apex Laboratories

A9D0307

inAP 4/12/19

SENDING LABORATORY:

Apex Laboratories
12232 S.W. Garden Place
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 718-0333
Project Manager: Philip Nerenberg

RECEIVING LABORATORY:

Cape Fear Analytical, LLC
3306 Kitty Hawk Rd Suite 120
Wilmington, NC 28405
Phone :(910) 795-0421
Fax: -

AAC 4/15/19

Sample Name: ISM-A-190403 - After Processing **Soil** **Sampled: 04/03/19 11:08** (A9D0307-02)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	04/17/19 17:00	09/30/19 11:08	
Containers Supplied:	4/3/2019		
(B)4 oz Glass Jar			

Sample Name: ISM-B-190403 - After Processing **Soil** **Sampled: 04/03/19 12:55** (A9D0307-04)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	04/17/19 17:00	09/30/19 12:55	
Containers Supplied:			
(B)4 oz Glass Jar			

Sample Name: ISM-C-190403 - After Processing **Soil** **Sampled: 04/03/19 14:50** (A9D0307-06)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	04/17/19 17:00	09/30/19 14:50	
Containers Supplied:			
(B)4 oz Glass Jar			

Sample Name: Rinsate Blank **Water** **Sampled: 04/02/19 17:30** (A9D0307-07)

Analysis	Due	Expires	Comments
1613B Dioxins and Furans (SUB)	04/17/19 17:00	09/29/19 17:30	
Containers Supplied:			
(A)1 L Amber Glass - Non Preserved			
(B)1 L Amber Glass - Non Preserved			

Standard TAT

temp. = 3.5° C

4/15/19 14:31 — Fed Ex (Shipper)

Released By Date Received By Date

Fed Ex (Shipper) — Cynde Larkins 16APR19 @ 1000

Released By Date Received By Date

SAMPLE RECEIPT CHECKLIST

Cape Fear Analytical

Client: APEX	Work Order: 14833
Shipping Company: FedEx	Date/Time Received: 16 APR 19 1000

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: ice bags blue ice dry ice none other (describe) Temperature Blank present: Yes (No) 4.0° - 0.5 = 3.5°C
5	Aqueous samples found to have visible solids?	✓			Sample IDs, containers affected: Minimal visible solids (<1%)
5	Samples requiring chemical preservation at proper pH?		✓		Sample IDs, containers affected and pH observed: pH=8 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 2-1L WMAC
12	COC form is properly signed in relinquished/received sections?	✓			

Comments:

Checklist performed by: Initials: CK Date: 16APR19

CF-UD-F-7

High Resolution Dioxins and Furans Analysis

Case Narrative

HDOX Case Narrative
Apex Laboratories (APEX)
SDG A9D0307
Work Order 14833

Method/Analysis Information

Product:	**Dioxins/Furans by EPA Method 1613B**
Analytical Method:	EPA Method 1613B
Extraction Method:	SW846 3520C, 3540C
Analytical Batch Number:	40415, 40523
Clean Up Batch Number:	40411, 40522
Extraction Batch Number:	40410, 40521

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA Method 1613B:

Sample ID	Client ID
12023626	Method Blank (MB)
12023627	Laboratory Control Sample (LCS)
12023628	Laboratory Control Sample Duplicate (LCSD)
12023720	Method Blank (MB)
12023721	Laboratory Control Sample (LCS)
12023722	Laboratory Control Sample Duplicate (LCSD)
12023723	14833002(ISM-B-190403-After Processing) Matrix Spike (MS)
12023724	14833002(ISM-B-190403-After Processing) Matrix Spike Duplicate (MSD)
14833001	ISM-A-190403-After Processing
14833002	ISM-B-190403-After Processing
14833003	ISM-C-190403-After Processing
14833004	Rinsate Blank

The samples in this SDG were 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# 15.

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
Sample 14833002 (ISM-B-190403-After Processing)- Batch 40523 was selected for analysis as the matrix spike and matrix spike duplicate.

Matrix Spike (MS) Recovery Statement
The MS recoveries were within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement
The MSD recoveries were within the established acceptance limits.

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

Technical Information

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.

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: A9D0307 CFA Work Order: 14833

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

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: Heather Patterson **Name: Heather Patterson**

Date: 02 MAY 2019 **Title: Group Leader**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**14833001**	**Date Collected:**	**04/03/2019 11:08**	**Matrix:**	**SOIL**
Client Sample:	**1613B Soil**	**Date Received:**	**04/16/2019 10:00**		
Client ID:	**ISM-A-190403-After Processing**			**Prep Basis:**	**As Received**
Batch ID:	**40523**	**Method:**	**EPA Method 1613B**		
Run Date:	**05/01/2019 19:31**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A01MAY19B_2-4**			**Dilution:**	**1**
Prep Batch:	**40521**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**30-APR-19**	**Prep Aliquot:**	**10.29 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.161	pg/g	0.161	0.972
40321-76-4	1,2,3,7,8-PeCDD	U	0.284	pg/g	0.284	4.86
39227-28-6	1,2,3,4,7,8-HxCDD	J	0.507	pg/g	0.360	4.86
57653-85-7	1,2,3,6,7,8-HxCDD	J	2.04	pg/g	0.365	4.86
19408-74-3	1,2,3,7,8,9-HxCDD	JK	1.04	pg/g	0.371	4.86
35822-46-9	1,2,3,4,6,7,8-HpCDD		59.5	pg/g	1.10	4.86
3268-87-9	1,2,3,4,6,7,8,9-OCDD		493	pg/g	2.14	9.72
51207-31-9	2,3,7,8-TCDF	J	0.317	pg/g	0.307	0.972
57117-41-6	1,2,3,7,8-PeCDF	JK	0.389	pg/g	0.169	4.86
57117-31-4	2,3,4,7,8-PeCDF	J	0.490	pg/g	0.158	4.86
70648-26-9	1,2,3,4,7,8-HxCDF	JK	1.06	pg/g	0.348	4.86
57117-44-9	1,2,3,6,7,8-HxCDF	J	0.624	pg/g	0.358	4.86
60851-34-5	2,3,4,6,7,8-HxCDF	J	0.564	pg/g	0.358	4.86
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.5	pg/g	0.500	4.86
67562-39-4	1,2,3,4,6,7,8-HpCDF		7.88	pg/g	0.282	4.86
55673-89-7	1,2,3,4,7,8,9-HpCDF	J	0.496	pg/g	0.418	4.86
39001-02-0	1,2,3,4,6,7,8,9-OCDF		18.2	pg/g	1.49	9.72
41903-57-5	Total TeCDD	JK	0.702	pg/g	0.161	0.972
36088-22-9	Total PeCDD	JK	1.47	pg/g	0.284	4.86
34465-46-8	Total HxCDD	JK	16.0	pg/g	0.360	4.86
37871-00-4	Total HpCDD	J	133	pg/g	1.10	4.86
30402-14-3	Total TeCDF	J	0.933	pg/g	0.307	0.972
30402-15-4	Total PeCDF	JK	4.81	pg/g	0.0713	4.86
55684-94-1	Total HxCDF	JK	13.3	pg/g	0.348	4.86
38998-75-3	Total HpCDF	J	24.3	pg/g	0.282	4.86
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		1.61	pg/g		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		1.85	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		178	194	pg/g	91.6	(25%-164%)
13C-1,2,3,7,8-PeCDD		187	194	pg/g	96.0	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		165	194	pg/g	84.7	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		176	194	pg/g	90.7	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		172	194	pg/g	88.6	(23%-140%)
13C-OCDD		362	389	pg/g	93.1	(17%-157%)
13C-2,3,7,8-TCDF		157	194	pg/g	80.7	(24%-169%)
13C-1,2,3,7,8-PeCDF		183	194	pg/g	94.2	(24%-185%)
13C-2,3,4,7,8-PeCDF		170	194	pg/g	87.7	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		158	194	pg/g	81.1	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		161	194	pg/g	83.0	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		164	194	pg/g	84.3	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		176	194	pg/g	90.7	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**14833001**	**Date Collected:**	**04/03/2019 11:08**	**Matrix:**	**SOIL**
Client Sample:	**1613B Soil**	**Date Received:**	**04/16/2019 10:00**		
Client ID:	**ISM-A-190403-After Processing**			**Prep Basis:**	**As Received**
Batch ID:	**40523**	**Method:**	**EPA Method 1613B**		
Run Date:	**05/01/2019 19:31**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A01MAY19B_2-4**			**Dilution:**	**1**
Prep Batch:	**40521**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**30-APR-19**	**Prep Aliquot:**	**10.29 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		156	194	pg/g	80.3	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		173	194	pg/g	89.1	(26%-138%)
37Cl-2,3,7,8-TCDD		19.0	19.4	pg/g	97.6	(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:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**14833002**	**Date Collected:**	**04/03/2019 12:55**	**Matrix:**	**SOIL**
Client Sample:	**1613B Soil**	**Date Received:**	**04/16/2019 10:00**		
Client ID:	**ISM-B-190403-After Processing**			**Prep Basis:**	**As Received**
Batch ID:	**40523**	**Method:**	**EPA Method 1613B**		
Run Date:	**05/01/2019 20:19**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A01MAY19B_2-5**			**Dilution:**	**1**
Prep Batch:	**40521**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**30-APR-19**	**Prep Aliquot:**	**10.15 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	J	0.250	pg/g	0.189	0.985
40321-76-4	1,2,3,7,8-PeCDD	U	0.301	pg/g	0.301	4.93
39227-28-6	1,2,3,4,7,8-HxCDD	J	0.428	pg/g	0.402	4.93
57653-85-7	1,2,3,6,7,8-HxCDD	J	1.92	pg/g	0.428	4.93
19408-74-3	1,2,3,7,8,9-HxCDD	J	1.08	pg/g	0.426	4.93
35822-46-9	1,2,3,4,6,7,8-HpCDD		49.1	pg/g	0.987	4.93
3268-87-9	1,2,3,4,6,7,8,9-OCDD		400	pg/g	2.05	9.85
51207-31-9	2,3,7,8-TCDF	U	0.262	pg/g	0.262	0.985
57117-41-6	1,2,3,7,8-PeCDF	J	0.343	pg/g	0.161	4.93
57117-31-4	2,3,4,7,8-PeCDF	J	0.384	pg/g	0.156	4.93
70648-26-9	1,2,3,4,7,8-HxCDF	JK	1.00	pg/g	0.192	4.93
57117-44-9	1,2,3,6,7,8-HxCDF	J	0.400	pg/g	0.196	4.93
60851-34-5	2,3,4,6,7,8-HxCDF	JK	0.489	pg/g	0.197	4.93
72918-21-9	1,2,3,7,8,9-HxCDF	JK	0.292	pg/g	0.268	4.93
67562-39-4	1,2,3,4,6,7,8-HpCDF		7.03	pg/g	0.282	4.93
55673-89-7	1,2,3,4,7,8,9-HpCDF	J	0.479	pg/g	0.426	4.93
39001-02-0	1,2,3,4,6,7,8,9-OCDF		16.2	pg/g	0.514	9.85
41903-57-5	Total TeCDD	JK	0.887	pg/g	0.189	0.985
36088-22-9	Total PeCDD	J	1.08	pg/g	0.301	4.93
34465-46-8	Total HxCDD	JK	13.5	pg/g	0.402	4.93
37871-00-4	Total HpCDD	J	95.9	pg/g	0.987	4.93
30402-14-3	Total TeCDF	JK	0.900	pg/g	0.262	0.985
30402-15-4	Total PeCDF	JK	4.34	pg/g	0.0676	4.93
55684-94-1	Total HxCDF	JK	11.3	pg/g	0.192	4.93
38998-75-3	Total HpCDF	J	20.7	pg/g	0.282	4.93
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		1.63	pg/g		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		1.79	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		172	197	pg/g	87.1	(25%-164%)
13C-1,2,3,7,8-PeCDD		186	197	pg/g	94.4	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		167	197	pg/g	84.5	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		179	197	pg/g	90.6	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		176	197	pg/g	89.3	(23%-140%)
13C-OCDD		378	394	pg/g	95.8	(17%-157%)
13C-2,3,7,8-TCDF		149	197	pg/g	75.8	(24%-169%)
13C-1,2,3,7,8-PeCDF		181	197	pg/g	91.9	(24%-185%)
13C-2,3,4,7,8-PeCDF		165	197	pg/g	83.5	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		158	197	pg/g	80.0	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		160	197	pg/g	81.2	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		166	197	pg/g	84.1	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		180	197	pg/g	91.6	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**14833002**	**Date Collected:**	**04/03/2019 12:55**	**Matrix:**	**SOIL**
Client Sample:	**1613B Soil**	**Date Received:**	**04/16/2019 10:00**		
Client ID:	**ISM-B-190403-After Processing**			**Prep Basis:**	**As Received**
Batch ID:	**40523**	**Method:**	**EPA Method 1613B**		
Run Date:	**05/01/2019 20:19**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A01MAY19B_2-5**			**Dilution:**	**1**
Prep Batch:	**40521**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**30-APR-19**	**Prep Aliquot:**	**10.15 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		161	197	pg/g	81.9	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		173	197	pg/g	87.7	(26%-138%)
37Cl-2,3,7,8-TCDD		19.9	19.7	pg/g	101	(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:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**14833003**	**Date Collected:**	**04/03/2019 14:50**	**Matrix:**	**SOIL**
Client Sample:	**1613B Soil**	**Date Received:**	**04/16/2019 10:00**		
Client ID:	**ISM-C-190403-After Processing**			**Prep Basis:**	**As Received**
Batch ID:	**40523**	**Method:**	**EPA Method 1613B**		
Run Date:	**05/01/2019 22:41**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A01MAY19B_2-8**			**Dilution:**	**1**
Prep Batch:	**40521**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**30-APR-19**	**Prep Aliquot:**	**10.01 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.212	pg/g	0.212	0.999
40321-76-4	1,2,3,7,8-PeCDD	U	0.282	pg/g	0.282	5.00
39227-28-6	1,2,3,4,7,8-HxCDD	JK	0.593	pg/g	0.478	5.00
57653-85-7	1,2,3,6,7,8-HxCDD	J	1.99	pg/g	0.482	5.00
19408-74-3	1,2,3,7,8,9-HxCDD	JK	1.16	pg/g	0.492	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		59.2	pg/g	1.03	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		465	pg/g	2.00	9.99
51207-31-9	2,3,7,8-TCDF	U	0.272	pg/g	0.272	0.999
57117-41-6	1,2,3,7,8-PeCDF	J	0.288	pg/g	0.197	5.00
57117-31-4	2,3,4,7,8-PeCDF	J	0.547	pg/g	0.195	5.00
70648-26-9	1,2,3,4,7,8-HxCDF	J	1.03	pg/g	0.290	5.00
57117-44-9	1,2,3,6,7,8-HxCDF	J	0.390	pg/g	0.300	5.00
60851-34-5	2,3,4,6,7,8-HxCDF	JK	0.597	pg/g	0.294	5.00
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.406	pg/g	0.406	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		8.39	pg/g	0.312	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF	JK	0.573	pg/g	0.446	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		18.1	pg/g	1.20	9.99
41903-57-5	Total TeCDD	J	0.346	pg/g	0.212	0.999
36088-22-9	Total PeCDD	JK	1.10	pg/g	0.282	5.00
34465-46-8	Total HxCDD	JK	15.2	pg/g	0.478	5.00
37871-00-4	Total HpCDD	J	114	pg/g	1.03	5.00
30402-14-3	Total TeCDF	JK	0.635	pg/g	0.272	0.999
30402-15-4	Total PeCDF	JK	4.90	pg/g	0.0721	5.00
55684-94-1	Total HxCDF	JK	12.4	pg/g	0.290	5.00
38998-75-3	Total HpCDF	JK	23.9	pg/g	0.312	5.00
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		1.57	pg/g		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		1.86	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		163	200	pg/g	81.4	(25%-164%)
13C-1,2,3,7,8-PeCDD		177	200	pg/g	88.5	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		156	200	pg/g	78.3	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		168	200	pg/g	84.0	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		169	200	pg/g	84.7	(23%-140%)
13C-OCDD		375	400	pg/g	93.9	(17%-157%)
13C-2,3,7,8-TCDF		140	200	pg/g	70.1	(24%-169%)
13C-1,2,3,7,8-PeCDF		174	200	pg/g	86.9	(24%-185%)
13C-2,3,4,7,8-PeCDF		159	200	pg/g	79.6	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		150	200	pg/g	75.0	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		155	200	pg/g	77.6	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		157	200	pg/g	78.5	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		167	200	pg/g	83.4	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**14833003**	**Date Collected:**	**04/03/2019 14:50**	**Matrix:**	**SOIL**
Client Sample:	**1613B Soil**	**Date Received:**	**04/16/2019 10:00**		
Client ID:	**ISM-C-190403-After Processing**			**Prep Basis:**	**As Received**
Batch ID:	**40523**	**Method:**	**EPA Method 1613B**		
Run Date:	**05/01/2019 22:41**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A01MAY19B_2-8**			**Dilution:**	**1**
Prep Batch:	**40521**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**30-APR-19**	**Prep Aliquot:**	**10.01 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		148	200	pg/g	73.9	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		171	200	pg/g	85.4	(26%-138%)
37Cl-2,3,7,8-TCDD		18.5	20.0	pg/g	92.6	(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:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**14833004**	**Date Collected:**	**04/02/2019 17:30**	**Matrix:**	**WATER**
Client Sample:	**1613B Water**	**Date Received:**	**04/16/2019 10:00**		
Client ID:	**Rinsate Blank**			**Prep Basis:**	**As Received**
Batch ID:	**40415**	**Method:**	**EPA Method 1613B**		
Run Date:	**04/21/2019 17:24**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A21APR19A-9**			**Dilution:**	**1**
Prep Batch:	**40410**	**Prep Method:**	**SW846 3520C**		
Prep Date:	**18-APR-19**	**Prep Aliquot:**	**953.1 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	4.53	pg/L	4.53	10.5
40321-76-4	1,2,3,7,8-PeCDD	U	3.19	pg/L	3.19	52.5
39227-28-6	1,2,3,4,7,8-HxCDD	U	3.78	pg/L	3.78	52.5
57653-85-7	1,2,3,6,7,8-HxCDD	U	3.65	pg/L	3.65	52.5
19408-74-3	1,2,3,7,8,9-HxCDD	U	3.8	pg/L	3.80	52.5
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	8.27	pg/L	8.27	52.5
3268-87-9	1,2,3,4,6,7,8,9-OCDD	U	11.7	pg/L	11.7	105
51207-31-9	2,3,7,8-TCDF	U	6.86	pg/L	6.86	10.5
57117-41-6	1,2,3,7,8-PeCDF	U	2.52	pg/L	2.52	52.5
57117-31-4	2,3,4,7,8-PeCDF	U	2.1	pg/L	2.10	52.5
70648-26-9	1,2,3,4,7,8-HxCDF	U	2.73	pg/L	2.73	52.5
57117-44-9	1,2,3,6,7,8-HxCDF	U	2.79	pg/L	2.79	52.5
60851-34-5	2,3,4,6,7,8-HxCDF	U	3	pg/L	3.00	52.5
72918-21-9	1,2,3,7,8,9-HxCDF	U	4.78	pg/L	4.78	52.5
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	3.82	pg/L	3.82	52.5
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	6.51	pg/L	6.51	52.5
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	14.1	pg/L	14.1	105
41903-57-5	Total TeCDD	U	4.53	pg/L	4.53	10.5
36088-22-9	Total PeCDD	U	3.19	pg/L	3.19	52.5
34465-46-8	Total HxCDD	U	3.65	pg/L	3.65	52.5
37871-00-4	Total HpCDD	U	8.27	pg/L	8.27	52.5
30402-14-3	Total TeCDF	U	6.86	pg/L	6.86	10.5
30402-15-4	Total PeCDF	U	2.1	pg/L	2.10	52.5
55684-94-1	Total HxCDF	U	2.73	pg/L	2.73	52.5
38998-75-3	Total HpCDF	U	3.82	pg/L	3.82	52.5
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		0.00	pg/L		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		5.88	pg/L		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1630	2100	pg/L	77.8	(25%-164%)
13C-1,2,3,7,8-PeCDD		2080	2100	pg/L	99.2	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		1690	2100	pg/L	80.7	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		1980	2100	pg/L	94.2	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		1780	2100	pg/L	84.9	(23%-140%)
13C-OCDD		3630	4200	pg/L	86.4	(17%-157%)
13C-2,3,7,8-TCDF		1350	2100	pg/L	64.6	(24%-169%)
13C-1,2,3,7,8-PeCDF		1980	2100	pg/L	94.2	(24%-185%)
13C-2,3,4,7,8-PeCDF		1910	2100	pg/L	90.8	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		1670	2100	pg/L	79.6	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		1740	2100	pg/L	82.9	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		1680	2100	pg/L	80.3	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		1730	2100	pg/L	82.3	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**14833004**	**Date Collected:**	**04/02/2019 17:30**	**Matrix:**	**WATER**
Client Sample:	**1613B Water**	**Date Received:**	**04/16/2019 10:00**		
Client ID:	**Rinsate Blank**			**Prep Basis:**	**As Received**
Batch ID:	**40415**	**Method:**	**EPA Method 1613B**		
Run Date:	**04/21/2019 17:24**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A21APR19A-9**			**Dilution:**	**1**
Prep Batch:	**40410**	**Prep Method:**	**SW846 3520C**		
Prep Date:	**18-APR-19**	**Prep Aliquot:**	**953.1 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		1710	2100	pg/L	81.5	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		1630	2100	pg/L	77.7	(26%-138%)
37Cl-2,3,7,8-TCDD		184	210	pg/L	87.6	(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: A9D0307

Matrix Type: LIQUID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12023627	LCS for batch 40410	13C-2,3,7,8-TCDD		73.5	(20%-175%)
		13C-1,2,3,7,8-PeCDD		88.6	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		87.1	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		86.8	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		88.4	(22%-166%)
		13C-OCDD		91.3	(13%-199%)
		13C-2,3,7,8-TCDF		61.4	(22%-152%)
		13C-1,2,3,7,8-PeCDF		78.4	(21%-192%)
		13C-2,3,4,7,8-PeCDF		79.6	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		76.3	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		76.2	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		76.2	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		80.2	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		79.1	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		82.7	(20%-186%)
		37Cl-2,3,7,8-TCDD		79.1	(31%-191%)
12023628	LCSD for batch 40410	13C-2,3,7,8-TCDD		74.6	(20%-175%)
		13C-1,2,3,7,8-PeCDD		91.1	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		82.4	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		89.1	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		84.7	(22%-166%)
		13C-OCDD		88.3	(13%-199%)
		13C-2,3,7,8-TCDF		61.4	(22%-152%)
		13C-1,2,3,7,8-PeCDF		82.5	(21%-192%)
		13C-2,3,4,7,8-PeCDF		79.6	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		76.1	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		78.2	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		78.5	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		80.4	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		78.3	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		78.4	(20%-186%)
		37Cl-2,3,7,8-TCDD		84.3	(31%-191%)
12023626	MB for batch 40410	13C-2,3,7,8-TCDD		71.0	(25%-164%)
		13C-1,2,3,7,8-PeCDD		89.2	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		82.2	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		87.6	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		84.7	(23%-140%)
		13C-OCDD		85.5	(17%-157%)
		13C-2,3,7,8-TCDF		57.6	(24%-169%)
		13C-1,2,3,7,8-PeCDF		81.1	(24%-185%)
		13C-2,3,4,7,8-PeCDF		77.9	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		75.7	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		77.4	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		76.1	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		78.4	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		78.6	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		75.3	(26%-138%)
		37Cl-2,3,7,8-TCDD		71.2	(35%-197%)
14833004	Rinsate Blank	13C-2,3,7,8-TCDD		77.8	(25%-164%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: A9D0307

Matrix Type: LIQUID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
14833004	Rinsate Blank	13C-1,2,3,7,8-PeCDD		99.2	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		80.7	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		94.2	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		84.9	(23%-140%)
		13C-OCDD		86.4	(17%-157%)
		13C-2,3,7,8-TCDF		64.6	(24%-169%)
		13C-1,2,3,7,8-PeCDF		94.2	(24%-185%)
		13C-2,3,4,7,8-PeCDF		90.8	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		79.6	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		82.9	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		80.3	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		82.3	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		81.5	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		77.7	(26%-138%)
		37Cl-2,3,7,8-TCDD		87.6	(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: A9D0307

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12023721	LCS for batch 40521	13C-2,3,7,8-TCDD		82.1	(20%-175%)
		13C-1,2,3,7,8-PeCDD		88.4	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		81.5	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		85.0	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		82.4	(22%-166%)
		13C-OCDD		87.8	(13%-199%)
		13C-2,3,7,8-TCDF		72.4	(22%-152%)
		13C-1,2,3,7,8-PeCDF		84.9	(21%-192%)
		13C-2,3,4,7,8-PeCDF		79.7	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		76.8	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		75.1	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		78.1	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		81.6	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		76.4	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		81.5	(20%-186%)
		37Cl-2,3,7,8-TCDD		93.1	(31%-191%)
12023722	LCSD for batch 40521	13C-2,3,7,8-TCDD		86.2	(20%-175%)
		13C-1,2,3,7,8-PeCDD		89.6	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		82.3	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		92.1	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		87.0	(22%-166%)
		13C-OCDD		91.1	(13%-199%)
		13C-2,3,7,8-TCDF		74.1	(22%-152%)
		13C-1,2,3,7,8-PeCDF		89.3	(21%-192%)
		13C-2,3,4,7,8-PeCDF		82.7	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		79.6	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		84.5	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		81.6	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		87.9	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		80.0	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		85.5	(20%-186%)
		37Cl-2,3,7,8-TCDD		96.1	(31%-191%)
12023720	MB for batch 40521	13C-2,3,7,8-TCDD		83.5	(25%-164%)
		13C-1,2,3,7,8-PeCDD		83.2	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		78.6	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		86.0	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		81.1	(23%-140%)
		13C-OCDD		85.9	(17%-157%)
		13C-2,3,7,8-TCDF		76.7	(24%-169%)
		13C-1,2,3,7,8-PeCDF		82.9	(24%-185%)
		13C-2,3,4,7,8-PeCDF		76.6	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		76.0	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		77.9	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		77.5	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		82.8	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		76.4	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		81.2	(26%-138%)
		37Cl-2,3,7,8-TCDD		101	(35%-197%)
14833001	ISM-A-190403-After Processing	13C-2,3,7,8-TCDD		91.6	(25%-164%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: A9D0307

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
14833001	ISM-A-190403-After Processing	13C-1,2,3,7,8-PeCDD		96.0	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		84.7	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		90.7	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		88.6	(23%-140%)
		13C-OCDD		93.1	(17%-157%)
		13C-2,3,7,8-TCDF		80.7	(24%-169%)
		13C-1,2,3,7,8-PeCDF		94.2	(24%-185%)
		13C-2,3,4,7,8-PeCDF		87.7	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		81.1	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		83.0	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		84.3	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		90.7	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		80.3	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		89.1	(26%-138%)
		37Cl-2,3,7,8-TCDD		97.6	(35%-197%)
14833002	ISM-B-190403-After Processing	13C-2,3,7,8-TCDD		87.1	(25%-164%)
		13C-1,2,3,7,8-PeCDD		94.4	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		84.5	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		90.6	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		89.3	(23%-140%)
		13C-OCDD		95.8	(17%-157%)
		13C-2,3,7,8-TCDF		75.8	(24%-169%)
		13C-1,2,3,7,8-PeCDF		91.9	(24%-185%)
		13C-2,3,4,7,8-PeCDF		83.5	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		80.0	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		81.2	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		84.1	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		91.6	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		81.9	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		87.7	(26%-138%)
		37Cl-2,3,7,8-TCDD		101	(35%-197%)
12023723	ISM-B-190403-After Processing(14833002MS	13C-2,3,7,8-TCDD		87.1	(25%-164%)
		13C-1,2,3,7,8-PeCDD		87.7	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		85.8	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		91.2	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		92.7	(23%-140%)
		13C-OCDD		102	(17%-157%)
		13C-2,3,7,8-TCDF		77.1	(24%-169%)
		13C-1,2,3,7,8-PeCDF		89.7	(24%-185%)
		13C-2,3,4,7,8-PeCDF		81.5	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		82.4	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		83.1	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		82.7	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		89.0	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		82.5	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		88.4	(26%-138%)
		37Cl-2,3,7,8-TCDD		94.4	(35%-197%)
12023724	ISM-B-190403-After Processing(14833002MS	13C-2,3,7,8-TCDD		83.2	(25%-164%)
		13C-1,2,3,7,8-PeCDD		89.7	(25%-181%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: A9D0307

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12023724	ISM-B-190403-After Processing(14833002MS	13C-1,2,3,4,7,8-HxCDD		81.5	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		87.7	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		86.8	(23%-140%)
		13C-OCDD		97.0	(17%-157%)
		13C-2,3,7,8-TCDF		73.4	(24%-169%)
		13C-1,2,3,7,8-PeCDF		88.0	(24%-185%)
		13C-2,3,4,7,8-PeCDF		80.6	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		77.3	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		79.2	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		81.1	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		84.3	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		79.1	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		85.6	(26%-138%)
		37Cl-2,3,7,8-TCDD		89.8	(35%-197%)
14833003	ISM-C-190403-After Processing	13C-2,3,7,8-TCDD		81.4	(25%-164%)
		13C-1,2,3,7,8-PeCDD		88.5	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		78.3	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		84.0	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		84.7	(23%-140%)
		13C-OCDD		93.9	(17%-157%)
		13C-2,3,7,8-TCDF		70.1	(24%-169%)
		13C-1,2,3,7,8-PeCDF		86.9	(24%-185%)
		13C-2,3,4,7,8-PeCDF		79.6	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		75.0	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		77.6	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		78.5	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		83.4	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		73.9	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		85.4	(26%-138%)
		37Cl-2,3,7,8-TCDD		92.6	(35%-197%)

* 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: **A9D0307** **Sample Type:** **Laboratory Control Sample**

Client ID: **LCS for batch 40410** **Matrix:** **WATER**

Lab Sample ID: **12023627**

Instrument: **HRP750** **Analysis Date:** **04/21/2019 11:49** **Dilution:** **1**

Analyst: **MJC** **Prep Batch ID:** **40410**

Batch ID: **40415**

CAS No.		Parmname	Amount Added pg/L	Spike Conc. pg/L	Recovery %	Acceptance Limits
1746-01-6	LCS	2,3,7,8-TCDD	200	191	95.7	67-158
40321-76-4	LCS	1,2,3,7,8-PeCDD	1000	1010	101	70-142
39227-28-6	LCS	1,2,3,4,7,8-HxCDD	1000	1000	100	70-164
57653-85-7	LCS	1,2,3,6,7,8-HxCDD	1000	1020	102	74-134
19408-74-3	LCS	1,2,3,7,8,9-HxCDD	1000	1010	101	64-162
35822-46-9	LCS	1,2,3,4,6,7,8-HpCDD	1000	1080	108	70-140
3268-87-9	LCS	1,2,3,4,6,7,8,9-OCDD	2000	1960	97.9	78-144
51207-31-9	LCS	2,3,7,8-TCDF	200	197	98.7	75-158
57117-41-6	LCS	1,2,3,7,8-PeCDF	1000	1030	103	80-134
57117-31-4	LCS	2,3,4,7,8-PeCDF	1000	1030	103	68-160
70648-26-9	LCS	1,2,3,4,7,8-HxCDF	1000	1050	105	72-134
57117-44-9	LCS	1,2,3,6,7,8-HxCDF	1000	1080	108	84-130
60851-34-5	LCS	2,3,4,6,7,8-HxCDF	1000	1070	107	70-156
72918-21-9	LCS	1,2,3,7,8,9-HxCDF	1000	1020	102	78-130
67562-39-4	LCS	1,2,3,4,6,7,8-HpCDF	1000	1070	107	82-122
55673-89-7	LCS	1,2,3,4,7,8,9-HpCDF	1000	1010	101	78-138
39001-02-0	LCS	1,2,3,4,6,7,8,9-OCDF	2000	1860	93	63-170

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: **A9D0307** **Sample Type:** **Laboratory Control Sample Duplicate**

Client ID: **LCSD for batch 40410** **Matrix:** **WATER**

Lab Sample ID: **12023628**

Instrument: **HRP750** **Analysis Date:** **04/21/2019 12:36** **Dilution:** **1**

Analyst: **MJC** **Prep Batch ID:** **40410**

Batch ID: **40415**

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	174	87.2	67-158	9.34	0-20
40321-76-4	LCSD	1,2,3,7,8-PeCDD	1000	956	95.6	70-142	5.83	0-20
39227-28-6	LCSD	1,2,3,4,7,8-HxCDD	1000	986	98.6	70-164	1.85	0-20
57653-85-7	LCSD	1,2,3,6,7,8-HxCDD	1000	994	99.4	74-134	2.91	0-20
19408-74-3	LCSD	1,2,3,7,8,9-HxCDD	1000	1000	100	64-162	0.934	0-20
35822-46-9	LCSD	1,2,3,4,6,7,8-HpCDD	1000	1040	104	70-140	3.74	0-20
3268-87-9	LCSD	1,2,3,4,6,7,8,9-OCDD	2000	2000	100	78-144	2.12	0-20
51207-31-9	LCSD	2,3,7,8-TCDF	200	199	99.4	75-158	0.757	0-20
57117-41-6	LCSD	1,2,3,7,8-PeCDF	1000	964	96.4	80-134	7.10	0-20
57117-31-4	LCSD	2,3,4,7,8-PeCDF	1000	1010	101	68-160	2.30	0-20
70648-26-9	LCSD	1,2,3,4,7,8-HxCDF	1000	1030	103	72-134	1.62	0-20
57117-44-9	LCSD	1,2,3,6,7,8-HxCDF	1000	991	99.1	84-130	8.97	0-20
60851-34-5	LCSD	2,3,4,6,7,8-HxCDF	1000	1020	102	70-156	4.80	0-20
72918-21-9	LCSD	1,2,3,7,8,9-HxCDF	1000	1010	101	78-130	1.59	0-20
67562-39-4	LCSD	1,2,3,4,6,7,8-HpCDF	1000	1040	104	82-122	2.75	0-20
55673-89-7	LCSD	1,2,3,4,7,8,9-HpCDF	1000	1050	105	78-138	3.29	0-20
39001-02-0	LCSD	1,2,3,4,6,7,8,9-OCDF	2000	1780	89.1	63-170	4.26	0-20

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: **A9D0307** **Sample Type:** **Laboratory Control Sample**

Client ID: **LCS for batch 40521** **Matrix:** **SOIL**

Lab Sample ID: **12023721**

Instrument: **HRP750** **Analysis Date:** **05/01/2019 17:10** **Dilution:** **1**

Analyst: **MJC** **Prep Batch ID:** **40521**

Batch ID: **40523**

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	17.2	86.2	67-158
40321-76-4	LCS	1,2,3,7,8-PeCDD	100	94.2	94.2	70-142
39227-28-6	LCS	1,2,3,4,7,8-HxCDD	100	95.8	95.8	70-164
57653-85-7	LCS	1,2,3,6,7,8-HxCDD	100	97.1	97.1	76-134
19408-74-3	LCS	1,2,3,7,8,9-HxCDD	100	100	100	64-162
35822-46-9	LCS	1,2,3,4,6,7,8-HpCDD	100	103	103	70-140
3268-87-9	LCS	1,2,3,4,6,7,8,9-OCDD	200	186	93.2	78-144
51207-31-9	LCS	2,3,7,8-TCDF	20.0	18.2	91.1	75-158
57117-41-6	LCS	1,2,3,7,8-PeCDF	100	99.8	99.8	80-134
57117-31-4	LCS	2,3,4,7,8-PeCDF	100	99.6	99.6	68-160
70648-26-9	LCS	1,2,3,4,7,8-HxCDF	100	98.4	98.4	72-134
57117-44-9	LCS	1,2,3,6,7,8-HxCDF	100	104	104	84-130
60851-34-5	LCS	2,3,4,6,7,8-HxCDF	100	100	100	70-156
72918-21-9	LCS	1,2,3,7,8,9-HxCDF	100	100	100	78-130
67562-39-4	LCS	1,2,3,4,6,7,8-HpCDF	100	99.0	99	82-122
55673-89-7	LCS	1,2,3,4,7,8,9-HpCDF	100	98.3	98.3	78-138
39001-02-0	LCS	1,2,3,4,6,7,8,9-OCDF	200	194	96.8	63-170

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: **A9D0307** **Sample Type:** **Laboratory Control Sample Duplicate**

Client ID: **LCSD for batch 40521** **Matrix:** **SOIL**

Lab Sample ID: **12023722**

Instrument: **HRP750** **Analysis Date:** **05/01/2019 17:57** **Dilution:** **1**

Analyst: **MJC** **Prep Batch ID:** **40521**

Batch ID: **40523**

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	17.0	85.1	67-158	1.35	0-20
40321-76-4	LCSD	1,2,3,7,8-PeCDD	100	94.7	94.7	70-142	0.585	0-20
39227-28-6	LCSD	1,2,3,4,7,8-HxCDD	100	96.6	96.6	70-164	0.765	0-20
57653-85-7	LCSD	1,2,3,6,7,8-HxCDD	100	95.5	95.5	76-134	1.67	0-20
19408-74-3	LCSD	1,2,3,7,8,9-HxCDD	100	99.2	99.2	64-162	0.999	0-20
35822-46-9	LCSD	1,2,3,4,6,7,8-HpCDD	100	97.3	97.3	70-140	5.36	0-20
3268-87-9	LCSD	1,2,3,4,6,7,8,9-OCDD	200	192	96.2	78-144	3.21	0-20
51207-31-9	LCSD	2,3,7,8-TCDF	20.0	18.8	94.1	75-158	3.27	0-20
57117-41-6	LCSD	1,2,3,7,8-PeCDF	100	98.2	98.2	80-134	1.65	0-20
57117-31-4	LCSD	2,3,4,7,8-PeCDF	100	99.7	99.7	68-160	0.183	0-20
70648-26-9	LCSD	1,2,3,4,7,8-HxCDF	100	98.1	98.1	72-134	0.332	0-20
57117-44-9	LCSD	1,2,3,6,7,8-HxCDF	100	102	102	84-130	2.46	0-20
60851-34-5	LCSD	2,3,4,6,7,8-HxCDF	100	100	100	70-156	0.0679	0-20
72918-21-9	LCSD	1,2,3,7,8,9-HxCDF	100	97.1	97.1	78-130	3.12	0-20
67562-39-4	LCSD	1,2,3,4,6,7,8-HpCDF	100	98.0	98	82-122	1.02	0-20
55673-89-7	LCSD	1,2,3,4,7,8,9-HpCDF	100	98.3	98.3	78-138	0.0692	0-20
39001-02-0	LCSD	1,2,3,4,6,7,8,9-OCDF	200	195	97.6	63-170	0.755	0-20

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: **A9D0307** **Sample Type:** **Matrix Spike**

Client ID: **ISM-B-190403-After Processing(14833002MS** **Matrix:** **SOIL**

Lab Sample ID: **12023723**

Instrument: **HRP750** **Analysis Date:** **05/01/2019 21:06** **Dilution:** **1**

Analyst: **MJC** **Prep Batch ID:** **40521**

Batch ID: **40523**

CAS No.		Parmname	Amount Added pg/g		Spike Conc. pg/g	Recovery %	Acceptance Limits
1746-01-6	MS	2,3,7,8-TCDD	19.7	J	17.3	86.4	70-130
40321-76-4	MS	1,2,3,7,8-PeCDD	98.4	U	95.5	97.1	70-130
39227-28-6	MS	1,2,3,4,7,8-HxCDD	98.4	J	96.2	97.3	70-130
57653-85-7	MS	1,2,3,6,7,8-HxCDD	98.4	J	93.3	92.8	70-130
19408-74-3	MS	1,2,3,7,8,9-HxCDD	98.4	J	94.7	95.1	70-130
35822-46-9	MS	1,2,3,4,6,7,8-HpCDD	98.4		151	104	70-130
3268-87-9	MS	1,2,3,4,6,7,8,9-OCDD	197		595	98.8	70-130
51207-31-9	MS	2,3,7,8-TCDF	19.7	U	18.2	92.7	70-130
57117-41-6	MS	1,2,3,7,8-PeCDF	98.4	J	95.1	96.2	70-130
57117-31-4	MS	2,3,4,7,8-PeCDF	98.4	J	98.8	100	70-130
70648-26-9	MS	1,2,3,4,7,8-HxCDF	98.4	JK	98.7	99.3	70-130
57117-44-9	MS	1,2,3,6,7,8-HxCDF	98.4	J	99.5	101	70-130
60851-34-5	MS	2,3,4,6,7,8-HxCDF	98.4	JK	99.3	100	70-130
72918-21-9	MS	1,2,3,7,8,9-HxCDF	98.4	JK	98.7	100	70-130
67562-39-4	MS	1,2,3,4,6,7,8-HpCDF	98.4		108	102	70-130
55673-89-7	MS	1,2,3,4,7,8,9-HpCDF	98.4	J	101	102	70-130
39001-02-0	MS	1,2,3,4,6,7,8,9-OCDF	197		201	93.7	70-130

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: **A9D0307** **Sample Type:** **Matrix Spike Duplicate**

Client ID: **ISM-B-190403-After Processing(14833002MS** **Matrix:** **SOIL**

Lab Sample ID: **12023724**

Instrument: **HRP750** **Analysis Date:** **05/01/2019 21:54** **Dilution:** **1**

Analyst: **MJC** **Prep Batch ID:** **40521**

Batch ID: **40523**

CAS No.		Parmname	Amount Added pg/g		Spike Conc. pg/g	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
1746-01-6	MSD	2,3,7,8-TCDD	19.7	J	16.7	83.5	70-130	3.12	0-20
40321-76-4	MSD	1,2,3,7,8-PeCDD	98.7	U	94.7	95.9	70-130	0.879	0-20
39227-28-6	MSD	1,2,3,4,7,8-HxCDD	98.7	J	96.7	97.5	70-130	0.494	0-20
57653-85-7	MSD	1,2,3,6,7,8-HxCDD	98.7	J	98.5	97.8	70-130	5.46	0-20
19408-74-3	MSD	1,2,3,7,8,9-HxCDD	98.7	J	100	100	70-130	5.67	0-20
35822-46-9	MSD	1,2,3,4,6,7,8-HpCDD	98.7		155	107	70-130	2.00	0-20
3268-87-9	MSD	1,2,3,4,6,7,8,9-OCDD	197		620	111	70-130	4.09	0-20
51207-31-9	MSD	2,3,7,8-TCDF	19.7	U	18.6	94.2	70-130	1.92	0-20
57117-41-6	MSD	1,2,3,7,8-PeCDF	98.7	J	96.0	96.9	70-130	1.02	0-20
57117-31-4	MSD	2,3,4,7,8-PeCDF	98.7	J	99.2	100	70-130	0.435	0-20
70648-26-9	MSD	1,2,3,4,7,8-HxCDF	98.7	JK	99.7	100	70-130	0.991	0-20
57117-44-9	MSD	1,2,3,6,7,8-HxCDF	98.7	J	99.6	100	70-130	0.114	0-20
60851-34-5	MSD	2,3,4,6,7,8-HxCDF	98.7	JK	96.2	96.9	70-130	3.19	0-20
72918-21-9	MSD	1,2,3,7,8,9-HxCDF	98.7	JK	99.4	100	70-130	0.676	0-20
67562-39-4	MSD	1,2,3,4,6,7,8-HpCDF	98.7		106	100	70-130	1.60	0-20
55673-89-7	MSD	1,2,3,4,7,8,9-HpCDF	98.7	J	98.4	99.2	70-130	2.84	0-20
39001-02-0	MSD	1,2,3,4,6,7,8,9-OCDF	197		213	99.8	70-130	6.14	0-20

Method Blank Summary

SDG Number:	**A9D0307**	**Client:**	**APEX001**	**Matrix:**	**WATER**
Client ID:	**MB for batch 40410**	**Instrument ID:**	**HRP750**	**Data File:**	**A21APR19A-4**
Lab Sample ID:	**12023626**	**Prep Date:**	**18-APR-19**	**Analyzed:**	**04/21/19 13:24**
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 40410	12023627	A21APR19A-2	04/21/19	1149
02	LCSD for batch 40410	12023628	A21APR19A-3	04/21/19	1236
03	Rinsate Blank	14833004	A21APR19A-9	04/21/19	1724

Method Blank Summary

SDG Number:	**A9D0307**	**Client:**	**APEX001**	**Matrix:**	**SOIL**
Client ID:	**MB for batch 40521**	**Instrument ID:**	**HRP750**	**Data File:**	**A01MAY19B_2-3**
Lab Sample ID:	**12023720**	**Prep Date:**	**30-APR-19**	**Analyzed:**	**05/01/19 18:44**
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 40521	12023721	A01MAY19B_2-1	05/01/19	1710
02	LCSD for batch 40521	12023722	A01MAY19B_2-2	05/01/19	1757
03	ISM-A-190403-After Processing	14833001	A01MAY19B_2-4	05/01/19	1931
04	ISM-B-190403-After Processing	14833002	A01MAY19B_2-5	05/01/19	2019
05	ISM-B-190403-After Processing(14833002MS	12023723	A01MAY19B_2-6	05/01/19	2106
06	ISM-B-190403-After Processing(14833002MS	12023724	A01MAY19B_2-7	05/01/19	2154
07	ISM-C-190403-After Processing	14833003	A01MAY19B_2-8	05/01/19	2241

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**12023626**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 40410**				
Client ID:	**MB for batch 40410**			**Prep Basis:**	**As Received**
Batch ID:	**40415**	**Method:**	**EPA Method 1613B**		
Run Date:	**04/21/2019 13:24**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A21APR19A-4**			**Dilution:**	**1**
Prep Batch:	**40410**	**Prep Method:**	**SW846 3520C**		
Prep Date:	**18-APR-19**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	4.92	pg/L	4.92	10.0
40321-76-4	1,2,3,7,8-PeCDD	U	3.98	pg/L	3.98	50.0
39227-28-6	1,2,3,4,7,8-HxCDD	U	4.54	pg/L	4.54	50.0
57653-85-7	1,2,3,6,7,8-HxCDD	U	3.84	pg/L	3.84	50.0
19408-74-3	1,2,3,7,8,9-HxCDD	U	4.26	pg/L	4.26	50.0
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	8.46	pg/L	8.46	50.0
3268-87-9	1,2,3,4,6,7,8,9-OCDD	U	13.7	pg/L	13.7	100
51207-31-9	2,3,7,8-TCDF	U	6.7	pg/L	6.70	10.0
57117-41-6	1,2,3,7,8-PeCDF	U	2.36	pg/L	2.36	50.0
57117-31-4	2,3,4,7,8-PeCDF	U	2.22	pg/L	2.22	50.0
70648-26-9	1,2,3,4,7,8-HxCDF	U	3.48	pg/L	3.48	50.0
57117-44-9	1,2,3,6,7,8-HxCDF	U	3.62	pg/L	3.62	50.0
60851-34-5	2,3,4,6,7,8-HxCDF	U	3.8	pg/L	3.80	50.0
72918-21-9	1,2,3,7,8,9-HxCDF	U	6.16	pg/L	6.16	50.0
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	3.92	pg/L	3.92	50.0
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	7.7	pg/L	7.70	50.0
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	15.3	pg/L	15.3	100
41903-57-5	Total TeCDD	U	4.92	pg/L	4.92	10.0
36088-22-9	Total PeCDD	U	3.98	pg/L	3.98	50.0
34465-46-8	Total HxCDD	U	3.84	pg/L	3.84	50.0
37871-00-4	Total HpCDD	U	8.46	pg/L	8.46	50.0
30402-14-3	Total TeCDF	U	6.7	pg/L	6.70	10.0
30402-15-4	Total PeCDF	U	2.22	pg/L	2.22	50.0
55684-94-1	Total HxCDF	U	3.48	pg/L	3.48	50.0
38998-75-3	Total HpCDF	U	3.92	pg/L	3.92	50.0
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		0.00	pg/L		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		6.74	pg/L		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1420	2000	pg/L	71.0	(25%-164%)
13C-1,2,3,7,8-PeCDD		1780	2000	pg/L	89.2	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		1640	2000	pg/L	82.2	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		1750	2000	pg/L	87.6	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		1690	2000	pg/L	84.7	(23%-140%)
13C-OCDD		3420	4000	pg/L	85.5	(17%-157%)
13C-2,3,7,8-TCDF		1150	2000	pg/L	57.6	(24%-169%)
13C-1,2,3,7,8-PeCDF		1620	2000	pg/L	81.1	(24%-185%)
13C-2,3,4,7,8-PeCDF		1560	2000	pg/L	77.9	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		1510	2000	pg/L	75.7	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		1550	2000	pg/L	77.4	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		1520	2000	pg/L	76.1	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		1570	2000	pg/L	78.4	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**12023626**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 40410**				
Client ID:	**MB for batch 40410**			**Prep Basis:**	**As Received**
Batch ID:	**40415**	**Method:**	**EPA Method 1613B**		
Run Date:	**04/21/2019 13:24**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A21APR19A-4**			**Dilution:**	**1**
Prep Batch:	**40410**	**Prep Method:**	**SW846 3520C**		
Prep Date:	**18-APR-19**	**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		1570	2000	pg/L	78.6	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		1510	2000	pg/L	75.3	(26%-138%)
37Cl-2,3,7,8-TCDD		142	200	pg/L	71.2	(35%-197%)

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:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**12023627**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 40410**				
Client ID:	**LCS for batch 40410**			**Prep Basis:**	**As Received**
Batch ID:	**40415**	**Method:**	**EPA Method 1613B**		
Run Date:	**04/21/2019 11:49**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A21APR19A-2**			**Dilution:**	**1**
Prep Batch:	**40410**	**Prep Method:**	**SW846 3520C**		
Prep Date:	**18-APR-19**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		191	pg/L	4.40	10.0
40321-76-4	1,2,3,7,8-PeCDD		1010	pg/L	8.20	50.0
39227-28-6	1,2,3,4,7,8-HxCDD		1000	pg/L	8.68	50.0
57653-85-7	1,2,3,6,7,8-HxCDD		1020	pg/L	8.66	50.0
19408-74-3	1,2,3,7,8,9-HxCDD		1010	pg/L	8.88	50.0
35822-46-9	1,2,3,4,6,7,8-HpCDD		1080	pg/L	13.4	50.0
3268-87-9	1,2,3,4,6,7,8,9-OCDD		1960	pg/L	26.2	100
51207-31-9	2,3,7,8-TCDF		197	pg/L	5.82	10.0
57117-41-6	1,2,3,7,8-PeCDF		1030	pg/L	7.92	50.0
57117-31-4	2,3,4,7,8-PeCDF		1030	pg/L	6.92	50.0
70648-26-9	1,2,3,4,7,8-HxCDF		1050	pg/L	10.7	50.0
57117-44-9	1,2,3,6,7,8-HxCDF		1080	pg/L	10.5	50.0
60851-34-5	2,3,4,6,7,8-HxCDF		1070	pg/L	11.8	50.0
72918-21-9	1,2,3,7,8,9-HxCDF		1020	pg/L	16.6	50.0
67562-39-4	1,2,3,4,6,7,8-HpCDF		1070	pg/L	10.6	50.0
55673-89-7	1,2,3,4,7,8,9-HpCDF		1010	pg/L	18.7	50.0
39001-02-0	1,2,3,4,6,7,8,9-OCDF		1860	pg/L	17.0	100

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1470	2000	pg/L	73.5	(20%-175%)
13C-1,2,3,7,8-PeCDD		1770	2000	pg/L	88.6	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		1740	2000	pg/L	87.1	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		1740	2000	pg/L	86.8	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		1770	2000	pg/L	88.4	(22%-166%)
13C-OCDD		3650	4000	pg/L	91.3	(13%-199%)
13C-2,3,7,8-TCDF		1230	2000	pg/L	61.4	(22%-152%)
13C-1,2,3,7,8-PeCDF		1570	2000	pg/L	78.4	(21%-192%)
13C-2,3,4,7,8-PeCDF		1590	2000	pg/L	79.6	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		1530	2000	pg/L	76.3	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		1520	2000	pg/L	76.2	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		1520	2000	pg/L	76.2	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		1600	2000	pg/L	80.2	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		1580	2000	pg/L	79.1	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		1650	2000	pg/L	82.7	(20%-186%)
37Cl-2,3,7,8-TCDD		158	200	pg/L	79.1	(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:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**12023628**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 40410**				
Client ID:	**LCSD for batch 40410**			**Prep Basis:**	**As Received**
Batch ID:	**40415**	**Method:**	**EPA Method 1613B**		
Run Date:	**04/21/2019 12:36**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A21APR19A-3**			**Dilution:**	**1**
Prep Batch:	**40410**	**Prep Method:**	**SW846 3520C**		
Prep Date:	**18-APR-19**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		174	pg/L	4.84	10.0
40321-76-4	1,2,3,7,8-PeCDD		956	pg/L	6.04	50.0
39227-28-6	1,2,3,4,7,8-HxCDD		986	pg/L	10.0	50.0
57653-85-7	1,2,3,6,7,8-HxCDD		994	pg/L	9.20	50.0
19408-74-3	1,2,3,7,8,9-HxCDD		1000	pg/L	9.78	50.0
35822-46-9	1,2,3,4,6,7,8-HpCDD		1040	pg/L	15.1	50.0
3268-87-9	1,2,3,4,6,7,8,9-OCDD		2000	pg/L	25.6	100
51207-31-9	2,3,7,8-TCDF		199	pg/L	6.42	10.0
57117-41-6	1,2,3,7,8-PeCDF		964	pg/L	9.10	50.0
57117-31-4	2,3,4,7,8-PeCDF		1010	pg/L	8.48	50.0
70648-26-9	1,2,3,4,7,8-HxCDF		1030	pg/L	10.1	50.0
57117-44-9	1,2,3,6,7,8-HxCDF		991	pg/L	9.54	50.0
60851-34-5	2,3,4,6,7,8-HxCDF		1020	pg/L	11.3	50.0
72918-21-9	1,2,3,7,8,9-HxCDF		1010	pg/L	15.5	50.0
67562-39-4	1,2,3,4,6,7,8-HpCDF		1040	pg/L	13.2	50.0
55673-89-7	1,2,3,4,7,8,9-HpCDF		1050	pg/L	20.8	50.0
39001-02-0	1,2,3,4,6,7,8,9-OCDF		1780	pg/L	32.4	100

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1490	2000	pg/L	74.6	(20%-175%)
13C-1,2,3,7,8-PeCDD		1820	2000	pg/L	91.1	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		1650	2000	pg/L	82.4	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		1780	2000	pg/L	89.1	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		1690	2000	pg/L	84.7	(22%-166%)
13C-OCDD		3530	4000	pg/L	88.3	(13%-199%)
13C-2,3,7,8-TCDF		1230	2000	pg/L	61.4	(22%-152%)
13C-1,2,3,7,8-PeCDF		1650	2000	pg/L	82.5	(21%-192%)
13C-2,3,4,7,8-PeCDF		1590	2000	pg/L	79.6	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		1520	2000	pg/L	76.1	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		1560	2000	pg/L	78.2	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		1570	2000	pg/L	78.5	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		1610	2000	pg/L	80.4	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		1570	2000	pg/L	78.3	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		1570	2000	pg/L	78.4	(20%-186%)
37Cl-2,3,7,8-TCDD		169	200	pg/L	84.3	(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:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**12023720**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 40521**				
Client ID:	**MB for batch 40521**			**Prep Basis:**	**As Received**
Batch ID:	**40523**	**Method:**	**EPA Method 1613B**		
Run Date:	**05/01/2019 18:44**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A01MAY19B_2-3**			**Dilution:**	**1**
Prep Batch:	**40521**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**30-APR-19**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.17	pg/g	0.170	1.00
40321-76-4	1,2,3,7,8-PeCDD	U	0.132	pg/g	0.132	5.00
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.18	pg/g	0.180	5.00
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.177	pg/g	0.177	5.00
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.182	pg/g	0.182	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	0.236	pg/g	0.236	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD	U	0.34	pg/g	0.340	10.0
51207-31-9	2,3,7,8-TCDF	U	0.206	pg/g	0.206	1.00
57117-41-6	1,2,3,7,8-PeCDF	U	0.124	pg/g	0.124	5.00
57117-31-4	2,3,4,7,8-PeCDF	U	0.125	pg/g	0.125	5.00
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.108	pg/g	0.108	5.00
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.105	pg/g	0.105	5.00
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.112	pg/g	0.112	5.00
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.163	pg/g	0.163	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	0.135	pg/g	0.135	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.21	pg/g	0.210	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.392	pg/g	0.392	10.0
41903-57-5	Total TeCDD	U	0.17	pg/g	0.170	1.00
36088-22-9	Total PeCDD	U	0.132	pg/g	0.132	5.00
34465-46-8	Total HxCDD	U	0.177	pg/g	0.177	5.00
37871-00-4	Total HpCDD	U	0.236	pg/g	0.236	5.00
30402-14-3	Total TeCDF	U	0.206	pg/g	0.206	1.00
30402-15-4	Total PeCDF	U	0.0828	pg/g	0.0828	5.00
55684-94-1	Total HxCDF	U	0.105	pg/g	0.105	5.00
38998-75-3	Total HpCDF	U	0.135	pg/g	0.135	5.00
3333-30-2	TEQ WHO2005 ND=0 with EMPCs		0.00	pg/g		
3333-30-3	TEQ WHO2005 ND=0.5 with EMPCs		0.237	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		167	200	pg/g	83.5	(25%-164%)
13C-1,2,3,7,8-PeCDD		166	200	pg/g	83.2	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		157	200	pg/g	78.6	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		172	200	pg/g	86.0	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		162	200	pg/g	81.1	(23%-140%)
13C-OCDD		344	400	pg/g	85.9	(17%-157%)
13C-2,3,7,8-TCDF		153	200	pg/g	76.7	(24%-169%)
13C-1,2,3,7,8-PeCDF		166	200	pg/g	82.9	(24%-185%)
13C-2,3,4,7,8-PeCDF		153	200	pg/g	76.6	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		152	200	pg/g	76.0	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		156	200	pg/g	77.9	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		155	200	pg/g	77.5	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		166	200	pg/g	82.8	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**12023720**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 40521**				
Client ID:	**MB for batch 40521**			**Prep Basis:**	**As Received**
Batch ID:	**40523**	**Method:**	**EPA Method 1613B**		
Run Date:	**05/01/2019 18:44**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A01MAY19B_2-3**			**Dilution:**	**1**
Prep Batch:	**40521**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**30-APR-19**	**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		153	200	pg/g	76.4	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		162	200	pg/g	81.2	(26%-138%)
37Cl-2,3,7,8-TCDD		20.2	20.0	pg/g	101	(35%-197%)

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:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**12023721**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 40521**				
Client ID:	**LCS for batch 40521**			**Prep Basis:**	**As Received**
Batch ID:	**40523**	**Method:**	**EPA Method 1613B**		
Run Date:	**05/01/2019 17:10**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A01MAY19B_2-1**			**Dilution:**	**1**
Prep Batch:	**40521**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**30-APR-19**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		17.2	pg/g	0.236	1.00
40321-76-4	1,2,3,7,8-PeCDD		94.2	pg/g	0.316	5.00
39227-28-6	1,2,3,4,7,8-HxCDD		95.8	pg/g	0.574	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		97.1	pg/g	0.574	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		100	pg/g	0.588	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		103	pg/g	0.944	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		186	pg/g	1.38	10.0
51207-31-9	2,3,7,8-TCDF		18.2	pg/g	0.290	1.00
57117-41-6	1,2,3,7,8-PeCDF		99.8	pg/g	0.330	5.00
57117-31-4	2,3,4,7,8-PeCDF		99.6	pg/g	0.310	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		98.4	pg/g	0.710	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		104	pg/g	0.746	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		100	pg/g	0.736	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		100	pg/g	1.10	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		99.0	pg/g	0.672	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		98.3	pg/g	1.04	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		194	pg/g	1.27	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		164	200	pg/g	82.1	(20%-175%)
13C-1,2,3,7,8-PeCDD		177	200	pg/g	88.4	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		163	200	pg/g	81.5	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		170	200	pg/g	85.0	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		165	200	pg/g	82.4	(22%-166%)
13C-OCDD		351	400	pg/g	87.8	(13%-199%)
13C-2,3,7,8-TCDF		145	200	pg/g	72.4	(22%-152%)
13C-1,2,3,7,8-PeCDF		170	200	pg/g	84.9	(21%-192%)
13C-2,3,4,7,8-PeCDF		159	200	pg/g	79.7	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		154	200	pg/g	76.8	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		150	200	pg/g	75.1	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		156	200	pg/g	78.1	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		163	200	pg/g	81.6	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		153	200	pg/g	76.4	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		163	200	pg/g	81.5	(20%-186%)
37Cl-2,3,7,8-TCDD		18.6	20.0	pg/g	93.1	(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:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**12023722**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 40521**				
Client ID:	**LCSD for batch 40521**			**Prep Basis:**	**As Received**
Batch ID:	**40523**	**Method:**	**EPA Method 1613B**		
Run Date:	**05/01/2019 17:57**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A01MAY19B_2-2**			**Dilution:**	**1**
Prep Batch:	**40521**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**30-APR-19**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		17.0	pg/g	0.212	1.00
40321-76-4	1,2,3,7,8-PeCDD		94.7	pg/g	0.250	5.00
39227-28-6	1,2,3,4,7,8-HxCDD		96.6	pg/g	0.456	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		95.5	pg/g	0.442	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		99.2	pg/g	0.460	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		97.3	pg/g	0.982	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		192	pg/g	1.34	10.0
51207-31-9	2,3,7,8-TCDF		18.8	pg/g	0.364	1.00
57117-41-6	1,2,3,7,8-PeCDF		98.2	pg/g	0.362	5.00
57117-31-4	2,3,4,7,8-PeCDF		99.7	pg/g	0.352	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		98.1	pg/g	0.814	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		102	pg/g	0.768	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		100	pg/g	0.838	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		97.1	pg/g	1.13	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		98.0	pg/g	0.850	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		98.3	pg/g	1.12	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		195	pg/g	1.65	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		172	200	pg/g	86.2	(20%-175%)
13C-1,2,3,7,8-PeCDD		179	200	pg/g	89.6	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		165	200	pg/g	82.3	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		184	200	pg/g	92.1	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		174	200	pg/g	87.0	(22%-166%)
13C-OCDD		364	400	pg/g	91.1	(13%-199%)
13C-2,3,7,8-TCDF		148	200	pg/g	74.1	(22%-152%)
13C-1,2,3,7,8-PeCDF		179	200	pg/g	89.3	(21%-192%)
13C-2,3,4,7,8-PeCDF		165	200	pg/g	82.7	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		159	200	pg/g	79.6	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		169	200	pg/g	84.5	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		163	200	pg/g	81.6	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		176	200	pg/g	87.9	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		160	200	pg/g	80.0	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		171	200	pg/g	85.5	(20%-186%)
37Cl-2,3,7,8-TCDD		19.2	20.0	pg/g	96.1	(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:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**12023723**	**Date Collected:**	**04/03/2019 12:55**	**Matrix:**	**SOIL**
Client Sample:	**QC for batch 40521**	**Date Received:**	**04/16/2019 10:00**		
Client ID:	**ISM-B-190403-After Processing(1483**			**Prep Basis:**	**As Received**
Batch ID:	**40523**	**Method:**	**EPA Method 1613B**		
Run Date:	**05/01/2019 21:06**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A01MAY19B_2-6**			**Dilution:**	**1**
Prep Batch:	**40521**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**30-APR-19**	**Prep Aliquot:**	**10.16 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		17.3	pg/g	0.240	0.984
40321-76-4	1,2,3,7,8-PeCDD		95.5	pg/g	0.476	4.92
39227-28-6	1,2,3,4,7,8-HxCDD		96.2	pg/g	0.724	4.92
57653-85-7	1,2,3,6,7,8-HxCDD		93.3	pg/g	0.707	4.92
19408-74-3	1,2,3,7,8,9-HxCDD		94.7	pg/g	0.732	4.92
35822-46-9	1,2,3,4,6,7,8-HpCDD		151	pg/g	1.60	4.92
3268-87-9	1,2,3,4,6,7,8,9-OCDD		595	pg/g	3.29	9.84
51207-31-9	2,3,7,8-TCDF		18.2	pg/g	0.337	0.984
57117-41-6	1,2,3,7,8-PeCDF		95.1	pg/g	0.435	4.92
57117-31-4	2,3,4,7,8-PeCDF		98.8	pg/g	0.449	4.92
70648-26-9	1,2,3,4,7,8-HxCDF		98.7	pg/g	0.770	4.92
57117-44-9	1,2,3,6,7,8-HxCDF		99.5	pg/g	0.750	4.92
60851-34-5	2,3,4,6,7,8-HxCDF		99.3	pg/g	0.787	4.92
72918-21-9	1,2,3,7,8,9-HxCDF		98.7	pg/g	1.12	4.92
67562-39-4	1,2,3,4,6,7,8-HpCDF		108	pg/g	0.654	4.92
55673-89-7	1,2,3,4,7,8,9-HpCDF		101	pg/g	1.06	4.92
39001-02-0	1,2,3,4,6,7,8,9-OCDF		201	pg/g	1.78	9.84

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		171	197	pg/g	87.1	(25%-164%)
13C-1,2,3,7,8-PeCDD		173	197	pg/g	87.7	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		169	197	pg/g	85.8	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		180	197	pg/g	91.2	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		182	197	pg/g	92.7	(23%-140%)
13C-OCDD		402	394	pg/g	102	(17%-157%)
13C-2,3,7,8-TCDF		152	197	pg/g	77.1	(24%-169%)
13C-1,2,3,7,8-PeCDF		177	197	pg/g	89.7	(24%-185%)
13C-2,3,4,7,8-PeCDF		160	197	pg/g	81.5	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		162	197	pg/g	82.4	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		164	197	pg/g	83.1	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		163	197	pg/g	82.7	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		175	197	pg/g	89.0	(29%-147%)
13C-1,2,3,4,6,7,8-HpCDF		162	197	pg/g	82.5	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		174	197	pg/g	88.4	(26%-138%)
37Cl-2,3,7,8-TCDD		18.6	19.7	pg/g	94.4	(35%-197%)

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:	**A9D0307**	**Client:**	**APEX001**	**Project:**	**APEX00217**
Lab Sample ID:	**12023724**	**Date Collected:**	**04/03/2019 12:55**	**Matrix:**	**SOIL**
Client Sample:	**QC for batch 40521**	**Date Received:**	**04/16/2019 10:00**		
Client ID:	**ISM-B-190403-After Processing(1483**			**Prep Basis:**	**As Received**
Batch ID:	**40523**	**Method:**	**EPA Method 1613B**		
Run Date:	**05/01/2019 21:54**	**Analyst:**	**MJC**	**Instrument:**	**HRP750**
Data File:	**A01MAY19B_2-7**			**Dilution:**	**1**
Prep Batch:	**40521**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**30-APR-19**	**Prep Aliquot:**	**10.13 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		16.7	pg/g	0.223	0.987
40321-76-4	1,2,3,7,8-PeCDD		94.7	pg/g	0.430	4.94
39227-28-6	1,2,3,4,7,8-HxCDD		96.7	pg/g	0.776	4.94
57653-85-7	1,2,3,6,7,8-HxCDD		98.5	pg/g	0.782	4.94
19408-74-3	1,2,3,7,8,9-HxCDD		100	pg/g	0.798	4.94
35822-46-9	1,2,3,4,6,7,8-HpCDD		155	pg/g	1.41	4.94
3268-87-9	1,2,3,4,6,7,8,9-OCDD		620	pg/g	2.05	9.87
51207-31-9	2,3,7,8-TCDF		18.6	pg/g	0.300	0.987
57117-41-6	1,2,3,7,8-PeCDF		96.0	pg/g	0.442	4.94
57117-31-4	2,3,4,7,8-PeCDF		99.2	pg/g	0.442	4.94
70648-26-9	1,2,3,4,7,8-HxCDF		99.7	pg/g	0.665	4.94
57117-44-9	1,2,3,6,7,8-HxCDF		99.6	pg/g	0.675	4.94
60851-34-5	2,3,4,6,7,8-HxCDF		96.2	pg/g	0.679	4.94
72918-21-9	1,2,3,7,8,9-HxCDF		99.4	pg/g	0.960	4.94
67562-39-4	1,2,3,4,6,7,8-HpCDF		106	pg/g	0.691	4.94
55673-89-7	1,2,3,4,7,8,9-HpCDF		98.4	pg/g	1.00	4.94
39001-02-0	1,2,3,4,6,7,8,9-OCDF		213	pg/g	1.42	9.87

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		164	197	pg/g	83.2	(25%-164%)
13C-1,2,3,7,8-PeCDD		177	197	pg/g	89.7	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		161	197	pg/g	81.5	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		173	197	pg/g	87.7	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		171	197	pg/g	86.8	(23%-140%)
13C-OCDD		383	395	pg/g	97.0	(17%-157%)
13C-2,3,7,8-TCDF		145	197	pg/g	73.4	(24%-169%)
13C-1,2,3,7,8-PeCDF		174	197	pg/g	88.0	(24%-185%)
13C-2,3,4,7,8-PeCDF		159	197	pg/g	80.6	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		153	197	pg/g	77.3	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		156	197	pg/g	79.2	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		160	197	pg/g	81.1	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		167	197	pg/g	84.3	(29%-147%)
13C-1,2,3,4,6,7,8-HpCDF		156	197	pg/g	79.1	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		169	197	pg/g	85.6	(26%-138%)
37Cl-2,3,7,8-TCDD		17.7	19.7	pg/g	89.8	(35%-197%)

Comments:

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

APPENDIX C

DATA VALIDATION MEMORANDUM

DATA QUALITY ASSURANCE/QUALITY CONTROL REVIEW

PROJECT NO. 9003.01.40 | JUNE 5, 2019 | PORT OF RIDGEFIELD

Maul Foster & Alongi, Inc., conducted an independent review of the quality of analytical results for sediment collected in Carty Lake, located adjacent to the Port of Ridgefield former Pacific Wood Treating Corporation site. The samples were collected on April 2 and 3, 2019.

Apex Laboratories, LLC (Apex) and Cape Fear Analytical, LLC (CFA) performed the analyses. Apex report number A9D0307 was reviewed. CFA report WO14833 was appended to A9D0307 and was also reviewed. The samples were collected using incremental sampling methodology (ISM) and were first processed at Apex according to their ISM processing standard operating procedure. Apex analyzed the prepared samples for total organic carbon (TOC) by the Puget Sound Estuary Program-recommended Standard Methods for the Examination of Water and Wastewater Method 5310B, after which the samples were submitted to CFA for analysis of chlorinated dibenzo-p-dioxins and dibenzofurans (dioxins/furans) by U.S. Environmental Protection Agency (USEPA) Method 1613B. The following samples were analyzed.

Samples Analyzed
Report A9D0307/WO14833
ISM-A-190403
ISM-B-190403
ISM-C-190403
Rinsate Blank

DATA QUALIFICATIONS

Analytical results were evaluated according to applicable sections of USEPA procedures (USEPA, 2014, 2016, 2017) and appropriate laboratory and method-specific guidelines (Apex, 2018; CFA, 2018; USEPA, 1986).

USEPA Method 1613B dioxins/furans congeners that were detected below the method reporting limit (MRL) and reported as estimated maximum potential concentrations (EMPCs) were qualified by the reviewer with "U" as non-detect at the reported EMPC values. USEPA Method 1613B total homolog results reported by CFA as EMPCs were qualified by the reviewer as estimated, not detected, at the reported concentration when all associated congeners were reported by CFA as non-detect or EMPCs. However, when one or more associated congeners was reported as a detection without an EMPC qualifier, the total homolog result was qualified by the reviewer with "J" as estimated. Total homolog results already reported as estimated due to detections below the MRL were not additionally qualified.

Results were qualified as follows:

Sample	Analyte	Original Result (pg/g)	Qualified Result (pg/g)
ISM-A-190403	1,2,3,7,8,9-HxCDD	1.04 JK	1.04 UJ
	1,2,3,7,8-PeCDF	0.389 JK	0.389 UJ
	1,2,3,4,7,8-HxCDF	1.06 JK	1.06 UJ
	Total TeCDD	0.702 JK	0.702 UJ
	Total PeCDD	1.47 JK	1.47 UJ
	Total HxCDD	16.0 JK	16.0 J
	Total PeCDF	4.81 JK	4.81 J
	Total HxCDF	13.3 JK	13.3 J
ISM-B-190403	1,2,3,4,7,8-HxCDF	1.00 JK	1.00 UJ
	2,3,4,6,7,8-HxCDF	0.489 JK	0.489 UJ
	1,2,3,7,8,9-HxCDF	0.292 JK	0.292 UJ
	Total TeCDD	0.887 JK	0.887 J
	Total HxCDD	13.5 JK	13.5 J
	Total TeCDF	0.900 JK	0.900 UJ
	Total PeCDF	4.34 JK	4.34 J
	Total HxCDF	11.3 JK	11.3 J
ISM-C-190403	1,2,3,4,7,8-HxCDD	0.593 JK	0.593 UJ
	1,2,3,7,8,9-HxCDD	1.16 JK	1.16 UJ
	2,3,4,6,7,8-HxCDF	0.597 JK	0.597 UJ
	1,2,3,4,7,8,9-HpCDF	0.573 JK	0.573 UJ
	Total PeCDD	1.10 JK	1.10 UJ
	Total HxCDD	15.2 JK	15.2 J
	Total TeCDF	0.635 JK	0.635 UJ
	Total PeCDF	4.90 JK	4.90 J
	Total HxCDF	12.4 JK	12.4 J
	Total HpCDF	23.9 JK	23.9 J

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

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. All laboratory method blanks were non-detect to appropriate MRLs or estimated detection limits (EDLs) for all target analytes.

Trip Blanks

Trip blanks were not required for this sampling event.

Equipment Rinsate Blanks

An equipment rinsate blank was collected for this sampling event and submitted for USEPA Method 1613B analysis. The equipment rinsate blank was non-detect for all target analytes.

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.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

Matrix spike/matrix spike duplicate (MS/MSD) results are used to evaluate laboratory precision and accuracy. All MS/MSD samples were extracted and analyzed at the required frequency. All MS/MSD results were within acceptance limits for percent recovery and relative percent difference (RPD).

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 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.

INCREMENTAL SAMPLING METHODOLOGY REPLICATE EVALUATION

An ISM sample replicate set was collected in triplicate and submitted to Apex and CFA for TOC and dioxin/furan analysis. The ISM replicate set included samples ISM-A-190403, ISM-B-190403, and ISM-C-190403. The relative standard deviations (RSDs) of the replicate sets were not calculated for dioxin/furan congener results that were non-detect or less than five times the MRL. RSDs calculated for results greater than five times the MRL were all less than 30 percent; thus, qualification was not required.

Analyte	ISM-A-190403	ISM-B-190403	ISM-C-190403	RSD (%)
TOC	6800	6400	7000	4.5
1,2,3,4,6,7,8-HpCDD	59.5	49.1	59.2	10.6
1,2,3,4,6,7,8,9-OCDD	493	400	465	10.5

REPORTING LIMITS

Apex and CFA used routine MRLs and EDLs for non-detect results. CFA adjusted some EDLs for ratio criteria exceedances (resulting in EMPCs). USEPA Method 1613B detections between the MRL and the EDL were reported as estimates ("J") by the laboratory.

DATA PACKAGE

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

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

No transcription errors, omissions, or anomalies were found.

REFERENCES

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