CARTY LAKE PREDESIGN SAMPLING REPORT

FORMER PACIFIC WOOD TREATING CO. SITE

Prepared for
PORT OF RIDGEFIELD
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MAUL FOSTER ALONGI

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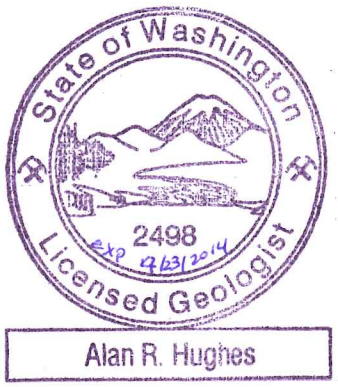
The material and data in this report were prepared under the supervision and direction of the undersigned.

MAUL FOSTER & ALONGI, INC.



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ACRONYMS AND ABBREVIATIONS

CAP	cleanup action plan
cm	centimeters
COE	U.S. Army Corps of Engineers
CUL	cleanup level
dioxins	chlorinated dibenzo-p-dioxins and dibenzofurans
DU	decision unit
Ecology	Washington State Department of Ecology
ISM	incremental sampling methodology
LRIS	Lake River Industrial Site
MFA	Maul Foster & Alongi, Inc.
MTCA	Model Toxics Control Act
Order	Agreed Order No. 01TCPSR-3119 between the Port and Ecology
Port	Port of Ridgefield
PSAP	Predesign Sampling and Analysis Plan
PWT	Pacific Wood Treating Co.
QA/QC	quality assurance/quality control
RI/FS	remedial investigation and feasibility study
RNWR	Ridgefield National Wildlife Refuge
SMS	Sediment Management Standards
SRM	sediment reference material
TEQ	toxicity equivalency
TOC	total organic carbon
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code

1 INTRODUCTION

On behalf of the Port of Ridgefield (Port), Maul Foster & Alongi, Inc. (MFA) has prepared this report to summarize Carty Lake predesign sampling and analytical results. Carty Lake is located in the Ridgefield National Wildlife Refuge Carty Unit adjacent to the former Pacific Wood Treating Co. (PWT) site in Ridgefield, Washington (see Figure 1-1). PWT operated a wood-treating facility from 1964 to 1993 at the Port's Lake River Industrial Site (LRIS); historical operations resulted in sediment contamination in Carty Lake. This document has been prepared under the authority of Agreed Order No. 01TCPSR-3119 between the Port and the Washington State Department of Ecology (Ecology) to satisfy the requirements of the Model Toxics Control Act (MTCA) and sediment management standards (SMS), and addresses the substantive requirements of Washington Administrative Code (WAC) 173-340, 350, and 360 (MTCA) and WAC 173-204 (SMS).

This report describes activities conducted to support the design of remedial actions targeting contaminated sediment in Carty Lake. The selected remedy includes removal and disposal of contaminated sediment and addressing low-level residual contamination through placement of clean sand. Carty Lake sediment characterization, cleanup level (CUL) development, and remedial alternatives evaluation are detailed in the Ecology-approved former PWT site remedial investigation and feasibility study (RI/FS) (MFA, 2013b) and in the cleanup action plan (CAP), Exhibit A of consent decree 13-2-03830-1 issued November 5, 2013. This report provides information regarding environmental field sampling, sample handling and analysis, quality assurance protocols, and laboratory analytical results and interpretation.

Sampling and reporting were conducted in accordance with the Ecology-approved predesign sampling and analysis plan (PSAP) (Mercuri, 2013; MFA, 2013a) that incorporated input from the U.S. Fish and Wildlife Service (USFWS); sampling activities were generally consistent with current Puget Sound Estuary Program (PSEP) and U.S. Environmental Protection Agency (USEPA) protocols for sampling and analysis (PSEP, 1986, 1997a,b; USEPA, 1993) and standard USEPA methods based on USEPA test methods for evaluating solid waste, physical/chemical methods (also known as SW-846) requirements, as amended (USEPA, 1986). Sampling activities were consistent with guidance provided in Ecology's Sediment Source Control Standards User Manual, Sediment Sampling and Analysis Plan appendix (Ecology, 2008).

2 INVESTIGATION OBJECTIVES

The PSAP identified the chemical and physical sediment characterization needed to design the Carty Lake cleanup action (MFA, 2013a). The primary investigation objectives of sampling and analysis conducted were:

- Delineation of the remedy area, including excavation (horizontal and vertical extent) and residuals cap areas
- Collection of remedial action confirmation samples
- Characterization of sediment physical parameters to evaluate sediment retrieval, handling, and disposal methods

These objectives are discussed further below.

2.1 Remedial Action Area

The nature and extent of hazardous substances in Carty Lake are generally well understood (MFA, 2013b). Significantly elevated dioxin concentrations are largely limited to the extreme southern portion of the lake at locations LRIS-CL-01, -02, and -04, although elevated (i.e., higher than the CUL of 5 nanograms per kilogram) dioxin toxicity equivalent concentrations occur at multiple locations. Dioxin concentrations decrease substantially within the top 1 to 2 feet of the mudline. Metals (arsenic and chromium) and pentachlorophenol exceedances of screening criteria are well defined and are collocated with significantly elevated dioxin concentrations in the extreme southern portion of the lake at LRIS-CL-01, -02, and -04. Based on elevated chemical concentrations, the extreme southern portion was identified as the minimum area for remedial action (MFA, 2013a).

To support delineation of other areas for potential remedial action, additional subsurface discrete sampling and surface incremental sampling (i.e., the incremental sampling methodology [ISM]) was conducted in five decision units to the north of the extreme southern portion of Carty Lake (MFA, 2013a). ISM consisted of combining ten individual samples (termed "increments") into one increment composite for each predefined decision unit. ISM is further discussed in the PSAP (MFA, 2013a) and references therein (ADEC, 2009; HDOH, 2009, 2011; ITRC, 2012).

The RI/FS (MFA, 2013b) evaluated a variety of remedial action scenarios on the basis of technical feasibility, cost and anticipated postremedial surface-weighted average concentrations (using the Thiessen polygon (TP) interpolation method). The preferred alternative presented in the RI/FS involved removing sediment with dioxins above levels protective of ecological receptors, i.e., at the risk-based ecological factors for dioxin congeners. Following removal, clean sand would be placed in an approximately 1-foot-thick layer over dredged areas and the resulting residuals. The TP method was used to estimate initial removal and clean sand volumes.

The predesign data described in this report, together with the data collected during RI activities, are used to inform the excavation and clean sand footprint (see the main text initial design report). The final remedy area will also consider removal logistics, feasibility, and lakebed characteristics, and will be developed in consultation with Ecology and USFWS.

Data collected during the predesign sampling effort are also used to confirm that the remedy will meet sediment criteria. As a result, additional confirmation samples will not be required during or immediately upon completion of the remedial action.

2.2 Sediment Physical Characterization

Information regarding the physical properties of sediment in the anticipated remedy area was collected to inform the design of the remedy and to refine remedial cost estimates. These properties inform evaluation of slope stability, hydrodynamics, sediment transfer, removal production rates, volumes, and handling requirements.

The sediment physical properties not only inform the handling requirements and excavation methods for sediment, but also provide a better understanding of hydrodynamics and sediment transfer information. One physical sample was collected from the remedy area, using a Shelby tube.

3 SEDIMENT SAMPLING

3.1 Sampling Methods

MFA conducted sediment sampling on June 24, 25, and 26, 2013. Sampling was conducted consistent with the Ecology-approved PSAP (MFA, 2013a), or as noted below. Figure 3-1 and Table 3-1 show and summarize sample stations, respectively. Sampling methods for each collection technique are described below.

3.1.1 Surface Sediment Sampling

Surface sediment samples for ISM composite samples were collected from decision units in the "island" area (decision units 3 and 5) and in the "in-water" area (decision units 1, 2, and 4) to account for varying sediment and vegetation conditions between areas (see Figure 3-1). Sample locations were accessed by foot, by wading, or with a small vessel. Sampling was first conducted in island areas, followed by sampling in-water areas. In both cases, a differential global positioning system was used to navigate to locations; care was taken to avoid stepping on locations before sampling. A 2-inch-diameter, thin-walled, stainless steel sediment sampling tube was used to retrieve increments from in-water decision units; however, a smaller, 1.75-inch-diameter tube was used for island decision units. Use of the smaller tube in the island area accounted for differing sediment density between in-water and island areas, providing sufficient (greater than 1.5 kilograms) and similar mass for all decision units (see Table 3-2). See Appendix A for photographs of sampling areas and representative samples collected.

In the in-water areas, a sampling tube was manually advanced to a depth greater than 10 centimeters (cm), water was decanted, and sediment was then extruded onto a clean work surface, using a plunger. The increments were measured, trimmed to 10 cm, weighed, and placed in the laboratory-supplied decision-unit-dedicated sampling container. Only sediment from the biologically active zone (i.e., sediment occurring above the non-biologically-active clay layer) was retained (see Appendix A). In some cases (see Table 3-2), a second core was retrieved from within 3 feet of the first core to achieve the total length (10 cm) and mass (within 20 percent of the decision unit mean

mass) of the biologically active layer required for a location. This ensured a similar contribution from each location increment to the increment composite sample (see Table 3-2). Triplicate samples were collected in decision unit 1, as specified in the PSAP.

In the island area, a sampling tube was manually advanced to a depth greater than 10 cm and extruded onto a clean work surface, using a plunger. Reed canary grass mats covering sediment were removed before the sampling tube was advanced. This effort ensured that minimal organic matter was included in sediment collected, as well as ensuring substrate consistency between sample increments. In addition, significant remaining organic matter (e.g., reed canary grass mat), if present, was removed from retrieved cores prior to processing. The increments were then measured, trimmed to 10 cm, weighed, and placed in the laboratory-supplied decision-unit-dedicated sampling container. See Table 3-2 for a summary of increment characteristics.

All sample containers were kept on ice before submittal to the laboratory for analysis. All equipment was decontaminated in accordance with the PSAP.

3.1.2 Subsurface Sediment Sampling

Twelve discrete subsurface sediment samples (and one duplicate) were collected using a stainless-steel hand auger (see Table 3-3). Locations were accessed by wading or by small boat (see Figure 3-1). If present, reed canary grass mats covering sediment were removed before sampling.

All sediment was homogenized over the target depth interval before it was placed in laboratory-supplied sample containers. Two 8-ounce jars were filled at sample locations for the ten 1- to 2-foot samples. One 8-ounce jar was submitted for analysis. The other sample container was submitted to the laboratory for archiving. In decision unit 1, two 2- to 3-foot samples were collected. Two 8-ounce jars were filled for each sample and submitted to the laboratory for archiving. All sample containers were kept on ice prior to submittal to the laboratory. Tier I samples were analyzed initially, while Tier II samples were archived pending the results of the Tier I analysis (see Table 3-3). All equipment was decontaminated in accordance with the PSAP.

3.1.3 QA/QC Samples

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

Rinsate blanks collected from reusable equipment coming into direct contact with sediment samples (e.g., bowls and spoons) were submitted for analysis by the same methods used for the collected sediment samples. Rinsate blanks were collected for each day of sampling.

One discrete sample, field duplicate was collected at sample location LRIS-CL-17. This field duplicate was prepared by dividing aliquots of a homogenized sample into two distinct samples for laboratory analysis.

Triplicate ISM composite samples were collected across decision unit 1. Replicates were processed and analyzed consistent with the methods used for the primary sample.

3.1.4 Shelby Tube Sampling

Sediment sampling for physical parameters was conducted by manually advancing Shelby tubes through the lake substrate. The Shelby tube sampling method allows for retrieval of a relatively undisturbed (i.e., in situ) sample.

The PSAP specified four sample locations (MFA, 2013a). However, only one sample was collected (see Figure 3-1). The clay layer (generally present at less than 2 feet below mudline) led to refusal and subsequent equipment failure following retrieval of the first sample. For the sample collected, a 3-inch-by-36-inch, thin-walled Shelby tube was secured to pole extensions and advanced through the sediment to 30 inches. The Shelby tube was removed from the sediment; each end of the Shelby tube was wiped clean of loose sediment cuttings; and the sample length was measured at 25.5 inches (85 percent of drive depth), achieving the minimum of 2 feet and more than the minimum of 75 percent retrieval specified in the PSAP. The sample was sealed at each end with a leak proof cap and stored upright for transportation to the geotechnical laboratory. All equipment was decontaminated in accordance with the PSAP.

3.2 Management of Investigation-Derived Waste

Use of dedicated sampling equipment significantly reduced the amount of decontamination fluids generated during the sampling event. Nondisposable incremental sampling equipment was decontaminated only between decision units (i.e., not decontaminated between increments within the same decision unit). Decontamination of nondisposable sampling equipment (i.e., hand augers, incremental sampling equipment) utilized disposable, single-use paper towels that were containerized, along with used personal protective equipment, and disposed of in a sanitary landfill.

3.3 Sample Processing

Samples for incremental sampling processing and chemical analysis were submitted to the Ecology-approved Apex Laboratories (Apex) of Tigard, Oregon. The Shelby tube sample for physical parameter testing was submitted to GeoDesign, Inc. (GeoDesign), of Portland, Oregon. Chain-of-custody documentation was prepared at the time of sampling and was maintained throughout the sample handling and testing process; it is included in the laboratory analytical reports (see Appendix B).

3.4 Laboratory Chemical Sample Processing and Analysis

Prior to analysis, decision unit composite samples were processed by Apex, using PSAP-identified ISM processing procedures. As part of the ISM processing, precise volumes (as identified in the PSAP) of composites were collected as aliquots for each individual laboratory analysis and QA/QC requirements. Apex conducted the following analyses of ISM aliquots and discrete samples by the methods indicated:

- Pentachlorophenol by USEPA Method 8270D
- Total arsenic and chromium by USEPA Method 6020A

- Total organic carbon by PSEP/SM 5310B Modified

Apex provided Maxxam Analytics Inc. (Maxxam) with ISM composite aliquots and discrete sample aliquots. Maxxam analyzed those aliquots for dioxins by USEPA Method 1613B.

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

One Puget Sound Sediment Reference Material (SRM) was requested and received through Ecology. The SRM sample is matrix-specific, with known concentrations of dioxins and furans that have been certified by the provider, Shaw Environmental, Inc. The SRM was prepared and analyzed for dioxins and furans, using USEPA Method 1613B. The SRM was prepared and analyzed with each batch of samples analyzed for dioxins and furans. The SRM was assessed by comparing laboratory results to the certified performance criteria found in the document Puget Sound Sediment Reference Material: Requesting and Analyzing the SRM, and Reporting Data (COE, 2012).

3.5 Laboratory Physical Sample Processing and Analysis

GeoDesign processed and analyzed the Shelby tube sample consistent with the methods identified in the PSAP.

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, 2008, 2010, 2011), appropriate laboratory and method-specific guidelines (Apex, 2013; Maxxam, 2013; USEPA, 1986), and the Dioxin and Furan Analysis, Data Validation, and TEQ Calculation Rules memorandum (see Appendix D) developed by MFA and included with the PSAP approved by Ecology (2013). SRM, discrete field duplicates, ISM replicates, and rinsate blanks were assessed as part of the data validation. Sample results were qualified appropriately to reflect any criteria not satisfied during the aforementioned assessments. All data are considered acceptable for use with associated qualifiers. Consistent with WAC 173-340-840(5) and Ecology Toxics Cleanup Program Policy 840 (Data Submittal Requirements), data were submitted in both written and electronic formats.

4 RESULTS

The results of the predesign sampling, including delineation of the remedy area, are used to support the remedial design effort. Sample results for chemical constituents are shown in Figure 4-1 and Table 4-1. Sediment characteristics, development of the remedy area, and characterization of post-remedy sediment conditions are described in Carty Lake design reports.

LIMITATIONS

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

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

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TABLES

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

Station ID	Surface Sample	Subsurface Sample	X Coordinate	Y Coordinate	Type
LRIS-CL-DU1A-1	ISM	NA	1066525.740	186370.630	Incremental Sample (Replicate 1)
LRIS-CL-DU1A-2	ISM	NA	1066550.036	186370.630	Incremental Sample (Replicate 1)
LRIS-CL-DU1A-3	ISM	NA	1066574.332	186370.630	Incremental Sample (Replicate 1)
LRIS-CL-DU1A-4	ISM	NA	1066513.592	186391.671	Incremental Sample (Replicate 1)
LRIS-CL-DU1A-5	ISM	NA	1066537.888	186391.671	Incremental Sample (Replicate 1)
LRIS-CL-DU1A-6	ISM	NA	1066562.184	186391.671	Incremental Sample (Replicate 1)
LRIS-CL-DU1A-7	ISM	NA	1066586.480	186391.671	Incremental Sample (Replicate 1)
LRIS-CL-DU1A-8	ISM	NA	1066501.444	186412.712	Incremental Sample (Replicate 1)
LRIS-CL-DU1A-9	ISM	NA	1066525.740	186412.712	Incremental Sample (Replicate 1)
LRIS-CL-DU1A-10	ISM	NA	1066550.036	186412.712	Incremental Sample (Replicate 1)
LRIS-CL-DU1B-1	ISM	NA	1066534.400	186370.630	Incremental Sample (Replicate 2)
LRIS-CL-DU1B-2	ISM	NA	1066558.696	186370.630	Incremental Sample (Replicate 2)
LRIS-CL-DU1B-3	ISM	NA	1066582.992	186370.630	Incremental Sample (Replicate 2)
LRIS-CL-DU1B-4	ISM	NA	1066522.252	186391.671	Incremental Sample (Replicate 2)
LRIS-CL-DU1B-5	ISM	NA	1066546.548	186391.671	Incremental Sample (Replicate 2)
LRIS-CL-DU1B-6	ISM	NA	1066570.844	186391.671	Incremental Sample (Replicate 2)
LRIS-CL-DU1B-7	ISM	NA	1066595.140	186391.671	Incremental Sample (Replicate 2)
LRIS-CL-DU1B-8	ISM	NA	1066510.104	186412.712	Incremental Sample (Replicate 2)
LRIS-CL-DU1B-9	ISM	NA	1066534.400	186412.712	Incremental Sample (Replicate 2)
LRIS-CL-DU1B-10	ISM	NA	1066558.696	186412.712	Incremental Sample (Replicate 2)
LRIS-CL-DU1C-1	ISM	NA	1066530.070	186378.130	Incremental Sample (Replicate 3)
LRIS-CL-DU1C-2	ISM	NA	1066554.366	186378.130	Incremental Sample (Replicate 3)
LRIS-CL-DU1C-3	ISM	NA	1066578.662	186378.130	Incremental Sample (Replicate 3)
LRIS-CL-DU1C-4	ISM	NA	1066517.922	186399.171	Incremental Sample (Replicate 3)
LRIS-CL-DU1C-5	ISM	NA	1066542.218	186399.171	Incremental Sample (Replicate 3)
LRIS-CL-DU1C-6	ISM	NA	1066566.514	186399.171	Incremental Sample (Replicate 3)
LRIS-CL-DU1C-7	ISM	NA	1066590.810	186399.171	Incremental Sample (Replicate 3)
LRIS-CL-DU1C-8	ISM	NA	1066505.774	186420.212	Incremental Sample (Replicate 3)
LRIS-CL-DU1C-9	ISM	NA	1066530.070	186420.212	Incremental Sample (Replicate 3)
LRIS-CL-DU1C-10	ISM	NA	1066554.366	186420.212	Incremental Sample (Replicate 3)
LRIS-CL-DU2-1	ISM	NA	1066499.108	186446.342	Incremental Sample
LRIS-CL-DU2-2	ISM	NA	1066524.022	186446.342	Incremental Sample
LRIS-CL-DU2-3	ISM	NA	1066548.935	186446.342	Incremental Sample
LRIS-CL-DU2-4	ISM	NA	1066511.565	186467.918	Incremental Sample
LRIS-CL-DU2-5	ISM	NA	1066536.478	186467.918	Incremental Sample
LRIS-CL-DU2-6	ISM	NA	1066499.108	186489.493	Incremental Sample
LRIS-CL-DU2-7	ISM	NA	1066524.022	186489.493	Incremental Sample
LRIS-CL-DU2-8	ISM	NA	1066486.652	186511.069	Incremental Sample
LRIS-CL-DU2-9	ISM	NA	1066511.565	186511.069	Incremental Sample
LRIS-CL-DU2-10	ISM	NA	1066536.478	186511.069	Incremental Sample

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

Station ID	Surface Sample	Subsurface Sample	X Coordinate	Y Coordinate	Type
LRIS-CL-DU3-1	ISM	NA	1066590.360	186419.718	Incremental Sample
LRIS-CL-DU3-2	ISM	NA	1066575.978	186444.629	Incremental Sample
LRIS-CL-DU3-3	ISM	NA	1066604.742	186444.629	Incremental Sample
LRIS-CL-DU3-4	ISM	NA	1066561.595	186469.540	Incremental Sample
LRIS-CL-DU3-5	ISM	NA	1066590.360	186469.540	Incremental Sample
LRIS-CL-DU3-6	ISM	NA	1066575.978	186494.451	Incremental Sample
LRIS-CL-DU3-7	ISM	NA	1066604.742	186494.451	Incremental Sample
LRIS-CL-DU3-8	ISM	NA	1066561.595	186519.362	Incremental Sample
LRIS-CL-DU3-9	ISM	NA	1066590.360	186519.362	Incremental Sample
LRIS-CL-DU3-10	ISM	NA	1066619.125	186519.362	Incremental Sample
LRIS-CL-DU4-1	ISM	NA	1066499.242	186533.159	Incremental Sample
LRIS-CL-DU4-2	ISM	NA	1066483.947	186559.651	Incremental Sample
LRIS-CL-DU4-3	ISM	NA	1066514.537	186559.651	Incremental Sample
LRIS-CL-DU4-4	ISM	NA	1066468.652	186586.142	Incremental Sample
LRIS-CL-DU4-5	ISM	NA	1066499.242	186586.142	Incremental Sample
LRIS-CL-DU4-6	ISM	NA	1066529.832	186586.142	Incremental Sample
LRIS-CL-DU4-7	ISM	NA	1066453.357	186612.634	Incremental Sample
LRIS-CL-DU4-8	ISM	NA	1066483.947	186612.634	Incremental Sample
LRIS-CL-DU4-9	ISM	NA	1066514.537	186612.634	Incremental Sample
LRIS-CL-DU4-10	ISM	NA	1066545.127	186612.634	Incremental Sample
LRIS-CL-DU5-1	ISM	NA	1066544.302	186550.219	Incremental Sample
LRIS-CL-DU5-2	ISM	NA	1066573.859	186550.219	Incremental Sample
LRIS-CL-DU5-3	ISM	NA	1066603.416	186550.219	Incremental Sample
LRIS-CL-DU5-4	ISM	NA	1066632.973	186550.219	Incremental Sample
LRIS-CL-DU5-5	ISM	NA	1066559.081	186575.816	Incremental Sample
LRIS-CL-DU5-6	ISM	NA	1066588.638	186575.816	Incremental Sample
LRIS-CL-DU5-7	ISM	NA	1066618.195	186575.816	Incremental Sample
LRIS-CL-DU5-8	ISM	NA	1066573.859	186601.413	Incremental Sample
LRIS-CL-DU5-9	ISM	NA	1066603.416	186601.413	Incremental Sample
LRIS-CL-DU5-10	ISM	NA	1066588.638	186627.011	Incremental Sample
LRIS-CL-16	NA	C	1066538.012	186380.409	Discrete Subsurface
LRIS-CL-17	NA	C	1066563.172	186413.215	Discrete Subsurface
LRIS-CL-18	NA	C	1066526.088	186436.551	Discrete Subsurface
LRIS-CL-19	NA	C	1066524.177	186509.284	Discrete Subsurface
LRIS-CL-20	NA	C	1066584.539	186447.288	Discrete Subsurface
LRIS-CL-21	NA	C	1066582.489	186509.513	Discrete Subsurface
LRIS-CL-22	NA	C	1066489.725	186559.479	Discrete Subsurface
LRIS-CL-23	NA	C	1066515.902	186604.392	Discrete Subsurface
LRIS-CL-24	NA	C	1066568.930	186557.111	Discrete Subsurface

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

Station ID	Surface Sample	Subsurface Sample	X Coordinate	Y Coordinate	Type
LRIS-CL-25	NA	C	1066585.385	186604.416	Discrete Subsurface
LRIS-CL-26	NA	P	1066596.220	186338.516	Discrete Subsurface

NOTES:

Coordinates based on Washington South State Plane HARN (NAD83).

C = discrete chemical data collection.

ISM = incremental sampling methodology.

NA = not applicable.

P = discrete physical data collection.

Table 3-2
Surface Sample Summary
Former PWT Site
Ridgefield, Washington

Sample Location	Sample Type	Depth (cm)	Date	Time	Measured Length (cm)[a]	Measured Mass (g)	Description	Notes
LRIS-CL-DU1A-1	ISM	0-10	06/25/2013	1446	10	190	Loose, wet, dark, gray, nonplastic silt, trace fine sand	Trace organics
LRIS-CL-DU1A-2	ISM	0-10	06/25/2013	1420	10	179	Loose, wet, dark, gray, nonplastic silt, trace fine sand	
LRIS-CL-DU1A-3	ISM	0-10	06/25/2013	1457	10	179	Loose, wet, dark, gray, nonplastic silt, trace fine sand	
LRIS-CL-DU1A-4	ISM	0-10	06/25/2013	1515	10	184	Loose, wet, dark, gray, firm, trace fine sand	Trace organics
LRIS-CL-DU1A-5	ISM	0-10	06/25/2013	1520	10	204	Loose, wet, dark, gray, trace fine sand	Trace organics
LRIS-CL-DU1A-6	ISM	0-10	06/25/2013	1535	10	178	Loose, wet, dark, gray, trace fine sand	Trace organics
LRIS-CL-DU1A-7	ISM	0-10	06/25/2013	1500	10	190	Medium plasticity, silt/clay	Trace organics
LRIS-CL-DU1A-8	ISM	0-10	06/25/2013	1549	10	199	Soft, medium plasticity, silt/clay	Trace organics
LRIS-CL-DU1A-9	ISM	0-10	06/25/2013	1600	10	177	Soft, medium plasticity, silt/clay	Trace organics
LRIS-CL-DU1A-10	ISM	0-10	06/25/2013	1615	10	173	Medium firm, medium plasticity, silt/clay	Trace organics
LRIS-CL-DU1A (Summary Parameters)	ISM	0-10	06/25/2013	NA	10	185	NA	NA
LRIS-CL-DU1B-1	ISM	0-10	06/25/2013	1440	10 (5+5)	193	Loose, wet, silt, gray, trace fines, sand, nonplastic	Trace organics, two cores
LRIS-CL-DU1B-2	ISM	0-10	06/25/2013	1430	10	186	Loose, wet, silt, gray, trace fines, sand, nonplastic	
LRIS-CL-DU1B-3	ISM	0-10	06/25/2013	1455	10	179	Loose, wet, silt, gray, trace fines, sand, nonplastic	
LRIS-CL-DU1B-4	ISM	0-10	06/25/2013	1525	10	171	Loose, wet, silt, gray, trace fines, sand, nonplastic, medium firm	Trace organics
LRIS-CL-DU1B-5	ISM	0-10	06/25/2013	1522	10	173	Loose, wet, silt, gray, trace fines, sand, non-plastic	Trace organics
LRIS-CL-DU1B-6	ISM	0-10	06/25/2013	1535	10	178	Loose, wet, silt, gray, trace fines, sand, non-plastic	Trace organics
LRIS-CL-DU1B-7	ISM	0-10	06/25/2013	1505	10	197	Silt/clay, medium plasticity, stiff	Trace organics
LRIS-CL-DU1B-8	ISM	0-10	06/25/2013	1549	10	193	Soft, silt, trace fines, sand	Trace organics
LRIS-CL-DU1B-9	ISM	0-10	06/25/2013	1604	10	184	Soft, silt, trace fines, sand	Trace organics
LRIS-CL-DU1B-10	ISM	0-10	06/25/2013	1620	10	178	Medium firm, soft, silt, trace fines, subangular	Trace organics
LRIS-CL-DU1B (Summary Parameters)	ISM	0-10	06/25/2013	NA	10	183	NA	NA
LRIS-CL-DU1C-1	ISM	0-10	06/25/2013	1444	10	189	Loose, wet, silt, gray, trace fine sand, nonplastic	Trace organics
LRIS-CL-DU1C-2	ISM	0-10	06/25/2013	1426	10 (5+5)	198	Loose, wet, silt, gray, trace fine sand, nonplastic	Two cores
LRIS-CL-DU1C-3	ISM	0-10	06/25/2013	1453	10	171	Loose, wet, silt, gray, trace fine sand, nonplastic	
LRIS-CL-DU1C-4	ISM	0-10	06/25/2013	1528	10	212	Loose, wet, silt, gray, trace fine sand, nonplastic, medium firm	Trace organics
LRIS-CL-DU1C-5	ISM	0-10	06/25/2013	1536	10	204	Loose, wet, silt, gray, trace fine sand, nonplastic, medium firm	Trace organics
LRIS-CL-DU1C-6	ISM	0-10	06/25/2013	1542	10	197	Loose, wet, silt, gray, trace fine sand, nonplastic, medium firm	Trace organics
LRIS-CL-DU1C-7	ISM	0-10	06/25/2013	1508	10	205	Silt/clay, dark gray, firm	Trace organics
LRIS-CL-DU1C-8	ISM	0-10	06/25/2013	1554	10	191	Loose, fine sand, silt	Trace organics
LRIS-CL-DU1C-9	ISM	0-10	06/25/2013	1610	10	187	Loose, subangular	Trace organics
LRIS-CL-DU1C-10	ISM	0-10	06/25/2013	1625	10	202	Medium firm, subangular	Trace organics
LRIS-CL-DU1C (Summary Parameters)	ISM	0-10	06/25/2013	NA	10	196	NA	NA
LRIS-CL-DU2-1	ISM	0-10	06/25/2013	1036	10	182	Silt with clay, top 1 cm saturated, bottom 9 cm medium plasticity, gray	Minimal organics
LRIS-CL-DU2-2	ISM	0-10	06/25/2013	1032	10	230	Silt with clay, saturated, nonplastic, gray	Minimal organics
LRIS-CL-DU2-3	ISM	0-10	06/25/2013	1045	10	198	Silt with clay, saturated, nonplastic, gray	Minimal organics
LRIS-CL-DU2-4	ISM	0-10	06/25/2013	1011	10 (8+2)	187	Silt with clay, saturated, nonplastic	Some organics, two cores
LRIS-CL-DU2-5	ISM	0-10	06/25/2013	1021	10	200	Silt with clay, saturated, nonplastic	Minimal organics
LRIS-CL-DU2-6	ISM	0-10	06/25/2013	930	10	197	Silt with clay, top 2 cm saturated and nonplastic, bottom 8 cm medium plasticity	Some organics
LRIS-CL-DU2-7	ISM	0-10	06/25/2013	945	10 (6.5+3.5)	189	Silty with clay, nonplastic, saturated	Some organics, two cores
LRIS-CL-DU2-8	ISM	0-10	06/25/2013	947	10	196	Silt with clay, medium plastic, near shore—unsaturated	Minimal organics
LRIS-CL-DU2-9	ISM	0-10	06/25/2013	955	10	216	Silt with clay, nonplastic, saturated	Minimal organics

Table 3-2
Surface Sample Summary
Former PWT Site
Ridgefield, Washington

Sample Location	Sample Type	Depth (cm)	Date	Time	Measured Length (cm)[a]	Measured Mass (g)	Description	Notes
LRIS-CL-DU2-10	ISM	0-10	06/25/2013	1005	10	217	Silty with clay, saturated, low plasticity	Minimal organics
LRIS-CL-DU2 (Summary Parameters)	ISM	0-10	06/25/2013	NA	10	201	NA	NA
LRIS-CL-DU3-1	ISM	0-10	06/24/2013	1440	10	185	Silt with clay, medium plasticity	Minimal organics
LRIS-CL-DU3-2	ISM	0-10	06/24/2013	1430	10	182	Silt with clay, medium plasticity	Minimal organics
LRIS-CL-DU3-3	ISM	0-10	06/24/2013	1425	10	194	Silt with clay, medium plasticity	Minimal organics
LRIS-CL-DU3-4	ISM	0-10	06/24/2013	1410	10	213	Silt with clay, medium plasticity	Minimal organics
LRIS-CL-DU3-5	ISM	0-10	06/24/2013	1420	10	197	Silt with clay, medium plasticity	Minimal organics
LRIS-CL-DU3-6	ISM	0-10	06/24/2013	1405	10	201	Silt with clay, medium plasticity	Minimal organics
LRIS-CL-DU3-7	ISM	0-10	06/24/2013	1410	10	193	Silt with clay, medium plasticity	Minimal organics
LRIS-CL-DU3-8	ISM	0-10	06/24/2013	1348	10	190	Silt with clay, nonplastic	Minimal organics
LRIS-CL-DU3-9	ISM	0-10	06/24/2013	1355	10	197	Silt with clay, medium plasticity	Minimal organics
LRIS-CL-DU3-10	ISM	0-10	06/24/2013	1400	10	189	Silt with clay, medium plasticity	Minimal organics
LRIS-CL-DU3 (Summary Parameters)	ISM	0-10	06/24/2013	NA	10	194	NA	NA
LRIS-CL-DU4-1	ISM	0-10	06/25/2013	1100	10	192	Silt with clay, low plasticity	Trace organics
LRIS-CL-DU4-2	ISM	0-10	06/25/2013	1110	10 (5+5)	191	Silt with clay, low plasticity	Trace organics, two cores
LRIS-CL-DU4-3	ISM	0-10	06/25/2013	1103	10 (5+5)	188	Silt, trace clay, dark gray, trace fine sand	Trace organics, two cores
LRIS-CL-DU4-4	ISM	0-10	06/25/2013	1120	10 (5+5)	184	Silt with clay, fine sand	Trace organics, two cores
LRIS-CL-DU4-5	ISM	0-10	06/25/2013	1128	10	205	Silt loose, low plasticity, trace fine sand	Trace organics
LRIS-CL-DU4-6	ISM	0-10	06/25/2013	1134	10 (7+3)	182	Silt loose, low plasticity, trace fine sand	Trace organics, two cores
LRIS-CL-DU4-7	ISM	0-10	06/25/2013	1217	10 (5+5)	180	Silt, loose, dark gray, low plasticity, wet	Trace organics, two cores
LRIS-CL-DU4-8	ISM	0-10	06/25/2013	1204	10 (8+10)	190	Silt, loose, low plasticity, trace fine sand	Trace organics, two cores
LRIS-CL-DU4-9	ISM	0-10	06/25/2013	1156	10	198	Silt, loose, low plasticity, trace fine sand	Trace organics
LRIS-CL-DU4-10	ISM	0-10	06/25/2013	1144	10	197	Silt, loose, low plasticity, trace fine sand	Trace organics
LRIS-CL-DU4 (Summary Parameters)	ISM	0-10	06/25/2013	NA	10	191	NA	NA
LRIS-CL-DU5-1	ISM	0-10	06/24/2013	1115	10	210	Silt with clay, medium plasticity	Some organics
LRIS-CL-DU5-2	ISM	0-10	06/24/2013	1125	10	213	Silt with clay, medium plasticity	Minimal organics
LRIS-CL-DU5-3	ISM	0-10	06/24/2013	1135	10	211	Silt with clay, medium plasticity	Minimal organics
LRIS-CL-DU5-4	ISM	0-10	06/24/2013	1145	10	221	Silt with clay, medium plasticity	Minimal organics, dense
LRIS-CL-DU5-5	ISM	0-10	06/24/2013	1155	10	234	Silt with clay, medium plasticity	Minimal organics, dense
LRIS-CL-DU5-6	ISM	0-10	06/24/2013	1205	10	203	Silt with clay, medium plasticity	Minimal organics, dense
LRIS-CL-DU5-7	ISM	0-10	06/24/2013	1210	10	202	Silt with clay, medium plasticity	Minimal organics, dense
LRIS-CL-DU5-8	ISM	0-10	06/24/2013	1215	10	237	Silt with clay, medium plasticity	Minimal organics, dense
LRIS-CL-DU5-9	ISM	0-10	06/24/2013	1220	10	194	Top 4 cm loose, wet silt, bottom 6 cm silt with clay, medium plasticity	Minimal organics
LRIS-CL-DU5-10	ISM	0-10	06/24/2013	1225	10	197	Top 4 cm loose, wet silt, bottom 6 cm silt with clay, medium plasticity	Minimal organics
LRIS-CL-DU5 (Summary Parameters)	ISM	0-10	06/24/2013	NA	10	212	NA	NA

NOTES:
Summary parameters provide the mean increment length and mass for each decision unit.
cm = centimeters.
g = gram(s).
NA = not applicable.
ISM = incremental sampling methodology.
[a]In cases where two cores were collected, total length is shown and length of each core is shown in ().

Table 3-3
Subsurface Sample Summary
Former PWT Site
Ridgefield, Washington

Sample Location	Sample Type	Depth	Analytical Tier	Date	Time	Measured Length (feet)	Description
LRIS-CL-16	Discrete	1-2 ft	Tier I	06/26/2013	1150	1-2 ft	Trace organics, soft, gray fines over stiff gray, silt with clay, plastic
LRIS-CL-16	Discrete	2-3 ft	Tier II	06/26/2013	1200	2-3 ft	Trace organics, soft, gray fines over stiff gray, silt with clay, plastic
LRIS-CL-17	Discrete	1-2 ft	Tier I	06/26/2013	1150	1-2 ft	Trace organics, soft, gray fines over stiff gray, silt with clay, plastic
LRIS-CL-17	Discrete	2-3 ft	Tier II	06/26/2013	1200	2-3 ft	Trace organics, dark gray to light gray
LRIS-CL-17-DUP	Discrete	1-2 ft	Tier I	06/26/2013	1150	1-2 ft	Trace organics, soft, gray fines over stiff gray, silt with clay, plastic
LRIS-CL-18	Discrete	1-2 ft	Tier II	06/26/2013	1110	1-2 ft	Trace organics, soft, gray fines over stiff gray, silt with clay, plastic
LRIS-CL-19	Discrete	1-2 ft	Tier II	06/26/2013	1053	1-2 ft	Trace organics, soft, gray fines over stiff gray, silt with clay, plastic
LRIS-CL-20	Discrete	1-2 ft	Tier II	06/26/2013	1015	1-2 ft	Trace organics, solid clay silt, dark gray to orange, plastic
LRIS-CL-21	Discrete	1-2 ft	Tier II	06/26/2013	1000	1-2 ft	Three inches soft fines, trace organics, solid clay, silt, dark gray, plastic
LRIS-CL-22	Discrete	1-2 ft	Tier II	06/26/2013	1055	1-2 ft	Trace organics, solid clay silt, dark gray to orange, plastic
LRIS-CL-23	Discrete	1-2 ft	Tier II	06/26/2013	1110	1-2 ft	Trace organics, solid clay silt, dark gray to orange, plastic
LRIS-CL-24	Discrete	1-2 ft	Tier II	06/26/2013	1020	1-2 ft	Two inches soft fines, organics, solid clay silt, dark gray, plastic
LRIS-CL-25	Discrete	1-2 ft	Tier II	06/26/2013	1000	1-2 ft	Two inches soft fines, organics, solid clay silt, dark gray, plastic

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

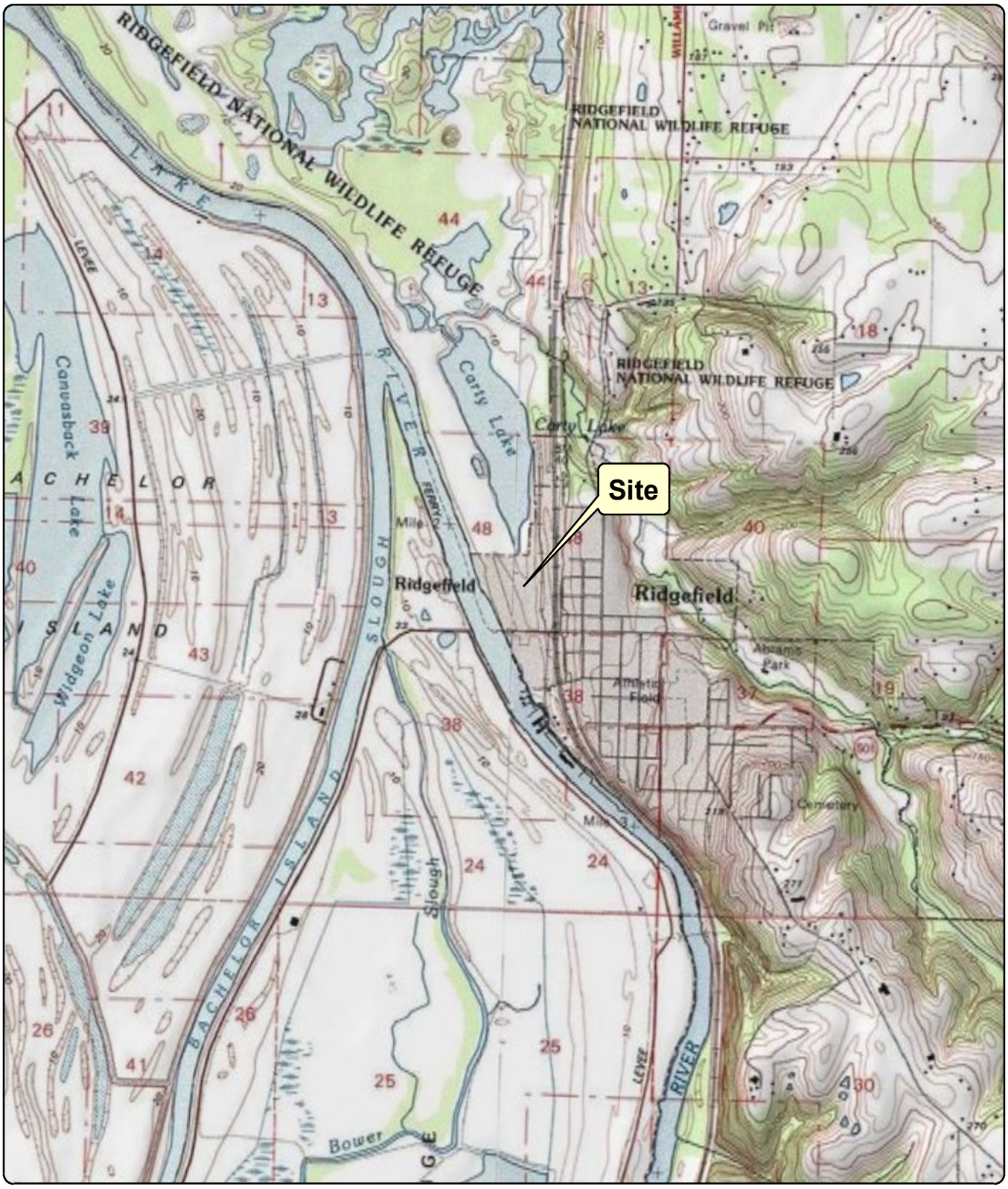
				Location ID Sample ID Sample Date Depth	LRIS-CL-16 LRIS-CL-16-1.5 06/26/2013 1-2 ft	LRIS-CL-16 LRIS-CL-16-2.5 06/26/2013 2-3 ft	LRIS-CL-17 LRIS-CL-17-1.5 06/26/2013 1-2 ft	LRIS-CL-17-DUP LRIS-CL-17-1.5-DUP 06/26/2013 1-2 ft	LRIS-CL-18 LRIS-CL-18-1.5 06/26/2013 1-2 ft	LRIS-CL-19 LRIS-CL-19-1.5 06/26/2013 1-2 ft	LRIS-CL-22 LRIS-CL-22-1.5 06/26/2013 1-2 ft	LRIS-CL-23 LRIS-CL-23-1.5 06/26/2013 1-2 ft
Analyte	Units	CUL	REL	Screening Criteria[a]								
Pentachlorophenol	µg/kg	NV	NV	200[b]	198 U	NV	177 U	165 U	161 U	176 U	NV	NV
Arsenic	mg/kg	NV	NV	14	11.2	NV	2.55	2.16	NV	NV	NV	NV
Chromium	mg/kg	NV	NV	72	34.2	NV	27.7	29.8	NV	NV	NV	NV
Dioxin/Furan TEQ	ng/kg	5	NV	NV	**3.2E+02**	**4.6E+01**	**2.2E+01**	**1.9E+01**	**1.2E+02**	**2.6E+01**	**3.6E+01**	**2.4E+01**
1,2,3,4,6,7,8,9-OCDF	ng/kg	NV	10000000	NV	1540	157	78.3	73.2	487	90.3	125	82.7
1,2,3,4,6,7,8,9-OCDD	ng/kg	NV	10000000	NV	78200 J	11900 J	7560 J	6480 J	32700 J	6930 J	9290 J	6210 J
1,2,3,4,6,7,8-HpCDF	ng/kg	NV	250000	NV	1180	154	74.7	66.2	397	85	116	79.6
1,2,3,4,6,7,8-HpCDD	ng/kg	NV	310000	NV	10800 J	1640 J	840 J	741 J	3960 J	950 J	1320 J	879 J
1,2,3,4,7,8,9-HpCDF	ng/kg	NV	250000	NV	69.6	9.02	3.9 J	3.14 J	22.7	4.72 J	6.53	3.96 J
1,2,3,4,7,8-HxCDF	ng/kg	NV	980	NV	256	32.8	12.8	10.2	74.4	15.4	22.8	14.6
1,2,3,4,7,8-HxCDD	ng/kg	NV	200	NV	77.3	10.4	4.8 J	4.18 J	30.5	6.51	9.02	6.34
1,2,3,6,7,8-HxCDF	ng/kg	NV	980	NV	97.7	11.6	5.04	4.34 J	29.6	6.11	8.93	6.03
1,2,3,6,7,8-HxCDD	ng/kg	NV	1200	NV	600	86.2	39.5	34.1	224	46.4	63.5	44.4
1,2,3,7,8,9-HxCDF	ng/kg	NV	980	NV	5.33 J	0.935 J	0.406 J	0.337 J	2.18 J	0.459 J	0.635 J	0.369 J
1,2,3,7,8,9-HxCDD	ng/kg	NV	1200	NV	204	37.6	13.3	12.9	104	23.1	32.8	19.6
1,2,3,7,8-PeCDF	ng/kg	NV	550	NV	46.1	5.5	2.25 J	1.94 J	14	2.90 J	3.84 J	2.62 J
1,2,3,7,8-PeCDD	ng/kg	NV	98	NV	23.1	3.1 J	1.43 J	1.32 J	9.31	1.78 J	2.65 J	1.85 J
2,3,4,6,7,8-HxCDF	ng/kg	NV	980	NV	56	6.77	3.4 J	2.63 J	16.7	3.51 J	5.13	3.09 J
2,3,4,7,8-PeCDF	ng/kg	NV	6.5	NV	**56.3**	6.49	2.72 J	2.17 J	**15.2**	2.97 J	4.21 J	2.93 J
2,3,7,8-TCDF	ng/kg	NV	86	NV	23.5	2.71	0.981 J	0.873 J	7.43	1.66	2.04	1.36
2,3,7,8-TCDD	ng/kg	NV	3.3	NV	1.74	0.224 J	0.173 J	0.102 U	0.608 J	0.202 J	0.242 J	0.128 U

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

				Location ID Sample ID Sample Date Depth	LRIS-CL-DU1 LRIS-CL-DU1A 06/25/2013 0-10 cm	LRIS-CL-DU1 LRIS-CL-DU1B 06/25/2013 0-10 cm	LRIS-CL-DU1 LRIS-CL-DU1C 06/25/2013 0-10 cm	LRIS-CL-DU2 LRIS-CL-DU2 06/25/2013 0-10 cm	LRIS-CL-DU3 LRIS-CL-DU3 06/24/2013 0-10 cm	LRIS-CL-DU4 LRIS-CL-DU4 06/25/2013 0-10 cm	LRIS-CL-DU5 LRIS-CL-DU5 06/24/2013 0-10 cm
Analyte	Units	CUL	REL	Screening Criteria[a]							
Pentachlorophenol	µg/kg	NV	NV	200[b]	**293**	**331**	**334 J**	**266 J**	104 U	162	104 U
Arsenic	mg/kg	NV	NV	14	12.1	10.1	10.9	9.04	4.53	7.52	4.03
Chromium	mg/kg	NV	NV	72	38.2	35.7	37.2	32.4	19.2	26.5	17.2
Dioxin/Furan TEQ	ng/kg	5	NV	NV	**6.0E+02**	**4.7E+02**	**3.5E+02**	**3.7E+02**	**3.9E+01**	**2.7E+02**	**2.7E+01**
1,2,3,4,6,7,8,9-OCDF	ng/kg	NV	10000000	NV	4050 J	1800 J	1120 J	1370 J	207 J	1610 J	91.6 J
1,2,3,4,6,7,8,9-OCDD	ng/kg	NV	10000000	NV	161000 J	76500 J	52100 J	95300 J	6860 J	81800 J	6540 J
1,2,3,4,6,7,8-HpCDF	ng/kg	NV	250000	NV	2360	1950	1310	1390	154	1060	96.4
1,2,3,4,6,7,8-HpCDD	ng/kg	NV	310000	NV	22100 J	18900 J	12700 J	14100 J	1150 J	11100 J	1100 J
1,2,3,4,7,8,9-HpCDF	ng/kg	NV	250000	NV	122	98.9	63.4	70.9	7.73	54.1	4.52
1,2,3,4,7,8-HxCDF	ng/kg	NV	980	NV	376	322 U	283 U	218	22.6	160 U	15.3 U
1,2,3,4,7,8-HxCDD	ng/kg	NV	200	NV	152	125	88.8	97.8	12	76	7.65
1,2,3,6,7,8-HxCDF	ng/kg	NV	980	NV	160	133	117	98.8	9.93	69.5 U	6.6 U
1,2,3,6,7,8-HxCDD	ng/kg	NV	1200	NV	1110	982	699	677	83.9	499	56.1
1,2,3,7,8,9-HxCDF	ng/kg	NV	980	NV	12.1 J	9.65 J	8.7 J	6.79 J	0.812 J	4.75 J	0.503 U
1,2,3,7,8,9-HxCDD	ng/kg	NV	1200	NV	332	341 U	237 U	243	37.5	186 U	21.6 U
1,2,3,7,8-PeCDF	ng/kg	NV	550	NV	80.7	68	63.8	48	4.28	34.1	3.48
1,2,3,7,8-PeCDD	ng/kg	NV	98	NV	47	38.8	35.8	29.6	3.69	21.4	2.52
2,3,4,6,7,8-HxCDF	ng/kg	NV	980	NV	91.6	78.5	69.9	56.8	6.5	40	4.07
2,3,4,7,8-PeCDF	ng/kg	NV	6.5	NV	**89.4**	**75.5**	**70.9**	**47.9**	5.38	**36.1**	3.84
2,3,7,8-TCDF	ng/kg	NV	86	NV	37.5	31.4	30.7	24	2.26	18.3	2.05
2,3,7,8-TCDD	ng/kg	NV	3.3	NV	2.61	2.09	1.98	1.78	0.291 J	1.48	0.229 J

NOTES:
Bold indicates values that exceed screening levels (for dioxins, if values were non-detects ["U" or "UJ"], half the reported concentration was used for comparison).
cm = centimeter(s).
CUL = cleanup level.
dup = duplicate sample.
ft = feet.
HpCDD = heptachlorodibenzo-p-dioxin.
HpCDF = heptachlorodibenzofuran.
HxCDD = hexachlorodibenzo-p-dioxin.
HxCDF = hexachlorodibenzofuran.
J = estimated value.
mg/kg = milligrams per kilogram.
µg/kg = micrograms per kilogram.
ng/kg = nanograms per kilogram (parts per trillion).
NV = no value.
OCDD = octachlorodibenzo-p-dioxin.
OCDF = octachlorodibenzofuran.
PeCDD = pentachlorodibenzo-p-dioxin.
PeCDF = pentachlorodibenzofuran.
REL = remediation level (based on ecological CULs).
TCDD = tetrachlorodibenzo-p-dioxin.
TCDF = tetrachlorodibenzofuran.
TEQ = toxicity equivalent.
U = Compound analyzed, but not detected above detection limit.
[a]Screening criteria described in MFA (2013).
[b]U.S. Fish and Wildlife Service screening criteria.

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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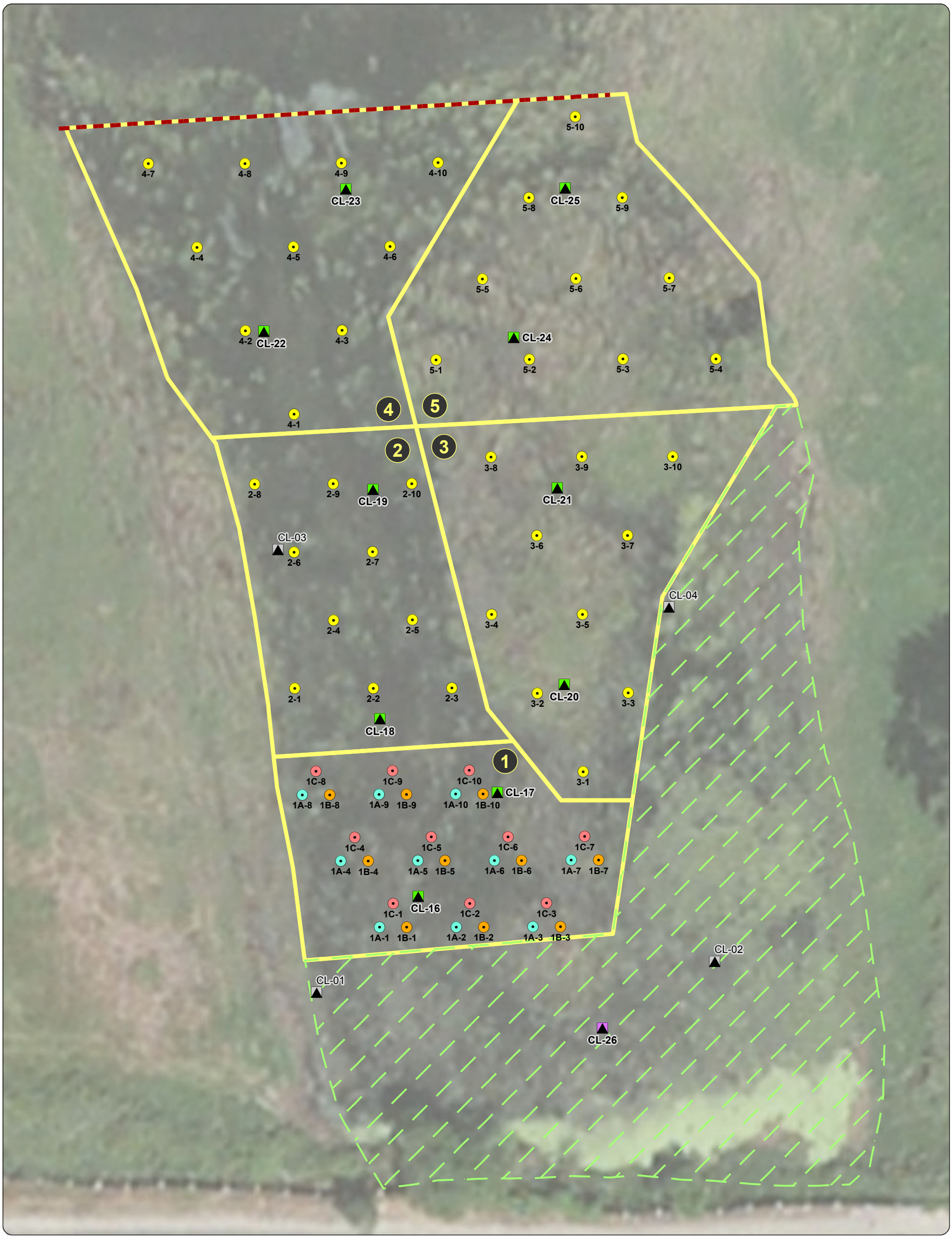
0 990 1,980
Feet

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 obtained from ESRI, Inc. ArcGIS Online (2010).

Note: Site boundary is approximate. Boundary is based on a 2013 vegetation survey and includes a 5 foot buffer.

Legend

Incremental Sample Locations

- Incremental Sample (Replicate 1)
- Incremental Sample (Replicate 2)
- Incremental Sample (Replicate 3)
- Incremental Sample Location

Discrete Subsurface Sample Locations

- Chemical
- Physical
- Historical Sediment Sample Location

- Former Berm (Approximate)
- Decision Unit

Site Features

- Remedial action area identified based on previous data collection activities

0 15 30
Feet

Figure 3-1
Carty Lake
Sample Locations

Former PWT Site
Ridgefield, Washington

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p. 971 544 2139 | www.maulfoster.com

Figure 4-1
Sediment Sampling Results

Former PWT Site
Ridgefield, Washington

LRIS-CL-23	
Depth	1-2 ft
PCP	NA
As	NA
Cr	NA
TEQ	24
PeCDF	2.93 J

LRIS-CL-22	
Depth	1-2 ft
PCP	NA
As	NA
Cr	NA
TEQ	36
PeCDF	4.21 J

LRIS-CL-18	
Depth	1-2 ft
PCP	161 UJ
As	NA
Cr	NA
TEQ	120
PeCDF	15.2

LRIS-CL-16		
Depth	1-2 ft	2-3 ft
PCP	198 U	NA
As	11.2	NA
Cr	34.2	NA
TEQ	320	46
PeCDF	56.3	6.49

LRIS-CL-17	
Depth	1-2 ft
PCP	177 U
As	2.55
Cr	27.7
TEQ	22
PeCDF	2.72 J

LRIS-CL-19		
Depth	1-2 ft	
PCP	176 UJ	
As	NA	
Cr	NA	
TEQ	26	
PeCDF	2.97 J	

LRIS-CL-DU5	
Depth	0-10 cm
PCP	104 U
As	4.03
Cr	17.2
TEQ	27
PeCDF	3.84

LRIS-CL-DU4	
Depth	0-10 cm
PCP	162
As	7.52
Cr	26.5
TEQ	270
PeCDF	36.1

LRIS-CL-DU3	
Depth	0-10 cm
PCP	104 U
As	4.53
Cr	19.2
TEQ	39
PeCDF	5.38

LRIS-CL-DU2	
Depth	0-10 cm
PCP	266 J
As	9.04
Cr	32.4
TEQ	370
PeCDF	47.9

LRIS-CL-DU1A		LRIS-CL-DU1B		LRIS-CL-DU1C	
Depth	0-10 cm	Depth	0-10 cm	Depth	0-10 cm
PCP	293	PCP	331	PCP	334 J
As	12.1	As	10.1	As	10.9
Cr	38.2	Cr	35.7	Cr	37.2
TEQ	600	TEQ	470	TEQ	350
PeCDF	89.4	PeCDF	75.5	PeCDF	70.9

Legend

- Sediment Sample (June, 2013)
- Decision Unit
- Former Berm (Approximate)

Notes:
1. As = Arsenic
2. Cr = Chromium
3. J = estimated value
4. NA = not analyzed
5. PCP = Pentachlorophenol
6. PeCDF = 2,3,4,7,8-Pentachlorodibenzofuran
7. TEQ = Toxicity Equivalent
8. TEQ measured in ng/kg
   (nanograms per kilogram)
   PCP in ug/kg
   (micrograms per kilogram)
   As and Cr in mg/kg
   (milligrams per kilogram)
9. U = non-detection

0 20 40
Feet

Source: Aerial photograph (2010) obtained from Esri ArcGIS Online

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Path: X:\9003.01 Port of Ridgefield\40\Projects\06\Lake River Initial Design Report\Revisions\Fig4-1_Sediment Sampling Results.mxd
Print Date: 9/19/2013
Approved By: P. Wiescher
Produced By: jschane
Project: 9003.01.40

APPENDIX A

PHOTO ARRAY

APPENDIX A—PHOTO ARRAY

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

Photo No. 1
Site Overview. "Island" area shown with orange border, "in-water" area shown with blue border. April 24, 2013.

Photo No. 2
Representative core from island area (1.75-inch diameter, 10 centimeters). Reed canary grass roots have been removed. June 24, 2013.

APPENDIX A—PHOTO ARRAY

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

Photo No. 3
Representative core No. 2 from island area (1.75-inch diameter). Note that reed canary grass organic matter at top of core has yet to be removed. June 24, 2013.

Photo No. 4
Representative core No. 1 from in-water area (2-inch diameter). June 25, 2013.

APPENDIX A—PHOTO ARRAY

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

Photo No. 5
Representative core No. 2 from in-water area (2-inch diameter). Core is cut at 10 centimeters; note transition from silt to clay at approximately 11 centimeters. June 25, 2013.

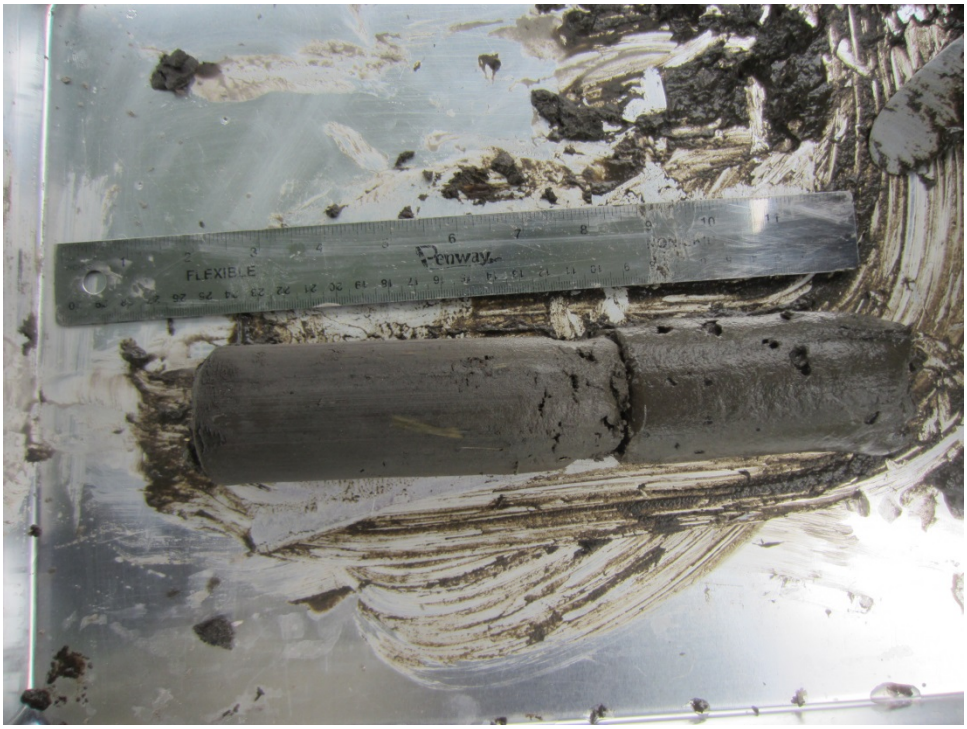

Photo No. 6
Carty Lake looking northeast. June 25, 2013.

APPENDIX A—PHOTO ARRAY

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

Photo No.7
Workstation with decision-unit-dedicated 1-gallon sampling jar. June 25, 2013.

Photo No.8
Carty Lake looking southeast. June 25, 2013.

APPENDIX B

ANALYTICAL REPORTS

GEODESIGN INC

15575 SW Sequoia Parkway Suite 100, Portland OR 97224
2121 S Towne Centre Place Suite 130, Anaheim CA 92806

14300 NE 20th Avenue Suite D-102-362, Vancouver WA 98686
10700 Meridian Avenue North Suite 210, Seattle WA 98133

LABORATORY TESTING REPORT

ASTM D2216 - LABORATORY DETERMINATION OF WATER (MOISTURE) CONTENT OF SOIL AND ROCK BY MASS
ASTM D7263 - LABORATORY DETERMINATION OF SOIL DENSITY

PROJECT NUMBER: MFAInc-15-01
PROJECT NAME: Port of Ridgefield Carty Lake
PROJECT MANAGER: smd

WORK ORDER NO: 6299
TESTED BY: MB
DATE TESTED:

Max Moisture 61.1
Min Moisture 49.8
Average Moisture: 55.7

Max DD 65.5
Min DD 65.5
Average DD 65.5

EQUIPMENT OVEN (1) ID: 185 OVEN (2) ID: *SCALE (1) ID: 243 *SCALE (2) ID: MEASURING DEVICE ID:

***** *LAB - use the same scale for all measurements of the same test sample. Also, input only one moisture for multiple tests under the same sample depth.*

Exploration	No.	Depth	Grab, Shelby, Core, SPT, D&M	Phase I	Phase II	Phase III	Pan No.	Tare (grams)	W+T (grams)	D+T (grams)	DIAM (in)	HT (in)	AREA (in²)	VOL (in³)	D (grams)	DD pcf	DD kg/m³	w (%)	Soil Description/Comments
CL	26	0.5	Shelby	ATT-P	-	-	u11	326.45	887.74	686.29					359.84			56.0	Dark gray SILT with clay, trace sand and organics (MH)
CL	26	0.5	Shelby	HYD	-	-	m16	1234.50	1556.00	1434.10					199.60			61.1	Dark gray SILT with clay, trace sand and organics (MH)
CL	26	1.0	Shelby	DEN-S	-	-	u11	326.45	887.74	686.29	2.870	3.235	6.469	20.928	359.84	65.5	1049	56.0	Dark gray SILT with clay, trace sand and organics (MH)
CL	26	1.5	Shelby	PERM-3	-	-	98	54.20	96.72	82.58					28.38			49.8	Dark gray SILT with clay, trace sand and organics (MH)
-	-	0.0	-	-	-	-													
-	-	0.0	-	-	-	-													
-	-	0.0	-	-	-	-													
-	-	0.0	-	-	-	-													
-	-	0.0	-	-	-	-													
-	-	0.0	-	-	-	-													
-	-	0.0	-	-	-	-													
-	-	0.0	-	-	-	-													
-	-	0.0	-	-	-	-													
-	-	0.0	-	-	-	-													
-	-	0.0	-	-	-	-													
-	-	0.0	-	-	-	-													
-	-	0.0	-	-	-	-													

GEODESIGN INC
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2121 S Towne Centre Place Suite 130, Anaheim CA 92806
1201 SE Tech Center Drive Suite 160, Vancouver WA 98683
10700 Meridian Avenue North Suite 210, Seattle WA 98133

LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX (ATTERBERG LIMITS) OF SOIL

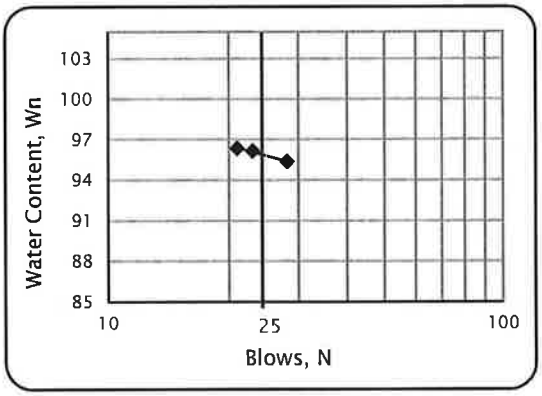
☑ ASTM D4318 ☐ AASHTO T89 & T90
☑ Multi-point method ☐ Single-point method

WORK ORDER NO: 6299

PROJECT NO: MFAInc-15-01 TESTED BY: MB DATE: 7/10/2013
PROJECT NAME: Port of Ridgefield Carty Lake CHECKED BY: VZ DATE: 7/23/2013
EXPLORATION: CL-26 DEPTH (ft): 0.5 SAMPLE NO:
DESCRIPTION: Dark gray SILT with clay, trace sand and organics (MH)

SCALE 243 SIEVE 259 OVEN 185 GLASS PLATE 261 LL DEVICE 245 GROOVING TOOL 284

LIQUID LIMIT			
Number of Blows, N	23	21	28
Drying Container ID	s1	s2	s3
(A) Drying container tare, g	20.82	20.58	20.94
(B) Wet Soil + tare mass, g	27.96	28.12	29.03
(C) Dry Soil + tare mass, g	24.46	24.42	25.08
(D) Water mass, g	3.50	3.70	3.95
(E_1) Water Content, Wn (%)	96.2	96.4	95.4
(F) LIQUID LIMIT, LLn	95.2	94.3	96.7
(G) LIQUID LIMIT, LL (PLOT ^{25})	95.8	LLn (Ave)	95.4

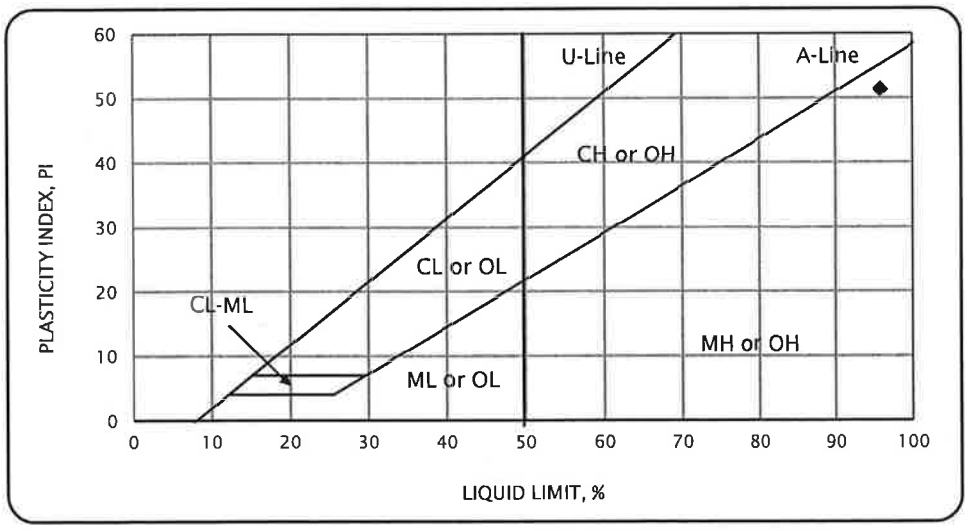


PLASTIC LIMIT		
Drying Container ID	s5	s6
(A) Drying container tare, g	20.95	20.74
(B) Wet Soil + tare mass, g	27.30	26.85
(C) Dry Soil + tare mass, g	25.36	24.96
(D) Water mass, g	1.94	1.89
(H) PLASTIC LIMIT, PL	44.0	44.8

WATER CONTENT	
Drying Container ID	u11
(A) Drying container tare, g	326.45
(B) Wet Soil + tare mass, g	887.74
(C) Dry Soil + tare mass, g	686.29
(D) Water mass, g	201.45
(E_3) Water Content, W (%)	56.0

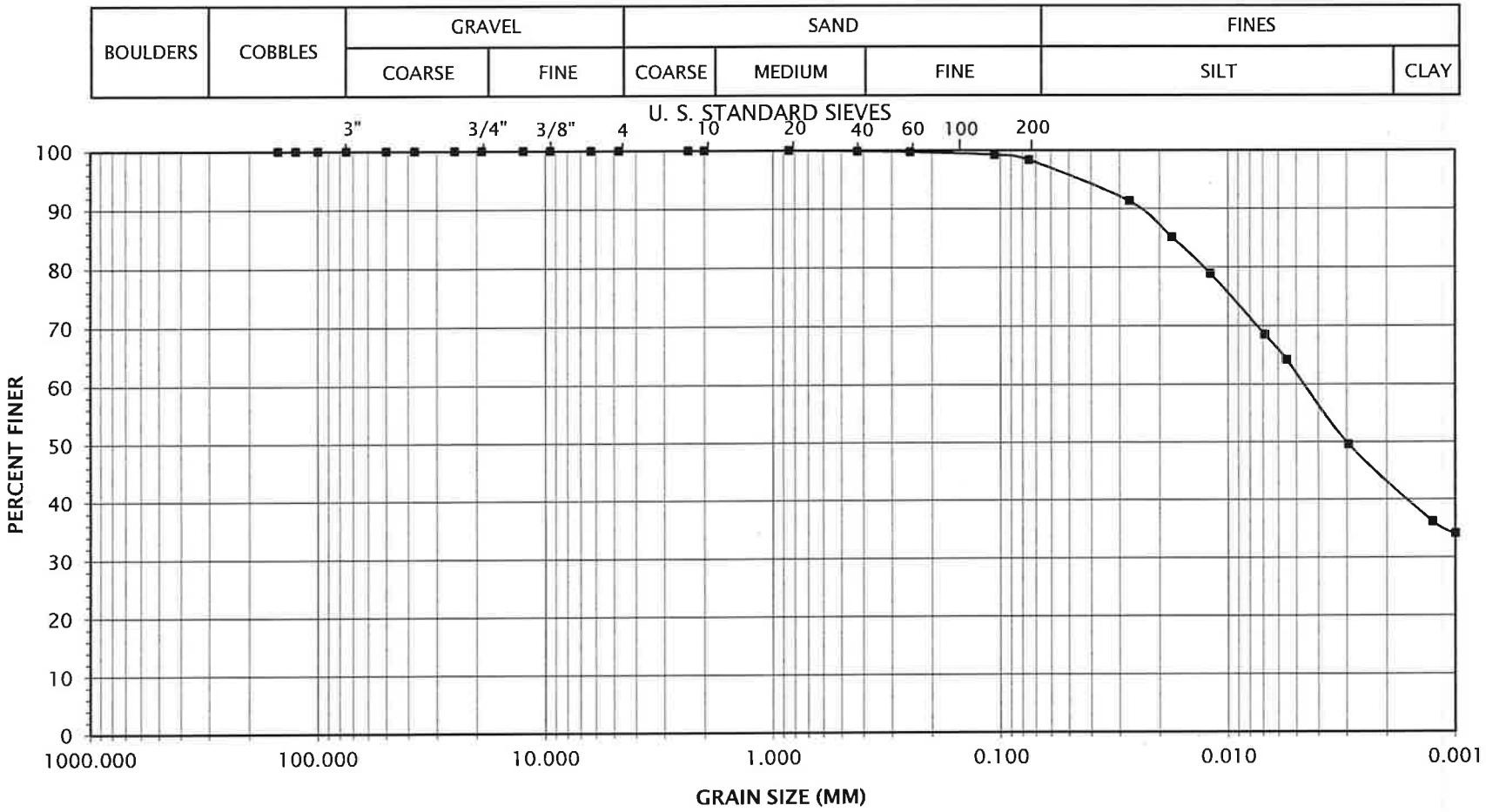
TEST RESULTS

NON-PLASTIC ☐
LIQUID LIMIT 96
PLASTIC LIMIT 44
PLASTICITY INDEX 51
LIQUIDITY INDEX 0.2
WATER CONTENT 56



CALCULATIONS *Water mass, D = B-C* *Plasticity Index = G-H* *Liquid Limit LLn, F = Wn x (N/25)* $^{0.121}$
Plastic Limit, H = Average (PL1,PL2,PL3) *Water Content, $E_{1,2,3}$ = (D/(C-A)x100)* *Liquidity Index = (E_3-H)/Plasticity Index*

DEVIATIONS/COMMENTS



SYMBOL	EXPLORATION	DEPTH (FEET)	SOIL DESCRIPTION
—■—	CL-26	0.5	Dark gray SILT with clay, trace sand and organics (MH)

J:\M-R\MFAInc\MFAInc-15\MFAInc-15-01\Lab\6299\MFA-15-01_6299_072313_HYD_CL-26_0.5.xls

GEODESIGN INC
15575 SW Sequoia Parkway Suite 100, Portland OR 97224
2121 S Towne Centre Place Suite 130, Anaheim CA 92806
1201 SE Tech Center Drive Suite 160, Vancouver WA 98683
10700 Meridian Avenue North Suite 210, Seattle WA 98133

TOTAL SOLIDS

☑ TOTAL SOLIDS - EPA - Puget Sound

WORK ORDER NO. 6299

PROJECT NO: MFAInc-15-01 TESTED BY: MB DATE: 7/22/2013
PROJECT NAME: Port of Ridgefield Carty Lake CHECKED BY: VZ DATE: 7/23/2013
SOURCE: Onsite

THERMOMETER ID 10 SCALE ID 243 OVEN ID 185 FURNACE ID 1

SAMPLE LOCATION AND DESCRIPTION

SAMPLE NO	EXPLORATION	DEPTH (FT)	SOIL DESCRIPTION
1	CL-26	1.5	Dark gray SILT with clay, trace sand and organics (MH)

TOTAL SOLIDS

SAMPLE NUMBER	1	0	0	
DRYING CONTAINER ID	C2			
DRYING CONTAINER + LID TARE (B)	114.78			
WEIGHT OF WET SOIL + TARE + LID (C)	175.88			
WEIGHT OF DRY SOIL + TARE + LID (A)	156.49			
WEIGHT OF MOISTURE	19.39			
MOISTURE CONTENT, (%)	46.5			
PERCENT SOLIDS, (%)	68.3			

DEVIATIONS/REMARKS:

GEODESIGN INC

ASTM D5084-Flexible Wall Permeability

Project No	MFAInc-15-01	Lab No	6299
Project Name	Carty Lake	Date Tested	7/26/2013
Exploration	CL-26	Tested By	MB/CMC
Depth	16.5"	Sample Type	Shelby
Sample Description	Dark gray SILT with clay, trace sand and organics (MH)		

Sample Parameters for Test

Confining Pressure: 3 psi

Test Sample Measurements

Sample weight w/tube:	N/A g
Tube:	N/A g
Height:	6.35 in
Wet Weight w/o tube:	1230.48 g
Diameter:	2.859 in
Volume:	0.02360 cu. Ft
Moist Density:	115.0 lb / cu. Ft.
Dry Density:	81.2 lb / cu. Ft.

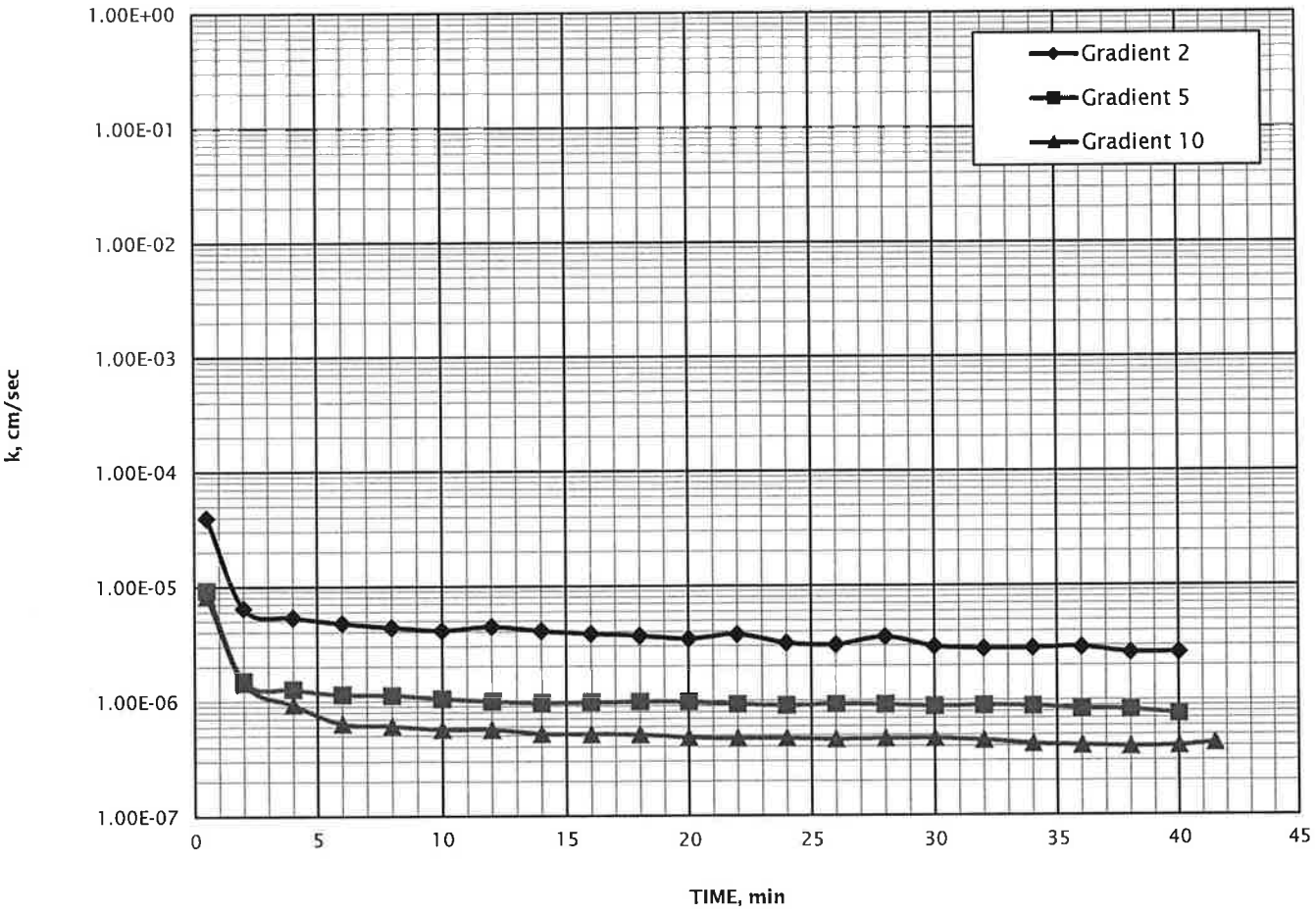
Water (Moisture) Content Testing

	Initial Test	After Test
Pan Identification:	19	j19
Tare mass:	53.69 g	249.5 g
Wet with tare mass:	152.07 g	1482.21 g
Dry with tare mass:	123.21 g	1120.42 g
Water (Moisture) Content:	41.5 %	41.5 %

Permeability Data

Gradient = 2	Temperature Begin	24.8 °C
	Temperature End	24.7 °C
	k - measured	4.3086E-06 cm/s
	k - corrected	3.8533E-06 cm/s
Gradient = 5	Temperature Begin	24.7 °C
	Temperature End	24.6 °C
	k - measured	1.0715E-06 cm/s
	k - corrected	9.5824E-07 cm/s
Gradient = 10	Temperature Begin	24.6 °C
	Temperature End	24.5 °C
	k - measured	6.4398E-07 cm/s
	k - corrected	5.7594E-07 cm/s

Comments



EXPLORATION NUMBER	SAMPLE DEPTH (FEET)	MOISTURE CONTENT (PERCENT)	DRY DENSITY (PCF)	CONFINING PRESSURE (PSI)
CL-26	1.5	41.5	81	3

PERMEABILITY_TEST .GPJ GEODESIGN.XLS PRINT DATE: jSB

GEODESIGN INC
15575 SW Sequoia Parkway - Suite 100
Portland OR 97224
Off 503.968.8787 Fax 503.968.3068

MFAInc-15-01	**FLEXIBLE WALL PERMEABILITY TEST**	
July, 2013	Port of Ridgefield Carty Lake	**FIGURE**

Apex Labs

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

Friday, July 26, 2013

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

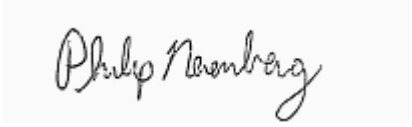
RE: Port of Ridgefield ISM / 9003.01.40

Enclosed are the results of analyses for work order A3F0629, which was received by the laboratory between 6/25/2013 at 4:36:00PM and 6/27/2013 at 4:00:00PM.

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

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

Apex Laboratories



Philip Nerenberg, Lab Director

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 Labs

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

Maul Foster & Alongi, INC.	Project: **Port of Ridgefield ISM**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
LRIS-CL-DU1A--ISM Composite	A3F0629-08	Sediment	07/01/13 18:00	06/25/13 16:36
LRIS-CL-DU1B--ISM Composite	A3F0629-09	Sediment	07/01/13 18:00	06/25/13 16:36
LRIS-CL-DU1C--ISM Composite	A3F0629-10	Sediment	07/01/13 18:00	06/25/13 16:36
LRIS-CL-DU2--ISM Composite	A3F0629-11	Sediment	07/01/13 18:00	06/25/13 16:36
LRIS-CL-DU3--ISM Composite	A3F0629-12	Sediment	07/01/13 18:00	06/25/13 16:36
LRIS-CL-DU4--ISM Composite	A3F0629-13	Sediment	07/01/13 18:00	06/25/13 16:36
LRIS-CL-DU5--ISM Composite	A3F0629-14	Sediment	07/02/13 09:30	06/25/13 16:36
LRIS-CL-DU1A--ISM Composite--0.25mm	A3F0629-15	Sediment	07/05/13 17:00	06/25/13 16:36
LRIS-CL-DU1B--ISM Composite--0.25mm	A3F0629-16	Sediment	07/05/13 17:00	06/25/13 16:36
LRIS-CL-DU1C--ISM Composite--0.25mm	A3F0629-17	Sediment	07/05/13 17:00	06/25/13 16:36
LRIS-CL-DU2--ISM Composite--0.25mm G	A3F0629-18	Sediment	07/05/13 17:00	06/25/13 16:36
LRIS-CL-DU3--ISM Composite--0.25mm G	A3F0629-19	Sediment	07/05/13 17:00	06/25/13 16:36
LRIS-CL-DU4--ISM Composite--0.25mm G	A3F0629-20	Sediment	07/05/13 17:00	06/25/13 16:36
LRIS-CL-DU5--ISM Composite--0.25mm G	A3F0629-21	Sediment	07/05/13 17:00	06/25/13 16:36
Grind Blank--ISM Composite--0.25mm Gri	A3F0629-22	Solid	07/05/13 17:00	06/25/13 16:36

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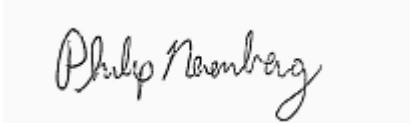


Philip Nerenberg, Lab Director

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 Labs

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

Maul Foster & Alongi, INC.	Project: **Port of Ridgefield ISM**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

ANALYTICAL CASE NARRATIVE

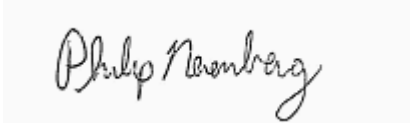
Work Order: A3F0629

Per client request, the below sample IDs have been altered from the COC.

LRIS-CL-003 has been changed to LRIS-CL-DU3
LRIS-CL-005 has been changed to LRIS-CL-DU5

Allison Greiner
Client Services Manager
7-1-13

Apex Laboratories



Philip Nerenberg, Lab Director

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield ISM**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

ANALYTICAL SAMPLE RESULTS

Pentachlorophenol by EPA 8270D

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
LRIS-CL-DU1A--ISM Composite (A3F0629-08RE2)			**Matrix: Sediment**		**Batch: 3070219**			
Pentachlorophenol (PCP)	**293**	104	209	ug/kg dry	5	07/17/13 19:10	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 92 %*	*Limits: 40-125 %*	"	"	"	
LRIS-CL-DU1B--ISM Composite (A3F0629-09RE2)			**Matrix: Sediment**		**Batch: 3070219**			
Pentachlorophenol (PCP)	**331**	107	214	ug/kg dry	5	07/17/13 21:00	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 102 %*	*Limits: 40-125 %*	"	"	"	
LRIS-CL-DU1C--ISM Composite (A3F0629-10RE2)			**Matrix: Sediment**		**Batch: 3070219**			
Pentachlorophenol (PCP)	**543**	110	219	ug/kg dry	5	07/17/13 22:13	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 110 %*	*Limits: 40-125 %*	"	"	"	
LRIS-CL-DU1C--ISM Composite (A3F0629-10RE3)			**Matrix: Sediment**		**Batch: 3070459**			**H-08**
Pentachlorophenol (PCP)	**334**	91.8	184	ug/kg dry	2	07/19/13 14:00	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 107 %*	*Limits: 40-125 %*	"	"	"	*Q-41*
LRIS-CL-DU2--ISM Composite (A3F0629-11RE2)			**Matrix: Sediment**		**Batch: 3070219**			
Pentachlorophenol (PCP)	**254**	104	208	ug/kg dry	5	07/17/13 18:33	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 103 %*	*Limits: 40-125 %*	"	"	"	
LRIS-CL-DU2--ISM Composite (A3F0629-11RE3)			**Matrix: Sediment**		**Batch: 3070459**			**H-08**
Pentachlorophenol (PCP)	**266**	94.3	189	ug/kg dry	2	07/19/13 15:09	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 115 %*	*Limits: 40-125 %*	"	"	"	*Q-41*
LRIS-CL-DU3--ISM Composite (A3F0629-12RE2)			**Matrix: Sediment**		**Batch: 3070219**			**R-04**
Pentachlorophenol (PCP)	ND	104	208	ug/kg dry	5	07/17/13 16:48	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 75 %*	*Limits: 40-125 %*	"	"	"	
LRIS-CL-DU4--ISM Composite (A3F0629-13RE2)			**Matrix: Sediment**		**Batch: 3070219**			
Pentachlorophenol (PCP)	**162**	107	214	ug/kg dry	5	07/17/13 21:37	EPA 8270D PCP	J
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 97 %*	*Limits: 40-125 %*	"	"	"	
LRIS-CL-DU5--ISM Composite (A3F0629-14RE2)			**Matrix: Sediment**		**Batch: 3070219**			**R-04**
Pentachlorophenol (PCP)	ND	104	208	ug/kg dry	5	07/17/13 17:22	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 97 %*	*Limits: 40-125 %*	"	"	"	

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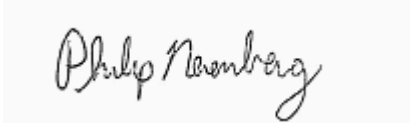

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield ISM**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
LRIS-CL-DU1A--ISM Composite--0.25mm Grind (A3F0629-1			**Matrix: Sediment**					
Batch: 3070345								
Arsenic	**12.1**	0.265	0.530	mg/kg dry	5	07/17/13 11:33	EPA 6020A	
Chromium	**38.2**	0.530	1.06	"	"	"	"	
LRIS-CL-DU1B--ISM Composite--0.25mm Grind (A3F0629-1			**Matrix: Sediment**					
Batch: 3070307								
Arsenic	**10.1**	0.261	0.521	mg/kg dry	5	07/17/13 11:08	EPA 6020A	
Chromium	**35.7**	0.521	1.04	"	"	"	"	
LRIS-CL-DU1C--ISM Composite--0.25mm Grind (A3F0629-1			**Matrix: Sediment**					
Batch: 3070306								
Arsenic	**10.9**	0.265	0.530	mg/kg dry	5	07/16/13 17:24	EPA 6020A	
Chromium	**37.2**	0.530	1.06	"	"	"	"	
LRIS-CL-DU2--ISM Composite--0.25mm Grind (A3F0629-18I			**Matrix: Sediment**					
Batch: 3070383								
Arsenic	**9.04**	0.260	0.520	mg/kg dry	5	07/17/13 16:50	EPA 6020A	
Chromium	**32.4**	0.520	1.04	"	"	"	"	
LRIS-CL-DU3--ISM Composite--0.25mm Grind (A3F0629-19)			**Matrix: Sediment**					
Batch: 3070293								
Arsenic	**4.53**	0.258	0.515	mg/kg dry	5	07/17/13 10:57	EPA 6020A	
Chromium	**19.2**	0.515	1.03	"	"	"	"	
LRIS-CL-DU4--ISM Composite--0.25mm Grind (A3F0629-20)			**Matrix: Sediment**					
Batch: 3070266								
Arsenic	**7.52**	0.258	0.517	mg/kg dry	5	07/15/13 12:31	EPA 6020A	
Chromium	**26.5**	0.517	1.03	"	"	"	"	
LRIS-CL-DU5--ISM Composite--0.25mm Grind (A3F0629-21)			**Matrix: Sediment**					
Batch: 3070252								
Arsenic	**4.03**	0.260	0.521	mg/kg dry	5	07/15/13 12:17	EPA 6020A	
Chromium	**17.2**	0.521	1.04	"	"	"	"	
Grind Blank--ISM Composite--0.25mm Grind (A3F0629-22)			**Matrix: Solid**					
Batch: 3070212								
Arsenic	ND	0.249	0.499	mg/kg	5	07/12/13 13:41	EPA 6020A	
Chromium	ND	0.499	0.997	"	"	"	"	

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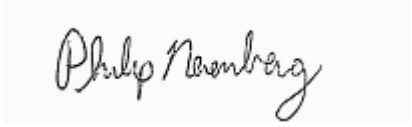

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield ISM**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

ANALYTICAL SAMPLE RESULTS

Conventional Chemistry Parameters

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
LRIS-CL-DU1A--ISM Composite--0.25mm Grind (A3F0629-1 Matrix: Sediment								
Batch: 3070189								
Total Organic Carbon	**2.7**	0.010	0.020	% by Weight	1	07/10/13 15:45	PSEP/SM 5310B MOD	
LRIS-CL-DU1B--ISM Composite--0.25mm Grind (A3F0629-1 Matrix: Sediment								
Batch: 3070189								
Total Organic Carbon	**2.7**	0.010	0.020	% by Weight	1	07/10/13 15:45	PSEP/SM 5310B MOD	
LRIS-CL-DU1C--ISM Composite--0.25mm Grind (A3F0629-1 Matrix: Sediment								
Batch: 3070189								
Total Organic Carbon	**2.5**	0.010	0.020	% by Weight	1	07/10/13 15:45	PSEP/SM 5310B MOD	
LRIS-CL-DU2--ISM Composite--0.25mm Grind (A3F0629-18) Matrix: Sediment								
Batch: 3070189								
Total Organic Carbon	**2.2**	0.010	0.020	% by Weight	1	07/10/13 15:45	PSEP/SM 5310B MOD	
LRIS-CL-DU3--ISM Composite--0.25mm Grind (A3F0629-19) Matrix: Sediment								
Batch: 3070189								
Total Organic Carbon	**2.1**	0.010	0.020	% by Weight	1	07/10/13 15:45	PSEP/SM 5310B MOD	
LRIS-CL-DU4--ISM Composite--0.25mm Grind (A3F0629-20) Matrix: Sediment								
Batch: 3070189								
Total Organic Carbon	**2.7**	0.010	0.020	% by Weight	1	07/10/13 15:45	PSEP/SM 5310B MOD	
LRIS-CL-DU5--ISM Composite--0.25mm Grind (A3F0629-21) Matrix: Sediment								
Batch: 3070189								
Total Organic Carbon	**2.0**	0.010	0.020	% by Weight	1	07/10/13 15:45	PSEP/SM 5310B MOD	

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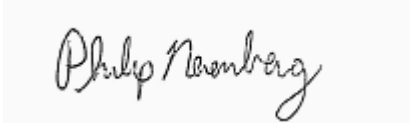

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield ISM**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

ANALYTICAL SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
LRIS-CL-DU1A--ISM Composite (A3F0629-08)			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**95.7**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	
LRIS-CL-DU1B--ISM Composite (A3F0629-09)			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**95.2**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	
LRIS-CL-DU1C--ISM Composite (A3F0629-10)			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**92.9**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	
LRIS-CL-DU2--ISM Composite (A3F0629-11)			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**95.1**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	
LRIS-CL-DU3--ISM Composite (A3F0629-12)			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**95.7**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	
LRIS-CL-DU4--ISM Composite (A3F0629-13)			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**95.5**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	
LRIS-CL-DU5--ISM Composite (A3F0629-14)			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**95.2**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	
LRIS-CL-DU1A--ISM Composite--0.25mm Grind (A3F0629-1			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**96.1**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	
LRIS-CL-DU1B--ISM Composite--0.25mm Grind (A3F0629-1			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**95.4**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	
LRIS-CL-DU1C--ISM Composite--0.25mm Grind (A3F0629-1			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**93.9**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	
LRIS-CL-DU2--ISM Composite--0.25mm Grind (A3F0629-18)			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**95.5**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	
LRIS-CL-DU3--ISM Composite--0.25mm Grind (A3F0629-19)			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**96.0**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	
LRIS-CL-DU4--ISM Composite--0.25mm Grind (A3F0629-20)			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**96.1**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	
LRIS-CL-DU5--ISM Composite--0.25mm Grind (A3F0629-21)			**Matrix: Sediment**		**Batch: 3070200**			
% Solids	**95.6**	---	1.00	% by Weight	1	07/10/13 10:05	Apex SOP	

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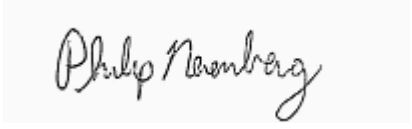

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield ISM**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

QUALITY CONTROL (QC) SAMPLE RESULTS

Pentachlorophenol by EPA 8270D

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070219 - EPA 3546							**Sediment**					
Blank (3070219-BLK1)					Prepared: 07/10/13 11:21 Analyzed: 07/10/13 19:03							
EPA 8270D PCP												
Pentachlorophenol (PCP)	ND	39.1	78.1	ug/kg wet	1	---	---	---	---	---	---	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 89 %*	*Limits: 40-125 %*			*Dilution: 1x*					
LCS (3070219-BS1)					Prepared: 07/10/13 11:21 Analyzed: 07/10/13 19:39							
EPA 8270D PCP												
Pentachlorophenol (PCP)	661	125	250	ug/kg wet	1	800	---	83	25-125%	---	---	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 104 %*	*Limits: 40-125 %*			*Dilution: 1x*					
Duplicate (3070219-DUP2)					Prepared: 07/10/13 11:21 Analyzed: 07/11/13 19:22							**R-04**
QC Source Sample: LRIS-CL-DU5--ISM Composite (A3F0629-14)												
EPA 8270D PCP												
Pentachlorophenol (PCP)	ND	419	837	ug/kg dry	10	---	ND	---	---	---	30%	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 69 %*	*Limits: 40-125 %*			*Dilution: 10x*					
Duplicate (3070219-DUP3)					Prepared: 07/10/13 11:22 Analyzed: 07/17/13 17:57							
QC Source Sample: LRIS-CL-DU5--ISM Composite (A3F0629-14RE2)												
EPA 8270D PCP												
Pentachlorophenol (PCP)	ND	105	209	ug/kg dry	5	---	ND	---	---	---	30%	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 74 %*	*Limits: 40-125 %*			*Dilution: 5x*					
Matrix Spike (3070219-MS2)					Prepared: 07/10/13 11:22 Analyzed: 07/17/13 19:46							
QC Source Sample: LRIS-CL-DU1A--ISM Composite (A3F0629-08RE2)												
EPA 8270D PCP												
Pentachlorophenol (PCP)	544	107	214	ug/kg dry	5	274	293	92	25-125%	---	---	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 106 %*	*Limits: 40-125 %*			*Dilution: 5x*					
Matrix Spike Dup (3070219-MSD2)					Prepared: 07/10/13 11:22 Analyzed: 07/17/13 20:23							
QC Source Sample: LRIS-CL-DU1A--ISM Composite (A3F0629-08RE2)												
EPA 8270D PCP												
Pentachlorophenol (PCP)	574	107	213	ug/kg dry	5	273	293	103	25-125%	5	35%	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 104 %*	*Limits: 40-125 %*			*Dilution: 5x*					
Batch 3070459 - EPA 3546							**Sediment**					

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

QUALITY CONTROL (QC) SAMPLE RESULTS

Pentachlorophenol by EPA 8270D

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070459 - EPA 3546							**Sediment**					
Blank (3070459-BLK1)					Prepared: 07/19/13 07:24 Analyzed: 07/19/13 12:50							
EPA 8270D PCP												
Pentachlorophenol (PCP)	ND	41.7	83.3	ug/kg wet	1	---	---	---	---	---	---	
Surr: 2,4,6-Tribromophenol (Surr)		*Recovery: 111 %*		*Limits: 40-125 %*		*Dilution: 1x*						*Q-41*
LCS (3070459-BS1)					Prepared: 07/19/13 07:24 Analyzed: 07/19/13 13:25							
EPA 8270D PCP												
Pentachlorophenol (PCP)	995	50.0	100	ug/kg wet	1	800	---	124	25-125%	---	---	
Surr: 2,4,6-Tribromophenol (Surr)		*Recovery: 124 %*		*Limits: 40-125 %*		*Dilution: 1x*						*Q-41*
Duplicate (3070459-DUP1)					Prepared: 07/19/13 07:24 Analyzed: 07/19/13 14:34							**H-08**
QC Source Sample: LRIS-CL-DU1C--ISM Composite (A3F0629-10RE3)												
EPA 8270D PCP												
Pentachlorophenol (PCP)	**438**	103	206	ug/kg dry	2	---	334	---	---	27	30%	
Surr: 2,4,6-Tribromophenol (Surr)		*Recovery: 117 %*		*Limits: 40-125 %*		*Dilution: 2x*						*Q-41*
Matrix Spike (3070459-MS1)					Prepared: 07/19/13 07:24 Analyzed: 07/19/13 15:44							**H-08**
QC Source Sample: LRIS-CL-DU2--ISM Composite (A3F0629-11RE3)												
EPA 8270D PCP												
Pentachlorophenol (PCP)	1100	238	476	ug/kg dry	2	761	266	110	25-125%	---	---	
Surr: 2,4,6-Tribromophenol (Surr)		*Recovery: 122 %*		*Limits: 40-125 %*		*Dilution: 2x*						*Q-41*

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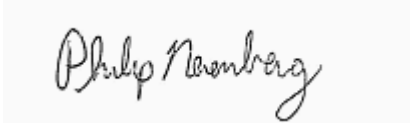

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070212 - EPA 3051A							**Solid**					
Blank (3070212-BLK1)					Prepared: 07/10/13 09:18 Analyzed: 07/12/13 13:22							
EPA 6020A												
Arsenic	ND	0.250	0.500	mg/kg	5	---	---	---	---	---	---	
Chromium	ND	0.500	1.00	"	"	---	---	---	---	---	---	
LCS (3070212-BS1)					Prepared: 07/10/13 09:18 Analyzed: 07/12/13 13:27							
EPA 6020A												
Arsenic	24.0	0.250	0.500	mg/kg	5	25.0	---	96	80-120%	---	---	
Chromium	26.2	0.500	1.00	"	"	"	---	105	"	---	---	
LCS Dup (3070212-BSD1)					Prepared: 07/10/13 09:18 Analyzed: 07/12/13 13:30							
EPA 6020A												
Arsenic	23.9	0.250	0.500	mg/kg	5	25.0	---	96	80-120%	0.5	20%	
Chromium	26.2	0.500	1.00	"	"	"	---	105	"	0.06	20%	

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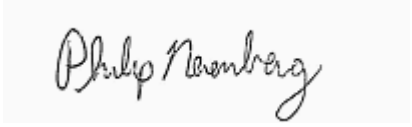

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Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070252 - EPA 3051A							**Sediment**					
Blank (3070252-BLK1)					Prepared: 07/11/13 09:43 Analyzed: 07/15/13 12:02							
EPA 6020A												
Arsenic	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.500	1.00	"	"	---	---	---	---	---	---	
LCS (3070252-BS1)					Prepared: 07/11/13 09:43 Analyzed: 07/15/13 12:05							
EPA 6020A												
Arsenic	25.7	0.250	0.500	mg/kg wet	5	25.0	---	103	80-120%	---	---	
Chromium	26.3	0.500	1.00	"	"	"	---	105	"	---	---	
LCS Dup (3070252-BSD1)					Prepared: 07/11/13 09:43 Analyzed: 07/15/13 12:08							
EPA 6020A												
Arsenic	24.2	0.250	0.500	mg/kg wet	5	25.0	---	97	80-120%	6	20%	
Chromium	24.7	0.500	1.00	"	"	"	---	99	"	6	20%	

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield ISM**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070266 - EPA 3051A							**Sediment**					
Blank (3070266-BLK1)					Prepared: 07/11/13 15:53 Analyzed: 07/15/13 12:23							
EPA 6020A												
Arsenic	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.500	1.00	"	"	---	---	---	---	---	---	
LCS (3070266-BS1)					Prepared: 07/11/13 15:53 Analyzed: 07/15/13 12:25							
EPA 6020A												
Arsenic	24.4	0.250	0.500	mg/kg wet	5	25.0	---	98	80-120%	---	---	
Chromium	25.0	0.500	1.00	"	"	"	---	100	"	---	---	
LCS Dup (3070266-BSD1)					Prepared: 07/11/13 15:53 Analyzed: 07/15/13 12:28							
EPA 6020A												
Arsenic	25.6	0.250	0.500	mg/kg wet	5	25.0	---	102	80-120%	5	20%	
Chromium	26.1	0.500	1.00	"	"	"	---	104	"	4	20%	

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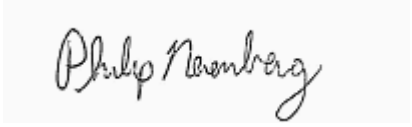

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Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070293 - EPA 3051A							**Sediment**					
Blank (3070293-BLK1)					Prepared: 07/12/13 14:17 Analyzed: 07/17/13 10:49							
EPA 6020A												
Arsenic	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.500	1.00	"	"	---	---	---	---	---	---	
LCS (3070293-BS1)					Prepared: 07/12/13 14:17 Analyzed: 07/17/13 12:22							
EPA 6020A												
Arsenic	29.2	0.250	0.500	mg/kg wet	5	25.0	---	117	80-120%	---	---	
Chromium	29.7	0.500	1.00	"	"	"	---	119	"	---	---	
LCS Dup (3070293-BSD1)					Prepared: 07/12/13 14:17 Analyzed: 07/17/13 10:54							
EPA 6020A												
Arsenic	26.6	0.250	0.500	mg/kg wet	5	25.0	---	106	80-120%	9	20%	
Chromium	29.7	0.500	1.00	"	"	"	---	119	"	0.05	20%	

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Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070306 - EPA 3051A							**Sediment**					
Blank (3070306-BLK1)					Prepared: 07/14/13 12:16 Analyzed: 07/16/13 17:16							
EPA 6020A												
Arsenic	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.500	1.00	"	"	---	---	---	---	---	---	
LCS (3070306-BS1)					Prepared: 07/14/13 12:16 Analyzed: 07/16/13 17:19							
EPA 6020A												
Arsenic	24.7	0.250	0.500	mg/kg wet	5	25.0	---	99	80-120%	---	---	
Chromium	25.1	0.500	1.00	"	"	"	---	100	"	---	---	
LCS Dup (3070306-BSD1)					Prepared: 07/14/13 12:16 Analyzed: 07/16/13 17:22							
EPA 6020A												
Arsenic	24.1	0.250	0.500	mg/kg wet	5	25.0	---	96	80-120%	2	20%	
Chromium	24.6	0.500	1.00	"	"	"	---	98	"	2	20%	

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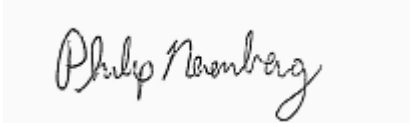

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070307 - EPA 3051A							**Sediment**					
Blank (3070307-BLK1)					Prepared: 07/14/13 12:53 Analyzed: 07/17/13 11:00							
EPA 6020A												
Arsenic	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.500	1.00	"	"	---	---	---	---	---	---	
LCS (3070307-BS1)					Prepared: 07/14/13 12:53 Analyzed: 07/17/13 11:03							
EPA 6020A												
Arsenic	22.4	0.250	0.500	mg/kg wet	5	25.0	---	89	80-120%	---	---	
Chromium	25.0	0.500	1.00	"	"	"	---	100	"	---	---	
LCS Dup (3070307-BSD1)					Prepared: 07/14/13 12:53 Analyzed: 07/17/13 11:05							
EPA 6020A												
Arsenic	21.8	0.250	0.500	mg/kg wet	5	25.0	---	87	80-120%	3	20%	
Chromium	24.4	0.500	1.00	"	"	"	---	98	"	3	20%	

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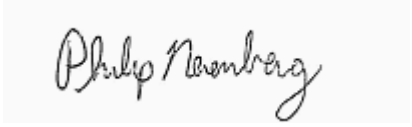

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070345 - EPA 3051A							**Sediment**					
Blank (3070345-BLK1)					Prepared: 07/16/13 08:13 Analyzed: 07/17/13 11:11							
EPA 6020A												
Arsenic	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.500	1.00	"	"	---	---	---	---	---	---	
Blank (3070345-BLK2)					Prepared: 07/16/13 08:13 Analyzed: 07/17/13 11:19							
EPA 6020A												
Arsenic	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.500	1.00	"	"	---	---	---	---	---	---	
Blank (3070345-BLK3)					Prepared: 07/16/13 08:13 Analyzed: 07/17/13 11:22							
EPA 6020A												
Arsenic	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.500	1.00	"	"	---	---	---	---	---	---	
LCS (3070345-BS1)					Prepared: 07/16/13 08:13 Analyzed: 07/17/13 11:25							
EPA 6020A												
Arsenic	23.8	0.250	0.500	mg/kg wet	5	25.0	---	95	80-120%	---	---	
Chromium	24.3	0.500	1.00	"	"	"	---	97	"	---	---	
LCS (3070345-BS2)					Prepared: 07/16/13 08:13 Analyzed: 07/17/13 11:27							
EPA 6020A												
Arsenic	24.3	0.250	0.500	mg/kg wet	5	25.0	---	97	80-120%	---	---	
Chromium	24.8	0.500	1.00	"	"	"	---	99	"	---	---	
LCS (3070345-BS3)					Prepared: 07/16/13 08:13 Analyzed: 07/17/13 11:30							
EPA 6020A												
Arsenic	22.6	0.250	0.500	mg/kg wet	5	25.0	---	90	80-120%	---	---	
Chromium	23.0	0.500	1.00	"	"	"	---	92	"	---	---	
Matrix Spike (3070345-MS1)					Prepared: 07/16/13 08:13 Analyzed: 07/17/13 11:36							
QC Source Sample: LRIS-CL-DU1A--ISM Composite--0.25mm Grind (A3F0629-15)												
EPA 6020A												
Arsenic	36.3	0.259	0.517	mg/kg dry	5	24.7	12.1	98	75-125%	---	---	
Chromium	63.9	0.517	1.03	"	"	"	38.2	104	"	---	---	

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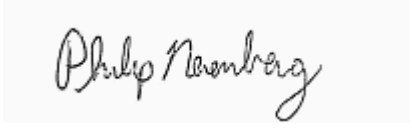

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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070345 - EPA 3051A							**Sediment**					
Matrix Spike Dup (3070345-MSD1)					Prepared: 07/16/13 08:13 Analyzed: 07/17/13 11:38							
QC Source Sample: LRIS-CL-DU1A--ISM Composite--0.25mm Grind (A3F0629-15)												
EPA 6020A												
Arsenic	36.6	0.258	0.515	mg/kg dry	5	25.8	12.1	95	75-125%	1	40%	
Chromium	64.3	0.515	1.03	"	"	"	38.2	101	"	0.6	40%	

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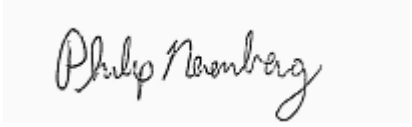

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Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070356 - EPA 3051A							**Solid**					
Blank (3070356-BLK1)					Prepared: 07/16/13 10:59 Analyzed: 07/16/13 15:21							
EPA 6020A												
Arsenic	ND	0.250	0.500	mg/kg	5	---	---	---	---	---	---	
Chromium	ND	0.500	1.00	"	"	---	---	---	---	---	---	
LCS (3070356-BS1)					Prepared: 07/16/13 10:59 Analyzed: 07/16/13 15:12							
EPA 6020A												
Arsenic	24.9	0.250	0.500	mg/kg	5	25.0	---	100	80-120%	---	---	
Chromium	25.4	0.500	1.00	"	"	"	---	102	"	---	---	

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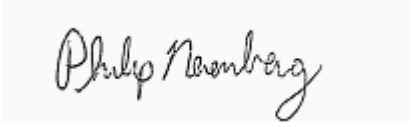

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QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070383 - EPA 3051A							**Sediment**					
Blank (3070383-BLK1)					Prepared: 07/17/13 08:41		Analyzed: 07/17/13 16:41					
EPA 6020A												
Arsenic	ND	0.250	0.500	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	0.500	1.00	"	"	---	---	---	---	---	---	
LCS (3070383-BS1)					Prepared: 07/17/13 08:41		Analyzed: 07/17/13 16:43					
EPA 6020A												
Arsenic	23.2	0.250	0.500	mg/kg wet	5	25.0	---	93	80-120%	---	---	
Chromium	23.4	0.500	1.00	"	"	"	---	94	"	---	---	
LCS Dup (3070383-BSD1)					Prepared: 07/17/13 08:41		Analyzed: 07/17/13 16:46					
EPA 6020A												
Arsenic	24.8	0.250	0.500	mg/kg wet	5	25.0	---	99	80-120%	7	20%	
Chromium	25.1	0.500	1.00	"	"	"	---	100	"	7	20%	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Conventional Chemistry Parameters

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070189 - PSEP TOC							**Sediment**					
Blank (3070189-BLK1)					Prepared: 07/09/13 09:15 Analyzed: 07/10/13 12:40							
PSEP/SM 5310B MOD												
Total Organic Carbon	ND	0.010	0.020	% by Weight	1	---	---	---	---	---	---	
LCS (3070189-BS1)					Prepared: 07/09/13 09:15 Analyzed: 07/10/13 12:40							
PSEP/SM 5310B MOD												
Total Organic Carbon	9300			mg/kg	1	10000	---	93	85-115%	---	---	

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QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070200 - Total Solids (Dry Weight)												**Soil**

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

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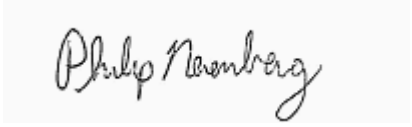

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SAMPLE PREPARATION INFORMATION

Pentachlorophenol by EPA 8270D

Prep: EPA 3546

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 3070219							
A3F0629-08RE2	Sediment	EPA 8270D PCP	07/01/13 18:00	07/10/13 11:22	31.29g/5mL	10g/5mL	0.32
A3F0629-09RE2	Sediment	EPA 8270D PCP	07/01/13 18:00	07/10/13 11:21	30.69g/5mL	10g/5mL	0.33
A3F0629-10RE2	Sediment	EPA 8270D PCP	07/01/13 18:00	07/10/13 11:21	30.71g/5mL	10g/5mL	0.33
A3F0629-11RE2	Sediment	EPA 8270D PCP	07/01/13 18:00	07/10/13 11:21	31.66g/5mL	10g/5mL	0.32
A3F0629-12RE2	Sediment	EPA 8270D PCP	07/01/13 18:00	07/10/13 11:21	31.42g/5mL	10g/5mL	0.32
A3F0629-13RE2	Sediment	EPA 8270D PCP	07/01/13 18:00	07/10/13 11:21	30.56g/5mL	10g/5mL	0.33
A3F0629-14RE2	Sediment	EPA 8270D PCP	07/02/13 09:30	07/10/13 11:21	31.56g/5mL	10g/5mL	0.32
Batch: 3070459							
A3F0629-10RE3	Sediment	EPA 8270D PCP	07/01/13 18:00	07/19/13 07:24	11.73g/5mL	10g/5mL	0.85
A3F0629-11RE3	Sediment	EPA 8270D PCP	07/01/13 18:00	07/19/13 07:24	11.15g/5mL	10g/5mL	0.90

Total Metals by EPA 6020 (ICPMS)

Prep: EPA 3051A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 3070212							
A3F0629-22	Solid	EPA 6020A	07/05/13 17:00	07/10/13 09:18	10.029g/1000mL	0.5g/50mL	1.00
Batch: 3070252							
A3F0629-21	Sediment	EPA 6020A	07/05/13 17:00	07/11/13 09:43	10.039g/1000mL	0.5g/50mL	1.00
Batch: 3070266							
A3F0629-20	Sediment	EPA 6020A	07/05/13 17:00	07/11/13 15:53	10.066g/1000mL	0.5g/50mL	0.99
Batch: 3070293							
A3F0629-19	Sediment	EPA 6020A	07/05/13 17:00	07/12/13 14:17	10.112g/1000mL	0.5g/50mL	0.99
Batch: 3070306							
A3F0629-17	Sediment	EPA 6020A	07/05/13 17:00	07/14/13 12:16	10.548g/1050mL	0.5g/50mL	1.00
Batch: 3070307							
A3F0629-16	Sediment	EPA 6020A	07/05/13 17:00	07/14/13 12:53	10.055g/1000mL	0.5g/50mL	1.00
Batch: 3070345							
A3F0629-15	Sediment	EPA 6020A	07/05/13 17:00	07/16/13 08:13	10.791g/1100mL	0.5g/50mL	1.02
Batch: 3070383							
A3F0629-18REL	Sediment	EPA 6020A	07/05/13 17:00	07/17/13 08:41	10.06g/1000mL	0.5g/50mL	0.99

Conventional Chemistry Parameters

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield ISM**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

SAMPLE PREPARATION INFORMATION

Conventional Chemistry Parameters

Prep: PSEP TOC

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 3070189							
A3F0629-15	Sediment	PSEP/SM 5310B MOD	07/05/13 17:00	07/09/13 09:15	5g/5g	5g/5g	NA
A3F0629-16	Sediment	PSEP/SM 5310B MOD	07/05/13 17:00	07/09/13 09:15	5g/5g	5g/5g	NA
A3F0629-17	Sediment	PSEP/SM 5310B MOD	07/05/13 17:00	07/09/13 09:15	5g/5g	5g/5g	NA
A3F0629-18	Sediment	PSEP/SM 5310B MOD	07/05/13 17:00	07/09/13 09:15	5g/5g	5g/5g	NA
A3F0629-19	Sediment	PSEP/SM 5310B MOD	07/05/13 17:00	07/09/13 09:15	5g/5g	5g/5g	NA
A3F0629-20	Sediment	PSEP/SM 5310B MOD	07/05/13 17:00	07/09/13 09:15	5g/5g	5g/5g	NA
A3F0629-21	Sediment	PSEP/SM 5310B MOD	07/05/13 17:00	07/09/13 09:15	5g/5g	5g/5g	NA

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57

Notes and Definitions

Qualifiers:

H-08	Sample hold time extended by freezing at -18 degrees C. Total time at 4 degrees C was less than the standard hold time.
J	Estimated Result . Result detected below the lowest point of the calibration curve, but above the specified MDL.
Q-41	Estimated Results. Recovery of Continuing Calibration Verification sample above upper control limit for this analyte. Results are likely biased high.
R-04	Reporting levels elevated due to dilution necessary for analysis.

Notes and Conventions:

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. Results listed as 'wet' or without 'dry'designation are not dry weight corrected.
RPD	Relative Percent Difference
MDL	If MDL is not listed, data has been evaluated to the Method Reporting Limit only.
WMSC	Water Miscible Solvent Correction has been applied to Results and MRLs for volatiles soil samples per EPA 8000C.
Batch QC	Unless specifically requested, this report contains only results for Batch QC derived from client samples included in this report. All analyses were performed with the appropriate Batch QC (including Sample Duplicates, Matrix Spikes and/or Matrix Spike Duplicates) in order to meet or exceed method and regulatory requirements. Any exceptions to this will be qualified in this report. Complete Batch QC results are available upon request. In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) is analyzed to demonstrate accuracy and precision of the extraction and analysis.
Blank Policy	Apex assesses blank data for potential high bias down to a level equal to ½ the method reporting limit (MRL), except for conventional chemistry and HCID analyses which are assessed only to the MRL. Sample results flagged with a B or B-02 qualifier are potentially biased high if they are less than ten times the level found in the blank for inorganic analyses or less than five times the level found in the blank for organic analyses. For accurate comparison of volatile results to the level found in the blank; water sample results should be divided by the dilution factor, and soil sample results should be divided by 1/50 of the sample dilution to account for the sample prep factor. Results qualified as reported below the MRL may include a potential high bias if associated with a B or B-02 qualified blank. B and B-02 qualifications are not applied to J qualified results reported below the MRL.
---	QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
***	Used to indicate a possible discrepency 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).

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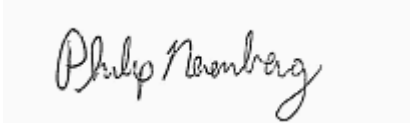

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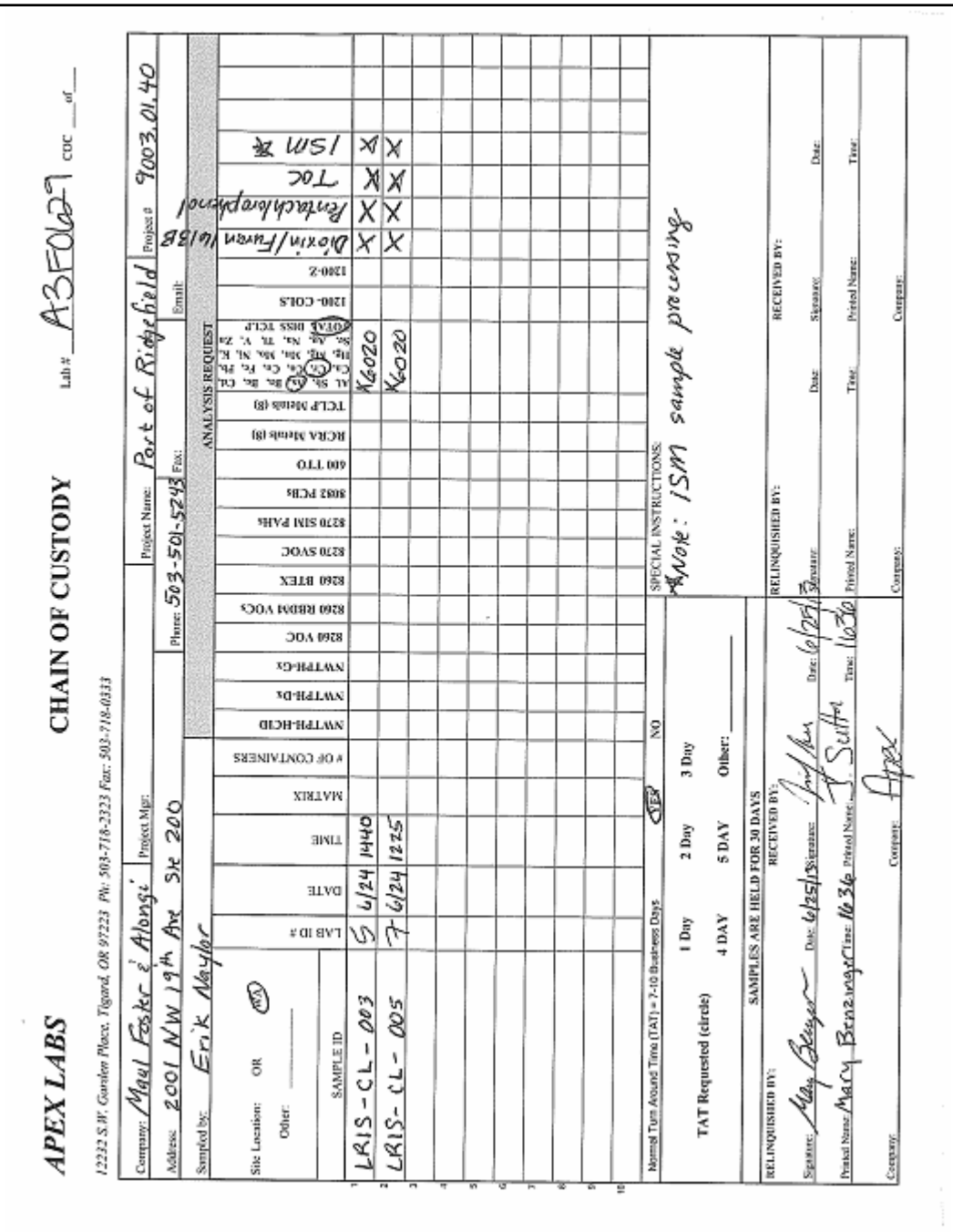
Portland, OR 97209	Project Manager: Madi Novak	07/26/13 11:57



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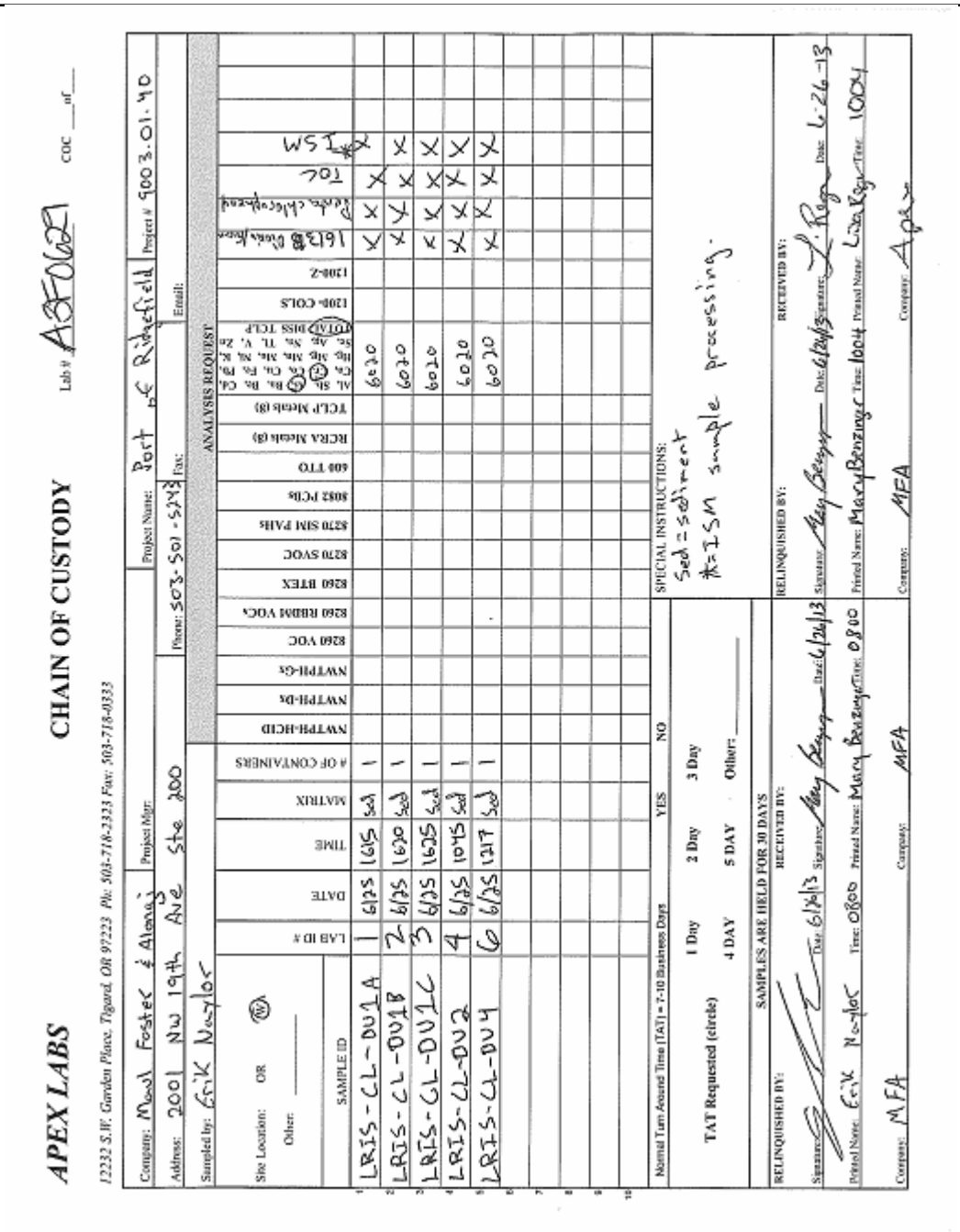

APEX LABS — **CHAIN OF CUSTODY** — Lab # ABF0627 — COC __ of __

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

Company: Maul Foster & Alongi — Project Mgr: — Project Name: Port of Ridgefield — Project #: 9003.01.40

Address: 2001 NW 19th Ave Ste 200 — Phone: 503-501-5543 — Fax: — Email:

Sampled by: Erik Naylor

	SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	ANALYSIS REQUESTED
1	LRIS-CL-DU1A	1	6/25	1615	Soil	1	
2	LRIS-CL-DU1B	2	6/25	1630	Soil	1	
3	LRIS-CL-DU1C	3	6/25	1635	Soil	1	
4	LRIS-CL-DU2	4	6/25	1045	Soil	1	
5	LRIS-CL-DU4	6	6/25	1217	Soil	1	

Site Location: OR — Other: _____

Normal Turn Around Time (TAT) = 7-10 Business Days — YES — NO

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

SAMPLES ARE HELD FOR 30 DAYS

SPECIAL INSTRUCTIONS:
Sed = sediment
*ISM sample processing.

RELINQUISHED BY: Signature: Mary Benzinger Date: 6/26/13 — RECEIVED BY:

RELINQUISHED BY: Signature: Mary Benzinger Date: 6/26/13 — RECEIVED BY: Signature: L. Rego Date: 6-26-13

Printed Name: Erik Naylor Time: 0800 — Printed Name: Mary Benzinger Time: 0800 — Printed Name: Lisa Rego Time: 1004

Company: MFA — Company: MFA — Company: Apex

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Tuesday, July 16, 2013

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

RE: Port of Ridgefield Discrete / 9003.01.40

Enclosed are the results of analyses for work order A3F0664, which was received by the laboratory on 6/27/2013 at 12:35:00PM.

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

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

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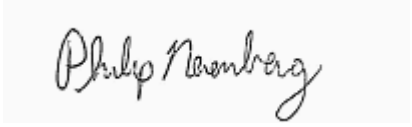

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield Discrete**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/16/13 17:24

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
RB-062413	A3F0664-01	Water	06/26/13 16:00	06/27/13 12:35
RB-062513	A3F0664-02	Water	06/26/13 16:10	06/27/13 12:35
RB-062613	A3F0664-03	Water	06/26/13 16:20	06/27/13 12:35

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/16/13 17:24

ANALYTICAL SAMPLE RESULTS

Pentachlorophenol by EPA 8270D

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
RB-062413 (A3F0664-01RE1)			**Matrix: Water**		**Batch: 3070089**			
Pentachlorophenol (PCP)	ND	0.500	1.00	ug/L	1	07/03/13 15:21	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 85 %*	*Limits: 40-125 %*	"	"	"	
RB-062513 (A3F0664-02RE1)			**Matrix: Water**		**Batch: 3070089**			
Pentachlorophenol (PCP)	ND	0.515	1.03	ug/L	1	07/03/13 14:44	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 76 %*	*Limits: 40-125 %*	"	"	"	
RB-062613 (A3F0664-03)			**Matrix: Water**		**Batch: 3070089**			
Pentachlorophenol (PCP)	ND	0.472	0.943	ug/L	1	07/03/13 14:05	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 80 %*	*Limits: 40-125 %*	"	"	"	

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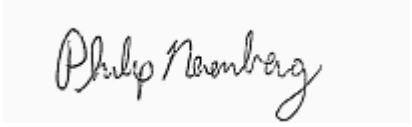

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/16/13 17:24

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
RB-062413 (A3F0664-01)			**Matrix: Water**					
Batch: 3070248								
Arsenic	ND	0.250	0.500	ug/L	1	07/12/13 16:24	EPA 6020A	
Chromium	ND	0.500	2.00	"	"	"	"	
RB-062513 (A3F0664-02)			**Matrix: Water**					
Batch: 3070248								
Arsenic	ND	0.250	0.500	ug/L	1	07/12/13 16:27	EPA 6020A	
Chromium	ND	0.500	2.00	"	"	"	"	
RB-062613 (A3F0664-03)			**Matrix: Water**					
Batch: 3070248								
Arsenic	ND	0.250	0.500	ug/L	1	07/12/13 16:30	EPA 6020A	
Chromium	ND	0.500	2.00	"	"	"	"	

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Portland, OR 97209	Project Manager: Madi Novak	07/16/13 17:24

ANALYTICAL SAMPLE RESULTS

Conventional Chemistry Parameters

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
RB-062413 (A3F0664-01)			**Matrix: Water**					
Batch: 3070053								
Total Organic Carbon	**1.07**	1.00	1.00	mg/L	1	07/02/13 20:51	SM 5310 B	
RB-062513 (A3F0664-02)			**Matrix: Water**					
Batch: 3070053								
Total Organic Carbon	**1.04**	1.00	1.00	mg/L	1	07/02/13 21:56	SM 5310 B	
RB-062613 (A3F0664-03)			**Matrix: Water**					
Batch: 3070053								
Total Organic Carbon	ND	1.00	1.00	mg/L	1	07/02/13 23:01	SM 5310 B	

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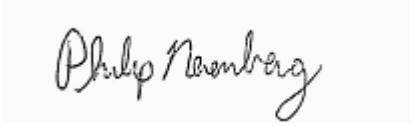

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Portland, OR 97209	Project Manager: Madi Novak	07/16/13 17:24

QUALITY CONTROL (QC) SAMPLE RESULTS

Pentachlorophenol by EPA 8270D

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070089 - EPA 3510C (Acid Extraction)								**Water**				
Blank (3070089-BLK2)					Prepared: 07/03/13 07:07 Analyzed: 07/03/13 11:06							
EPA 8270D PCP												
Pentachlorophenol (PCP)	ND	0.455	0.909	ug/L	1	---	---	---	---	---	---	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 86 %*	*Limits: 40-125 %*			*Dilution: 1x*					
LCS (3070089-BS2)					Prepared: 07/03/13 07:07 Analyzed: 07/03/13 11:43							
EPA 8270D PCP												
Pentachlorophenol (PCP)	7.12	0.500	1.00	ug/L	1	8.00	---	89	40-125%	---	---	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 106 %*	*Limits: 40-125 %*			*Dilution: 1x*					
LCS Dup (3070089-BSD2)					Prepared: 07/03/13 07:07 Analyzed: 07/03/13 12:19							**Q-19**
EPA 8270D PCP												
Pentachlorophenol (PCP)	7.38	0.500	1.00	ug/L	1	8.00	---	92	40-125%	4	30%	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 103 %*	*Limits: 40-125 %*			*Dilution: 1x*					

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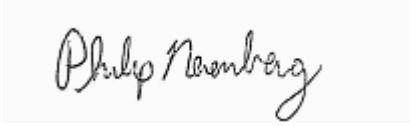

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/16/13 17:24

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070248 - EPA 3015A - HNO3 ONLY								**Water**				
Blank (3070248-BLK1)					Prepared: 07/12/13 09:17		Analyzed: 07/12/13 16:10					
EPA 6020A												
Arsenic	ND	0.250	0.500	ug/L	1	---	---	---	---	---	---	
Chromium	ND	0.500	2.00	"	"	---	---	---	---	---	---	
LCS (3070248-BS1)					Prepared: 07/12/13 09:17		Analyzed: 07/12/13 16:13					
EPA 6020A												
Arsenic	55.2	0.250	0.500	ug/L	1	55.6	---	99	85-115%	---	---	
Chromium	54.3	0.500	2.00	"	"	"	---	98	80-120%	---	---	
Duplicate (3070248-DUP1)					Prepared: 07/12/13 09:17		Analyzed: 07/12/13 16:33					
QC Source Sample: RB-062613 (A3F0664-03)												
EPA 6020A												
Arsenic	ND	0.250	0.500	ug/L	1	---	ND	---	---	---	20%	
Chromium	ND	0.500	2.00	"	"	---	ND	---	---	---	20%	
Matrix Spike (3070248-MS1)					Prepared: 07/12/13 09:17		Analyzed: 07/12/13 16:36					
QC Source Sample: RB-062613 (A3F0664-03)												
EPA 6020A												
Arsenic	54.6	0.250	0.500	ug/L	1	55.6	ND	98	70-130%	---	---	
Chromium	54.9	0.500	2.00	"	"	"	ND	99	75-125%	---	---	

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Portland, OR 97209	Project Manager: Madi Novak	07/16/13 17:24

QUALITY CONTROL (QC) SAMPLE RESULTS

Conventional Chemistry Parameters

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070053 - Method Prep: Aq							**Water**					
Blank (3070053-BLK1)					Prepared: 07/02/13 10:36		Analyzed: 07/02/13 19:18					
SM 5310 B												
Total Organic Carbon	ND	1.00	1.00	mg/L	1	---	---	---	---	---	---	
LCS (3070053-BS1)					Prepared: 07/02/13 10:36		Analyzed: 07/02/13 19:41					
SM 5310 B												
Total Organic Carbon	10.4	1.00	1.00	mg/L	1	10.0	---	104	85-115%	---	---	
Duplicate (3070053-DUP1)					Prepared: 07/02/13 10:36		Analyzed: 07/02/13 21:12					
QC Source Sample: RB-062413 (A3F0664-01)												
SM 5310 B												
Total Organic Carbon	ND	1.00	1.00	mg/L	1	---	1.07	---	---	***	20%	
Matrix Spike (3070053-MS1)					Prepared: 07/02/13 10:36		Analyzed: 07/02/13 21:35					
QC Source Sample: RB-062413 (A3F0664-01)												
SM 5310 B												
Total Organic Carbon	10.6	1.01	1.01	mg/L	1	10.1	1.07	95	75-125%	---	---	

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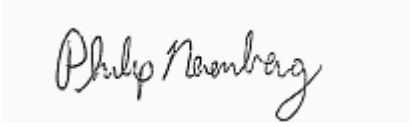

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/16/13 17:24

SAMPLE PREPARATION INFORMATION

Pentachlorophenol by EPA 8270D

Prep: EPA 3510C (Acid Extraction)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 3070089							
A3F0664-01RE1	Water	EPA 8270D PCP	06/26/13 16:00	07/03/13 07:07	1000mL/2mL	1000mL/2mL	1.00
A3F0664-02RE1	Water	EPA 8270D PCP	06/26/13 16:10	07/03/13 07:07	970mL/2mL	1000mL/2mL	1.03
A3F0664-03	Water	EPA 8270D PCP	06/26/13 16:20	07/03/13 07:07	1060mL/2mL	1000mL/2mL	0.94

Total Metals by EPA 6020 (ICPMS)

Prep: EPA 3015A - HNO3 ONLY

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 3070248							
A3F0664-01	Water	EPA 6020A	06/26/13 16:00	07/12/13 09:17	45mL/50mL	45mL/50mL	1.00
A3F0664-02	Water	EPA 6020A	06/26/13 16:10	07/12/13 09:17	45mL/50mL	45mL/50mL	1.00
A3F0664-03	Water	EPA 6020A	06/26/13 16:20	07/12/13 09:17	45mL/50mL	45mL/50mL	1.00

Conventional Chemistry Parameters

Prep: Method Prep: Aq

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 3070053							
A3F0664-01	Water	SM 5310 B	06/26/13 16:00	07/02/13 10:36	40mL/40mL	1mL/1mL	1.00
A3F0664-02	Water	SM 5310 B	06/26/13 16:10	07/02/13 10:36	40mL/40mL	1mL/1mL	1.00
A3F0664-03	Water	SM 5310 B	06/26/13 16:20	07/02/13 10:36	40mL/40mL	1mL/1mL	1.00

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Philip Nerenberg, Lab Director

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield Discrete**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/16/13 17:24

Notes and Definitions

Qualifiers:

Q-19	Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.

Notes and Conventions:

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. Results listed as 'wet' or without 'dry'designation are not dry weight corrected.
RPD	Relative Percent Difference
MDL	If MDL is not listed, data has been evaluated to the Method Reporting Limit only.
WMSC	Water Miscible Solvent Correction has been applied to Results and MRLs for volatiles soil samples per EPA 8000C.
Batch QC	Unless specifically requested, this report contains only results for Batch QC derived from client samples included in this report. All analyses were performed with the appropriate Batch QC (including Sample Duplicates, Matrix Spikes and/or Matrix Spike Duplicates) in order to meet or exceed method and regulatory requirements. Any exceptions to this will be qualified in this report. Complete Batch QC results are available upon request. In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) is analyzed to demonstrate accuracy and precision of the extraction and analysis.
Blank Policy	Apex assesses blank data for potential high bias down to a level equal to ½ the method reporting limit (MRL), except for conventional chemistry and HCID analyses which are assessed only to the MRL. Sample results flagged with a B or B-02 qualifier are potentially biased high if they are less than ten times the level found in the blank for inorganic analyses or less than five times the level found in the blank for organic analyses. For accurate comparison of volatile results to the level found in the blank; water sample results should be divided by the dilution factor, and soil sample results should be divided by 1/50 of the sample dilution to account for the sample prep factor. Results qualified as reported below the MRL may include a potential high bias if associated with a B or B-02 qualified blank. B and B-02 qualifications are not applied to J qualified results reported below the MRL.
---	QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
***	Used to indicate a possible discrepency 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).

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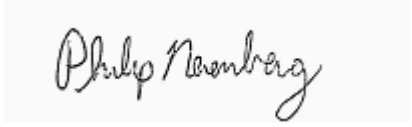

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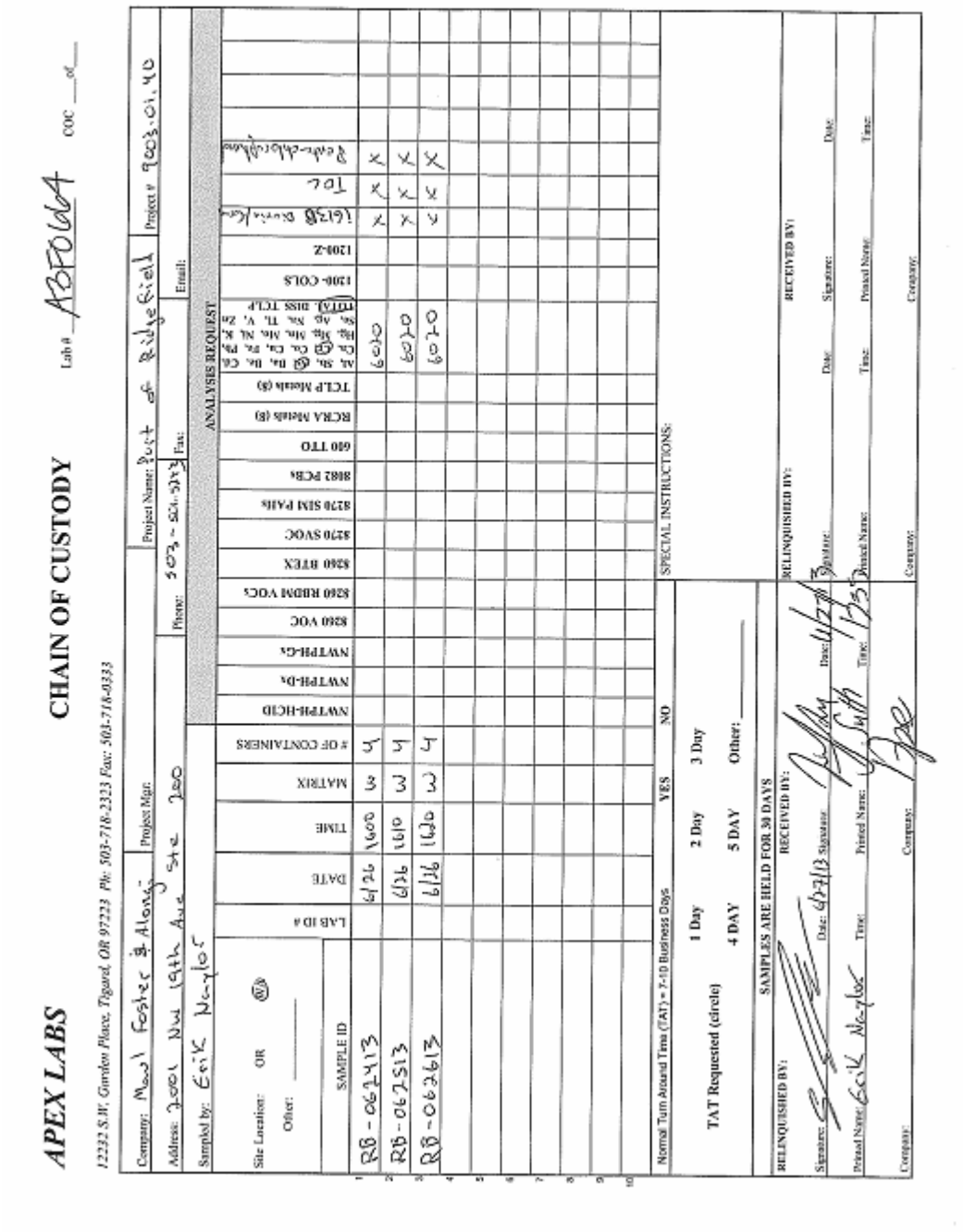
Portland, OR 97209	Project Manager: Madi Novak	07/16/13 17:24



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Wednesday, August 28, 2013

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

RE: Port of Ridgefield Discrete / 9003.01.40

Enclosed are the results of analyses for work order A3F0670, which was received by the laboratory on 6/27/2013 at 12:35:00PM.

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

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

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Christina M. Woodcock For Philip Nerenberg, Lab Director

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield Discrete**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
CL-16-1.5	A3F0670-01	Sediment	06/26/13 11:50	06/27/13 12:35
CL-17-1.5	A3F0670-03	Sediment	06/26/13 11:50	06/27/13 12:35
CL-17-1.5-DUP	A3F0670-05	Sediment	06/26/13 11:50	06/27/13 12:35
CL-18	A3F0670-06	Sediment	06/26/13 11:10	06/27/13 12:35
CL-19	A3F0670-07	Sediment	06/26/13 10:53	06/27/13 12:35

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield Discrete**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

ANALYTICAL CASE NARRATIVE

Work Order: A3F0670

Amended Report Revision 1

Additional Sample Analyses Requested:

Per client request on 7/19/13 via email, the following analyses were added to the corresponding sample ID's.

A3F0670-02/ CL-16-2.5: 1613 Dioxins (10g extraction)
A3F0670-06/ CL-18: 1613 Dioxins (10g extraction), 8270D PCP
A3F0670-07/ CL-19: 1613 Dioxins (10g extraction), 8270D PCP
A3F0670-10/ CL-22: 1613 Dioxins (10g extraction)
A3F0670-11/ CL-23: 1613 Dioxins (10g extraction)

Christina Woodcock
Project Manager
August 28, 2013

Apex Labs

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield Discrete**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

ANALYTICAL SAMPLE RESULTS

Pentachlorophenol by EPA 8270D

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
CL-16-1.5 (A3F0670-01RE1)			**Matrix: Sediment**		**Batch: 3070127**			
Pentachlorophenol (PCP)	ND	198	397	ug/kg dry	1	07/08/13 12:46	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 73 %*	*Limits: 40-125 %*	"	"	"	
CL-17-1.5 (A3F0670-03RE1)			**Matrix: Sediment**		**Batch: 3070127**			
Pentachlorophenol (PCP)	ND	177	353	ug/kg dry	1	07/08/13 13:58	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 78 %*	*Limits: 40-125 %*	"	"	"	
CL-17-1.5-DUP (A3F0670-05RE1)			**Matrix: Sediment**		**Batch: 3070127**			
Pentachlorophenol (PCP)	ND	165	329	ug/kg dry	1	07/08/13 14:34	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 77 %*	*Limits: 40-125 %*	"	"	"	
CL-18 (A3F0670-06RE2)			**Matrix: Sediment**		**Batch: 3070614**			**H-08**
Pentachlorophenol (PCP)	ND	161	321	ug/kg dry	1	07/26/13 10:51	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 124 %*	*Limits: 40-125 %*	"	"	"	
CL-19 (A3F0670-07RE1)			**Matrix: Sediment**		**Batch: 3070614**			**H-08**
Pentachlorophenol (PCP)	ND	176	353	ug/kg dry	1	07/26/13 12:03	EPA 8270D PCP	
Surrogate: 2,4,6-Tribromophenol (Surr)			*Recovery: 124 %*	*Limits: 40-125 %*	"	"	"	

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
CL-16-1.5 (A3F0670-01)			**Matrix: Sediment**					
Batch: 3070196								
Arsenic	**11.2**	---	0.847	mg/kg dry	5	07/10/13 11:02	EPA 6020A	
Chromium	**34.2**	---	1.69	"	"	"	"	
CL-17-1.5 (A3F0670-03)			**Matrix: Sediment**					
Batch: 3070196								
Arsenic	**2.55**	---	0.736	mg/kg dry	5	07/10/13 11:12	EPA 6020A	
Chromium	**27.7**	---	1.47	"	"	"	"	
CL-17-1.5-DUP (A3F0670-05)			**Matrix: Sediment**					
Batch: 3070196								
Arsenic	**2.16**	---	0.696	mg/kg dry	5	07/10/13 11:14	EPA 6020A	
Chromium	**29.8**	---	1.39	"	"	"	"	

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

ANALYTICAL SAMPLE RESULTS

Conventional Chemistry Parameters

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
CL-16-1.5 (A3F0670-01)			**Matrix: Sediment**					
Batch: 3070061								
Total Organic Carbon	**1.6**	---	0.020	% by Weight	1	07/09/13 13:55	PSEP/SM 5310B MOD	
CL-17-1.5 (A3F0670-03)			**Matrix: Sediment**					
Batch: 3070061								
Total Organic Carbon	**0.88**	---	0.020	% by Weight	1	07/09/13 13:55	PSEP/SM 5310B MOD	
CL-17-1.5-DUP (A3F0670-05)			**Matrix: Sediment**					
Batch: 3070061								
Total Organic Carbon	**0.61**	---	0.020	% by Weight	1	07/09/13 13:55	PSEP/SM 5310B MOD	

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

ANALYTICAL SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
CL-16-1.5 (A3F0670-01)			**Matrix: Sediment**		**Batch: 3070018**			
% Solids	**62.9**	---	1.00	% by Weight	1	07/02/13 11:38	Apex SOP	
CL-17-1.5 (A3F0670-03)			**Matrix: Sediment**		**Batch: 3070018**			
% Solids	**70.1**	---	1.00	% by Weight	1	07/02/13 11:38	Apex SOP	
CL-17-1.5-DUP (A3F0670-05)			**Matrix: Sediment**		**Batch: 3070018**			
% Solids	**70.7**	---	1.00	% by Weight	1	07/02/13 11:38	Apex SOP	
CL-18 (A3F0670-06)			**Matrix: Sediment**		**Batch: 3070577**			
% Solids	**59.2**	---	1.00	% by Weight	1	07/25/13 10:03	Apex SOP	
CL-19 (A3F0670-07)			**Matrix: Sediment**		**Batch: 3070577**			
% Solids	**68.8**	---	1.00	% by Weight	1	07/25/13 10:03	Apex SOP	

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

QUALITY CONTROL (QC) SAMPLE RESULTS

Pentachlorophenol by EPA 8270D

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070127 - EPA 3546							**Sediment**					
Blank (3070127-BLK1)					Prepared: 07/05/13 09:59 Analyzed: 07/05/13 15:55							
EPA 8270D PCP												
Pentachlorophenol (PCP)	ND	114	227	ug/kg wet	1	---	---	---	---	---	---	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 82 %*	*Limits: 40-125 %*			*Dilution: 1x*					
LCS (3070127-BS1)					Prepared: 07/05/13 09:59 Analyzed: 07/05/13 16:32							
EPA 8270D PCP												
Pentachlorophenol (PCP)	615	125	250	ug/kg wet	1	800	---	77	25-125%	---	---	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 90 %*	*Limits: 40-125 %*			*Dilution: 1x*					
Duplicate (3070127-DUP2)					Prepared: 07/05/13 09:59 Analyzed: 07/08/13 13:22							
QC Source Sample: CL-16-1.5 (A3F0670-01RE1)												
EPA 8270D PCP												
Pentachlorophenol (PCP)	ND	186	373	ug/kg dry	1	---	ND	---	---	---	30%	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 87 %*	*Limits: 40-125 %*			*Dilution: 1x*					
Matrix Spike (3070127-MS2)					Prepared: 07/05/13 09:59 Analyzed: 07/08/13 15:10							
QC Source Sample: CL-17-1.5-DUP (A3F0670-05RE1)												
EPA 8270D PCP												
Pentachlorophenol (PCP)	1020	177	354	ug/kg dry	1	1130	ND	90	25-125%	---	---	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 90 %*	*Limits: 40-125 %*			*Dilution: 1x*					
Batch 3070614 - EPA 3546							**Sediment**					
Blank (3070614-BLK1)					Prepared: 07/25/13 13:38 Analyzed: 07/25/13 15:45							
EPA 8270D PCP												
Pentachlorophenol (PCP)	ND	90.9	182	ug/kg wet	1	---	---	---	---	---	---	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 111 %*	*Limits: 40-125 %*			*Dilution: 1x*					
LCS (3070614-BS1)					Prepared: 07/25/13 13:38 Analyzed: 07/25/13 16:21							
EPA 8270D PCP												
Pentachlorophenol (PCP)	883	100	200	ug/kg wet	1	800	---	110	25-125%	---	---	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 114 %*	*Limits: 40-125 %*			*Dilution: 1x*					
Duplicate (3070614-DUP2)					Prepared: 07/25/13 13:38 Analyzed: 07/26/13 11:27							**H-08**
QC Source Sample: CL-18 (A3F0670-06RE2)												

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

QUALITY CONTROL (QC) SAMPLE RESULTS

Pentachlorophenol by EPA 8270D

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070614 - EPA 3546							**Sediment**					
Duplicate (3070614-DUP2)					Prepared: 07/25/13 13:38 Analyzed: 07/26/13 11:27							**H-08**
QC Source Sample: CL-18 (A3F0670-06RE2)												
EPA 8270D PCP												
Pentachlorophenol (PCP)	ND	166	332	ug/kg dry	1	---	ND	---	---	---	30%	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 121 %*	*Limits: 40-125 %*			*Dilution: 1x*					
Matrix Spike (3070614-MS1)					Prepared: 07/25/13 13:38 Analyzed: 07/26/13 12:40							**H-08**
QC Source Sample: CL-19 (A3F0670-07RE1)												
EPA 8270D PCP												
Pentachlorophenol (PCP)	1340	177	354	ug/kg dry	1	1130	ND	118	25-125%	---	---	
Surr: 2,4,6-Tribromophenol (Surr)			*Recovery: 122 %*	*Limits: 40-125 %*			*Dilution: 1x*					

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

QUALITY CONTROL (QC) SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070196 - EPA 3051A							**Sediment**					
Blank (3070196-BLK1)					Prepared: 07/09/13 11:19		Analyzed: 07/10/13 10:56					
EPA 6020A												
Arsenic	ND	---	0.500	mg/kg wet	5	---	---	---	---	---	---	
Chromium	ND	---	1.00	"	"	---	---	---	---	---	---	
LCS (3070196-BS1)					Prepared: 07/09/13 11:19		Analyzed: 07/10/13 10:59					
EPA 6020A												
Arsenic	24.9	---	0.500	mg/kg wet	5	25.0	---	99	80-120%	---	---	
Chromium	25.5	---	1.00	"	"	"	---	102	"	---	---	
Duplicate (3070196-DUP1)					Prepared: 07/09/13 11:19		Analyzed: 07/10/13 11:17					
QC Source Sample: CL-17-1.5-DUP (A3F0670-05)												
EPA 6020A												
Arsenic	**2.74**	---	0.749	mg/kg dry	5	---	2.16	---	---	24	40%	
Chromium	**31.4**	---	1.50	"	"	---	29.8	---	---	5	40%	
Matrix Spike (3070196-MS1)					Prepared: 07/09/13 11:19		Analyzed: 07/10/13 11:20					
QC Source Sample: CL-17-1.5-DUP (A3F0670-05)												
EPA 6020A												
Arsenic	39.4	---	0.786	mg/kg dry	5	39.3	2.16	95	75-125%	---	---	
Chromium	68.4	---	1.57	"	"	"	29.8	98	"	---	---	

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Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

QUALITY CONTROL (QC) SAMPLE RESULTS

Conventional Chemistry Parameters

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070061 - PSEP TOC							**Sediment**					
Blank (3070061-BLK1)					Prepared: 07/02/13 12:43		Analyzed: 07/09/13 13:55					
PSEP/SM 5310B MOD												
Total Organic Carbon	ND	---	0.020	% by Weight	1	---	---	---	---	---	---	
LCS (3070061-BS1)					Prepared: 07/02/13 12:43		Analyzed: 07/09/13 13:55					
PSEP/SM 5310B MOD												
Total Organic Carbon	9400	---		mg/kg	1	10000	---	94	85-115%	---	---	
Duplicate (3070061-DUP1)					Prepared: 07/02/13 12:43		Analyzed: 07/09/13 13:55					
QC Source Sample: CL-16-1.5 (A3F0670-01)												
PSEP/SM 5310B MOD												
Total Organic Carbon	**1.7**	---	0.020	% by Weight	1	---	1.6	---	---	6	20%	

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Christina M. Woodcock For Philip Nerenberg, Lab Director

Apex Labs

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

Maul Foster & Alongi, INC.	Project: **Port of Ridgefield Discrete**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes

Batch 3070018 - Total Solids (Dry Weight) **Soil**

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

Batch 3070577 - Total Solids (Dry Weight) **Soil**

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

Apex Laboratories

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

SAMPLE PREPARATION INFORMATION

Pentachlorophenol by EPA 8270D

Prep: EPA 3546

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 3070127							
A3F0670-01RE1	Sediment	EPA 8270D PCP	06/26/13 11:50	07/05/13 09:59	10.02g/5mL	10g/5mL	1.00
A3F0670-03RE1	Sediment	EPA 8270D PCP	06/26/13 11:50	07/05/13 09:59	10.09g/5mL	10g/5mL	0.99
A3F0670-05RE1	Sediment	EPA 8270D PCP	06/26/13 11:50	07/05/13 09:59	10.74g/5mL	10g/5mL	0.93
Batch: 3070614							
A3F0670-06RE2	Sediment	EPA 8270D PCP	06/26/13 11:10	07/25/13 13:38	10.51g/5mL	10g/5mL	0.95
A3F0670-07RE1	Sediment	EPA 8270D PCP	06/26/13 10:53	07/25/13 13:38	10.3g/5mL	10g/5mL	0.97

Total Metals by EPA 6020 (ICPMS)

Prep: EPA 3051A

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 3070196							
A3F0670-01	Sediment	EPA 6020A	06/26/13 11:50	07/09/13 11:19	0.938g/100mL	0.5g/50mL	1.07
A3F0670-03	Sediment	EPA 6020A	06/26/13 11:50	07/09/13 11:19	0.969g/100mL	0.5g/50mL	1.03
A3F0670-05	Sediment	EPA 6020A	06/26/13 11:50	07/09/13 11:19	1.016g/100mL	0.5g/50mL	0.98

Conventional Chemistry Parameters

Prep: PSEP TOC

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 3070061							
A3F0670-01	Sediment	PSEP/SM 5310B MOD	06/26/13 11:50	07/02/13 12:43	5g/5g	5g/5g	NA
A3F0670-03	Sediment	PSEP/SM 5310B MOD	06/26/13 11:50	07/02/13 12:43	5g/5g	5g/5g	NA
A3F0670-05	Sediment	PSEP/SM 5310B MOD	06/26/13 11:50	07/02/13 12:43	5g/5g	5g/5g	NA

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield Discrete**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

Notes and Definitions

Qualifiers:

H-08	Sample hold time extended by freezing at -18 degrees C. Total time at 4 degrees C was less than the standard hold time.

Notes and Conventions:

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. Results listed as 'wet' or without 'dry'designation are not dry weight corrected.
RPD	Relative Percent Difference
MDL	If MDL is not listed, data has been evaluated to the Method Reporting Limit only.
WMSC	Water Miscible Solvent Correction has been applied to Results and MRLs for volatiles soil samples per EPA 8000C.
Batch QC	Unless specifically requested, this report contains only results for Batch QC derived from client samples included in this report. All analyses were performed with the appropriate Batch QC (including Sample Duplicates, Matrix Spikes and/or Matrix Spike Duplicates) in order to meet or exceed method and regulatory requirements. Any exceptions to this will be qualified in this report. Complete Batch QC results are available upon request. In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) is analyzed to demonstrate accuracy and precision of the extraction and analysis.
Blank Policy	Apex assesses blank data for potential high bias down to a level equal to ½ the method reporting limit (MRL), except for conventional chemistry and HCID analyses which are assessed only to the MRL. Sample results flagged with a B or B-02 qualifier are potentially biased high if they are less than ten times the level found in the blank for inorganic analyses or less than five times the level found in the blank for organic analyses. For accurate comparison of volatile results to the level found in the blank; water sample results should be divided by the dilution factor, and soil sample results should be divided by 1/50 of the sample dilution to account for the sample prep factor. Results qualified as reported below the MRL may include a potential high bias if associated with a B or B-02 qualified blank. B and B-02 qualifications are not applied to J qualified results reported below the MRL.
---	QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
***	Used to indicate a possible discrepency with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Apex Laboratories

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33

APEX LABS — **CHAIN OF CUSTODY** — Lab # A3F0670 — COC 1 of 2

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

Company: Maul Foster & Alongi — Project Mgr: — Project Name: Port of Ridgefield — Project #: 9003.01.40

Address: 2001 NW 19th Ave Ste 200 — Phone: 503-501-5247 — Fax: — Email:

Sampled by: Erik Naylor

Site Location: OR WA — Other:

ANALYSIS REQUEST

	SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 VOC	8260 RBDM VOCs	8260 BTEX	8270 SVOC	8270 SIM PAHs	8082 PCBs	608 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	1613B Dioxins/Furans	TOC	Pentachlorophenol	Hold Archive			
1	CL-16-1.5	1	6/26	1150	Sed	2													6020			X	X	X	X			
2	CL-16-2.5	2	6/26	1200	Sed	2																			X			
3	CL-17-1.5	3	6/26	1150	Sed	2													6020			X	X	X	X			
4	CL-17-2.5	4	6/26	1200	Sed	2																			X			
5	CL-17-1.5-DUP	5	6/26	1150	Sed	2													6020			X	X	X	X			
6	CL-18	6	6/26	1110	Sed	2																			X			
7	CL-19	7	6/26	1053	Sed	2																			X			
8	CL-20	8	6/26	1015	Sed	2																			X			
9	CL-21	9	6/26	1000	Sed	2																			X			
10	CL-22	10	6/26	1055	Sed	2																			X			

Normal Turn Around Time (TAT) = 7-10 Business Days — YES — NO

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

SPECIAL INSTRUCTIONS:

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature] Date: 6/27	Signature: [signature] Date: 6/27/13	Signature: Date:	Signature: Date:
Printed Name: Erik Naylor Time: 1000	Printed Name: J Smith Time: 1235	Printed Name: Time:	Printed Name: Time:
Company:	Company: Apex	Company:	Company:

Apex Labs

12232 S.W. Garden Place
Tigard, OR 97223
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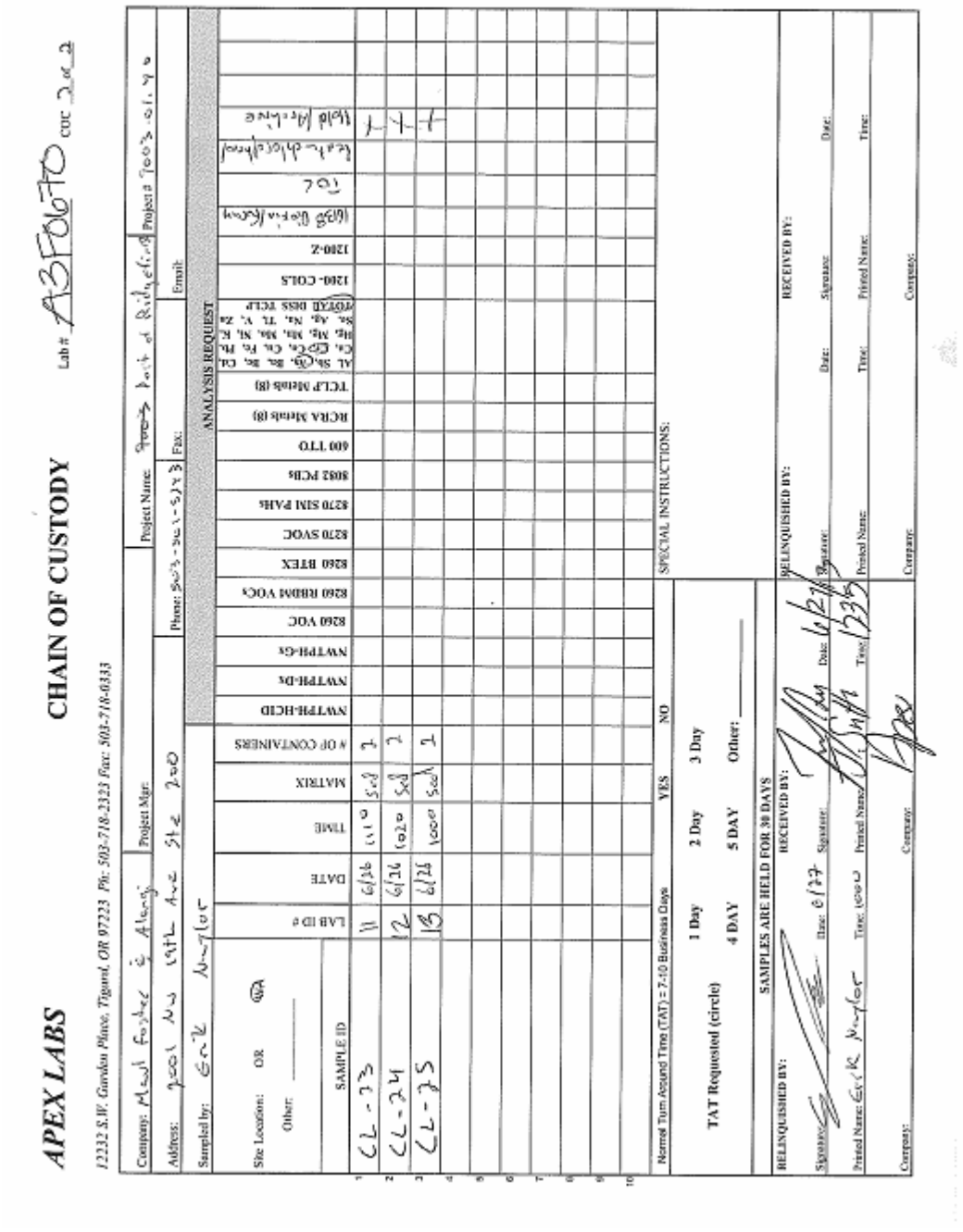
Maul Foster & Alongi, INC.	Project: **Port of Ridgefield Discrete**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	08/28/13 14:33



APEX LABS

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

CHAIN OF CUSTODY

Lab # A3F0670 COC 1 of 2

Company: Maul Foster & Alongi | Project Mgr: | Project Name: Port of Ridgefield | Project # 9003.01.40

Address: 2001 NW 19th Ave Ste 200 | Phone: 503-234-3323 | Fax: | Email:

Sampled by: Emily Nistler

Site Location: OR WA
Other: _____

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	ANALYSIS REQUEST: NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 VOC	8260 RHOH VOCs	8260 BTEX	8270 SVOC	8270 SIM PAHs	8082 PCBs	600 TTO	RCRA Metals (8)	TCLP Metals (8)	Al, Sb, Cd, Be, Ba, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn (TOTAL DISS TCLP)	1200-COLS	1200-Z	Light Diesel/Kero	TCL	Heavy Oil/Motor Oil	Field Parameters
1 CL-33	11	6/26	1110	Soil	1																			
2 CL-34	12	6/26	1020	Soil	1																			
3 CL-35	13	6/26	1000	Soil	1																			
4																								
5																								
6																								
7																								
8																								
9																								
10																								

Normal Turn Around Time (TAT) = 7-10 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: | RECEIVED BY: | RELINQUISHED BY: | RECEIVED BY:

Signature: | Date: 6/27 | Signature: | Date: 6/27 | Signature: | Date: 6/27 | Signature: | Date:

Printed Name: Emily Nistler | Time: 1000 | Printed Name: | Time: 1330 | Printed Name: | Time: | Printed Name: | Time:

Company: | Company: | Company: | Company:

Apex Laboratories

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Apex Labs

12232 S.W. Garden Place
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503-718-2323 Phone
503-718-0333 Fax

Wednesday, July 17, 2013

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

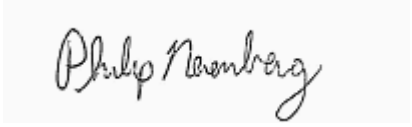
RE: Port of Ridgefield Discrete / 9003.01.40

Enclosed are the results of analyses for work order A3F0672, which was received by the laboratory on 6/27/2013 at 12:35:00PM.

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

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

Apex Laboratories



Philip Nerenberg, Lab Director

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Maul Foster & Alongi, INC.	Project: **Port of Ridgefield Discrete**	
2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/17/13 16:26

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
PS-SRM-062713	A3F0672-01	Sediment	06/27/13 10:00	06/27/13 12:35

Apex Laboratories

Philip Nerenberg

Philip Nerenberg, Lab Director

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/17/13 16:26

ANALYTICAL SAMPLE RESULTS

Conventional Chemistry Parameters

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
PS-SRM-062713 (A3F0672-01)			**Matrix: Sediment**					
Batch: 3070061								
Total Organic Carbon	**1.9**	0.010	0.020	% by Weight	1	07/09/13 13:55	PSEP/SM 5310B MOD	

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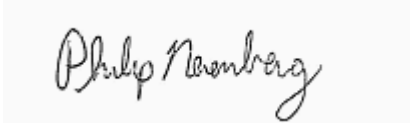

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/17/13 16:26

QUALITY CONTROL (QC) SAMPLE RESULTS

Conventional Chemistry Parameters

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070061 - PSEP TOC							**Sediment**					
Blank (3070061-BLK1)					Prepared: 07/02/13 12:43		Analyzed: 07/09/13 13:55					
PSEP/SM 5310B MOD												
Total Organic Carbon	ND	0.010	0.020	% by Weight	1	---	---	---	---	---	---	
LCS (3070061-BS1)					Prepared: 07/02/13 12:43		Analyzed: 07/09/13 13:55					
PSEP/SM 5310B MOD												
Total Organic Carbon	9400			mg/kg	1	10000	---	94	85-115%	---	---	

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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/17/13 16:26

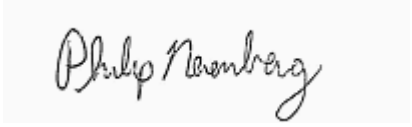
SAMPLE PREPARATION INFORMATION

Conventional Chemistry Parameters

Prep: PSEP TOC

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
Batch: 3070061							
A3F0672-01	Sediment	PSEP/SM 5310B MOD	06/27/13 10:00	07/02/13 12:43	5g/5g	5g/5g	NA

Apex Laboratories



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2001 NW 19th Ave, STE 200	Project Number: 9003.01.40	**Reported:**
Portland, OR 97209	Project Manager: Madi Novak	07/17/13 16:26

Notes and Definitions

Qualifiers:

Notes and Conventions:

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. Results listed as 'wet' or without 'dry'designation are not dry weight corrected.
RPD	Relative Percent Difference
MDL	If MDL is not listed, data has been evaluated to the Method Reporting Limit only.
WMSC	Water Miscible Solvent Correction has been applied to Results and MRLs for volatiles soil samples per EPA 8000C.
Batch QC	Unless specifically requested, this report contains only results for Batch QC derived from client samples included in this report. All analyses were performed with the appropriate Batch QC (including Sample Duplicates, Matrix Spikes and/or Matrix Spike Duplicates) in order to meet or exceed method and regulatory requirements. Any exceptions to this will be qualified in this report. Complete Batch QC results are available upon request. In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) is analyzed to demonstrate accuracy and precision of the extraction and analysis.
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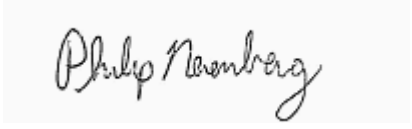
***	Used to indicate a possible discrepency with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Apex Laboratories



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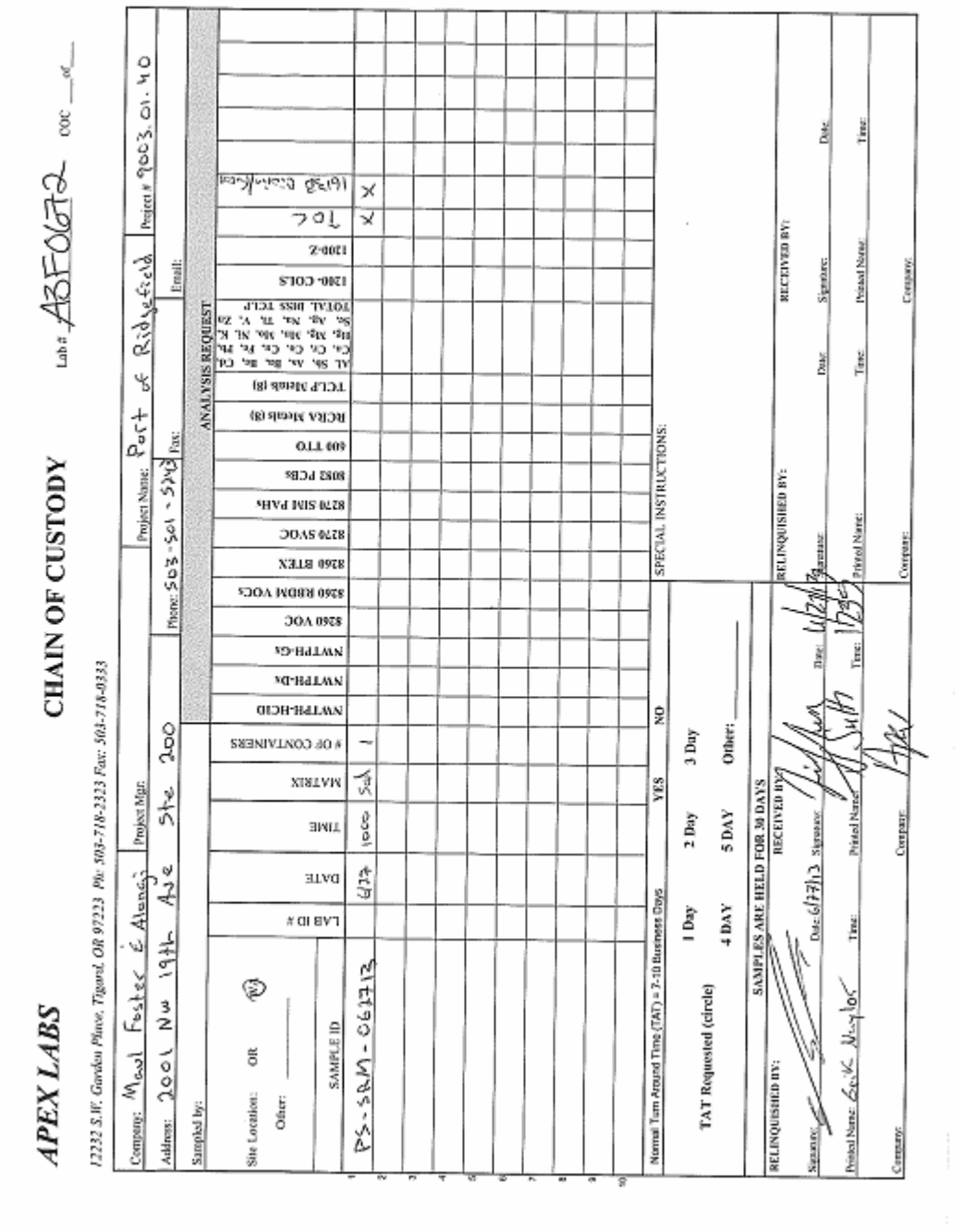

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Philip Nerenberg, Lab Director

Maxxam

Success Through Science®

Your Project #: A3F0664
Your C.O.C. #: na

Attention: Philip Nerenberg
Apex Laboratories
12232 SW Garden Place
Tigard, OR
USA 97223

Report Date: 2013/07/16

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B3A4675
Received: 2013/07/02, 12:48

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Dioxins/Furans in Water (1613B) (1)	3	2013/07/04	2013/07/15	BRL SOP-00410	EPA 1613B mod.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

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

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ivana Vukovic, Env Project Manager
Email: IVukovic@maxxam.ca
Phone# (905) 817-5700

==========

Total cover pages: 1

Maxxam Job #: B3A4675
Report Date: 2013/07/16

Apex Laboratories
Client Project #: A3F0664

DIOXINS AND FURANS BY HRMS (WATER)

Maxxam ID		SC3111						
Sampling Date		2013/06/26 16:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	**RB-062413**	**EDL**	**RDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
2,3,7,8-Tetra CDD *	pg/L	1.13 U	1.13	10.9	1.00	1.13		3272206
1,2,3,7,8-Penta CDD	pg/L	1.15 U	1.15	54.3	1.00	1.15		3272206
1,2,3,4,7,8-Hexa CDD	pg/L	1.11 U	1.11	54.3	0.100	0.111		3272206
1,2,3,6,7,8-Hexa CDD	pg/L	1.19 U	1.19	54.3	0.100	0.119		3272206
1,2,3,7,8,9-Hexa CDD	pg/L	1.11 U	1.11	54.3	0.100	0.111		3272206
1,2,3,4,6,7,8-Hepta CDD	pg/L	7.78 J	1.13	54.3	0.0100	0.0778		3272206
Octa CDD	pg/L	64.4 J	1.10	109	0.000300	0.0193		3272206
Total Tetra CDD	pg/L	1.13 U	1.13	10.9				3272206
Total Penta CDD	pg/L	1.15 U	1.15	54.3				3272206
Total Hexa CDD	pg/L	1.15 U	1.15	54.3				3272206
Total Hepta CDD	pg/L	13.1 J	1.13	54.3				3272206
2,3,7,8-Tetra CDF **	pg/L	1.10 U	1.10	10.9	0.100	0.110		3272206
1,2,3,7,8-Penta CDF	pg/L	1.20 U	1.20	54.3	0.0300	0.0360		3272206
2,3,4,7,8-Penta CDF	pg/L	1.15 U	1.15	54.3	0.300	0.345		3272206
1,2,3,4,7,8-Hexa CDF	pg/L	1.06 U	1.06	54.3	0.100	0.106		3272206
1,2,3,6,7,8-Hexa CDF	pg/L	1.10 U	1.10	54.3	0.100	0.110		3272206
2,3,4,6,7,8-Hexa CDF	pg/L	1.08 U	1.08	54.3	0.100	0.108		3272206
1,2,3,7,8,9-Hexa CDF	pg/L	1.12 U	1.12	54.3	0.100	0.112		3272206
1,2,3,4,6,7,8-Hepta CDF	pg/L	1.56 U (1)	1.56	54.3	0.0100	0.0156		3272206
1,2,3,4,7,8,9-Hepta CDF	pg/L	1.12 U	1.12	54.3	0.0100	0.0112		3272206
Octa CDF	pg/L	5.93 J	1.15	109	0.000300	0.00178		3272206
Total Tetra CDF	pg/L	1.10 U	1.10	10.9				3272206
Total Penta CDF	pg/L	1.17 U	1.17	54.3				3272206
Total Hexa CDF	pg/L	1.09 U	1.09	54.3				3272206
Total Hepta CDF	pg/L	1.36 J	1.12	54.3				3272206
TOTAL TOXIC EQUIVALENCY	pg/L					3.67		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD	%	90						3272206

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

Maxxam Job #: B3A4675
Report Date: 2013/07/16

Apex Laboratories
Client Project #: A3F0664

DIOXINS AND FURANS BY HRMS (WATER)

Maxxam ID		SC3111						
Sampling Date		2013/06/26 16:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	RB-062413	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDD *	%	85						3272206
C13-1234678 HeptaCDF **	%	98						3272206
C13-123478 HexaCDD	%	76						3272206
C13-123478 HexaCDF	%	96						3272206
C13-1234789 HeptaCDF	%	90						3272206
C13-123678 HexaCDD	%	85						3272206
C13-123678 HexaCDF	%	92						3272206
C13-12378 PentaCDD	%	78						3272206
C13-12378 PentaCDF	%	84						3272206
C13-123789 HexaCDF	%	81						3272206
C13-234678 HexaCDF	%	94						3272206
C13-23478 PentaCDF	%	95						3272206
C13-2378 TetraCDD	%	73						3272206
C13-2378 TetraCDF	%	76						3272206
C13-OCDD	%	82						3272206

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

Maxxam Job #: B3A4675
Report Date: 2013/07/16

Apex Laboratories
Client Project #: A3F0664

DIOXINS AND FURANS BY HRMS (WATER)

Maxxam ID		SC3112						
Sampling Date		2013/06/26 16:10						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	RB-062513	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/L	1.14 U	1.14	11.1	1.00	1.14		3272206
1,2,3,7,8-Penta CDD	pg/L	1.20 U	1.20	55.6	1.00	1.20		3272206
1,2,3,4,7,8-Hexa CDD	pg/L	1.16 U	1.16	55.6	0.100	0.116		3272206
1,2,3,6,7,8-Hexa CDD	pg/L	1.24 U	1.24	55.6	0.100	0.124		3272206
1,2,3,7,8,9-Hexa CDD	pg/L	1.16 U	1.16	55.6	0.100	0.116		3272206
1,2,3,4,6,7,8-Hepta CDD	pg/L	5.81 J	1.18	55.6	0.0100	0.0581		3272206
Octa CDD	pg/L	43.8 J	1.19	111	0.000300	0.0131		3272206
Total Tetra CDD	pg/L	1.14 U	1.14	11.1				3272206
Total Penta CDD	pg/L	1.20 U	1.20	55.6				3272206
Total Hexa CDD	pg/L	1.20 U	1.20	55.6				3272206
Total Hepta CDD	pg/L	10.1 J	1.18	55.6				3272206
2,3,7,8-Tetra CDF **	pg/L	1.17 U	1.17	11.1	0.100	0.117		3272206
1,2,3,7,8-Penta CDF	pg/L	1.22 U	1.22	55.6	0.0300	0.0366		3272206
2,3,4,7,8-Penta CDF	pg/L	1.18 U	1.18	55.6	0.300	0.354		3272206
1,2,3,4,7,8-Hexa CDF	pg/L	1.16 U	1.16	55.6	0.100	0.116		3272206
1,2,3,6,7,8-Hexa CDF	pg/L	1.20 U	1.20	55.6	0.100	0.120		3272206
2,3,4,6,7,8-Hexa CDF	pg/L	1.19 U	1.19	55.6	0.100	0.119		3272206
1,2,3,7,8,9-Hexa CDF	pg/L	1.23 U	1.23	55.6	0.100	0.123		3272206
1,2,3,4,6,7,8-Hepta CDF	pg/L	1.16 U (1)	1.16	55.6	0.0100	0.0116		3272206
1,2,3,4,7,8,9-Hepta CDF	pg/L	1.21 U	1.21	55.6	0.0100	0.0121		3272206
Octa CDF	pg/L	3.16 J	1.17	111	0.000300	0.000948		3272206
Total Tetra CDF	pg/L	1.17 U	1.17	11.1				3272206
Total Penta CDF	pg/L	1.20 U	1.20	55.6				3272206
Total Hexa CDF	pg/L	1.19 U	1.19	55.6				3272206
Total Hepta CDF	pg/L	1.20 U	1.20	55.6				3272206
TOTAL TOXIC EQUIVALENCY	pg/L					3.78		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD	%	110						3272206

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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Maxxam Job #: B3A4675
Report Date: 2013/07/16

Apex Laboratories
Client Project #: A3F0664

DIOXINS AND FURANS BY HRMS (WATER)

Maxxam ID		SC3112						
Sampling Date		2013/06/26 16:10						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	RB-062513	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDD *	%	85						3272206
C13-1234678 HeptaCDF **	%	97						3272206
C13-123478 HexaCDD	%	76						3272206
C13-123478 HexaCDF	%	98						3272206
C13-1234789 HeptaCDF	%	88						3272206
C13-123678 HexaCDD	%	84						3272206
C13-123678 HexaCDF	%	92						3272206
C13-12378 PentaCDD	%	88						3272206
C13-12378 PentaCDF	%	98						3272206
C13-123789 HexaCDF	%	83						3272206
C13-234678 HexaCDF	%	95						3272206
C13-23478 PentaCDF	%	108						3272206
C13-2378 TetraCDD	%	74						3272206
C13-2378 TetraCDF	%	84						3272206
C13-OCDD	%	84						3272206

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

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Maxxam Job #: B3A4675
Report Date: 2013/07/16

Apex Laboratories
Client Project #: A3F0664

DIOXINS AND FURANS BY HRMS (WATER)

Maxxam ID		SC3113						
Sampling Date		2013/06/26 16:20						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	RB-062613	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/L	1.15 U	1.15	11.6	1.00	1.15		3272206
1,2,3,7,8-Penta CDD	pg/L	1.25 U	1.25	58.1	1.00	1.25		3272206
1,2,3,4,7,8-Hexa CDD	pg/L	1.12 U	1.12	58.1	0.100	0.112		3272206
1,2,3,6,7,8-Hexa CDD	pg/L	1.20 U	1.20	58.1	0.100	0.120		3272206
1,2,3,7,8,9-Hexa CDD	pg/L	1.12 U	1.12	58.1	0.100	0.112		3272206
1,2,3,4,6,7,8-Hepta CDD	pg/L	5.27 J	1.24	58.1	0.0100	0.0527		3272206
Octa CDD	pg/L	39.0 J	1.19	116	0.000300	0.0117		3272206
Total Tetra CDD	pg/L	1.15 U	1.15	11.6				3272206
Total Penta CDD	pg/L	1.25 U	1.25	58.1				3272206
Total Hexa CDD	pg/L	1.16 U	1.16	58.1				3272206
Total Hepta CDD	pg/L	9.00 J	1.24	58.1				3272206
2,3,7,8-Tetra CDF **	pg/L	1.20 U	1.20	11.6	0.100	0.120		3272206
1,2,3,7,8-Penta CDF	pg/L	1.23 U	1.23	58.1	0.0300	0.0369		3272206
2,3,4,7,8-Penta CDF	pg/L	1.19 U	1.19	58.1	0.300	0.357		3272206
1,2,3,4,7,8-Hexa CDF	pg/L	1.12 U	1.12	58.1	0.100	0.112		3272206
1,2,3,6,7,8-Hexa CDF	pg/L	1.16 U	1.16	58.1	0.100	0.116		3272206
2,3,4,6,7,8-Hexa CDF	pg/L	1.14 U	1.14	58.1	0.100	0.114		3272206
1,2,3,7,8,9-Hexa CDF	pg/L	1.19 U	1.19	58.1	0.100	0.119		3272206
1,2,3,4,6,7,8-Hepta CDF	pg/L	1.21 U	1.21	58.1	0.0100	0.0121		3272206
1,2,3,4,7,8,9-Hepta CDF	pg/L	1.22 U	1.22	58.1	0.0100	0.0122		3272206
Octa CDF	pg/L	1.99 U (1)	1.99	116	0.000300	0.000597		3272206
Total Tetra CDF	pg/L	1.20 U	1.20	11.6				3272206
Total Penta CDF	pg/L	1.21 U	1.21	58.1				3272206
Total Hexa CDF	pg/L	1.15 U	1.15	58.1				3272206
Total Hepta CDF	pg/L	1.21 U	1.21	58.1				3272206
TOTAL TOXIC EQUIVALENCY	pg/L					3.81		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD	%	91						3272206

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

Maxxam Job #: B3A4675
Report Date: 2013/07/16

Apex Laboratories
Client Project #: A3F0664

DIOXINS AND FURANS BY HRMS (WATER)

Maxxam ID		SC3113						
Sampling Date		2013/06/26 16:20						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	RB-062613	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDD *	%	85						3272206
C13-1234678 HeptaCDF **	%	99						3272206
C13-123478 HexaCDD	%	73						3272206
C13-123478 HexaCDF	%	95						3272206
C13-1234789 HeptaCDF	%	94						3272206
C13-123678 HexaCDD	%	86						3272206
C13-123678 HexaCDF	%	92						3272206
C13-12378 PentaCDD	%	81						3272206
C13-12378 PentaCDF	%	88						3272206
C13-123789 HexaCDF	%	81						3272206
C13-234678 HexaCDF	%	95						3272206
C13-23478 PentaCDF	%	97						3272206
C13-2378 TetraCDD	%	63						3272206
C13-2378 TetraCDF	%	65						3272206
C13-OCDD	%	88						3272206

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

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Maxxam Job #: B3A4675
Report Date: 2013/07/16

Apex Laboratories
Client Project #: A3F0664

Test Summary

Maxxam ID SC3111 **Collected** 2013/06/26
Sample ID RB-062413 **Shipped**
Matrix Water **Received** 2013/07/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Water (1613B)	HRMS/MS	3272206	2013/07/04	2013/07/15	Owen Cosby

Maxxam ID SC3112 **Collected** 2013/06/26
Sample ID RB-062513 **Shipped**
Matrix Water **Received** 2013/07/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Water (1613B)	HRMS/MS	3272206	2013/07/04	2013/07/15	Owen Cosby

Maxxam ID SC3113 **Collected** 2013/06/26
Sample ID RB-062613 **Shipped**
Matrix Water **Received** 2013/07/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Water (1613B)	HRMS/MS	3272206	2013/07/04	2013/07/15	Owen Cosby

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Maxxam Job #: B3A4675
Report Date: 2013/07/16

Apex Laboratories
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Package 1	6.9°C

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

GENERAL COMMENTS

Results relate only to the items tested.

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Apex Laboratories
Attention: Philip Nerenberg
Client Project #: A3F0664
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: GB3A4675

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3272206	OBC	Spiked Blank	37CL4 2378 Tetra CDD	2013/07/14		98	%	35 - 197
			C13-1234678 HeptaCDD	2013/07/14		91	%	23 - 140
			C13-1234678 HeptaCDF	2013/07/14		107	%	28 - 143
			C13-123478 HexaCDD	2013/07/14		84	%	32 - 141
			C13-123478 HexaCDF	2013/07/14		105	%	26 - 152
			C13-1234789 HeptaCDF	2013/07/14		97	%	28 - 143
			C13-123678 HexaCDD	2013/07/14		93	%	28 - 130
			C13-123678 HexaCDF	2013/07/14		102	%	26 - 123
			C13-12378 PentaCDD	2013/07/14		75	%	25 - 181
			C13-12378 PentaCDF	2013/07/14		80	%	24 - 185
			C13-123789 HexaCDF	2013/07/14		89	%	28 - 136
			C13-234678 HexaCDF	2013/07/14		104	%	29 - 147
			C13-23478 PentaCDF	2013/07/14		91	%	21 - 178
			C13-2378 TetraCDD	2013/07/14		73	%	24 - 164
			C13-2378 TetraCDF	2013/07/14		75	%	24 - 169
			C13-OCDD	2013/07/14		92	%	17 - 157
			2,3,7,8-Tetra CDD	2013/07/14		102	%	67 - 158
			1,2,3,7,8-Penta CDD	2013/07/14		110	%	70 - 142
			1,2,3,4,7,8-Hexa CDD	2013/07/14		116	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2013/07/14		116	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2013/07/14		108	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2013/07/14		111	%	70 - 140
			Octa CDD	2013/07/14		113	%	78 - 144
			2,3,7,8-Tetra CDF	2013/07/14		98	%	75 - 158
			1,2,3,7,8-Penta CDF	2013/07/14		113	%	80 - 134
			2,3,4,7,8-Penta CDF	2013/07/14		102	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2013/07/14		102	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2013/07/14		107	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2013/07/14		104	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2013/07/14		106	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2013/07/14		105	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2013/07/14		105	%	78 - 138
			Octa CDF	2013/07/14		110	%	63 - 170
		Method Blank	37CL4 2378 Tetra CDD	2013/07/15		86	%	35 - 197
			C13-1234678 HeptaCDD	2013/07/15		85	%	23 - 140
			C13-1234678 HeptaCDF	2013/07/15		74	%	28 - 143
			C13-123478 HexaCDD	2013/07/15		78	%	32 - 141
			C13-123478 HexaCDF	2013/07/15		74	%	26 - 152
			C13-1234789 HeptaCDF	2013/07/15		93	%	28 - 143
			C13-123678 HexaCDD	2013/07/15		87	%	28 - 130
			C13-123678 HexaCDF	2013/07/15		70	%	26 - 123
			C13-12378 PentaCDD	2013/07/15		78	%	25 - 181
			C13-12378 PentaCDF	2013/07/15		82	%	24 - 185
			C13-123789 HexaCDF	2013/07/15		84	%	28 - 136
			C13-234678 HexaCDF	2013/07/15		99	%	29 - 147
			C13-23478 PentaCDF	2013/07/15		99	%	21 - 178
			C13-2378 TetraCDD	2013/07/15		56	%	24 - 164
			C13-2378 TetraCDF	2013/07/15		66	%	24 - 169
			C13-OCDD	2013/07/15		82	%	17 - 157
			2,3,7,8-Tetra CDD	2013/07/15	1.33 U, EDL=1.33		pg/L	
			1,2,3,7,8-Penta CDD	2013/07/15	1.32 U, EDL=1.32		pg/L	
			1,2,3,4,7,8-Hexa CDD	2013/07/15	1.25 U, EDL=1.25		pg/L	
			1,2,3,6,7,8-Hexa CDD	2013/07/15	1.42 U, EDL=1.42 (1)		pg/L	
			1,2,3,7,8,9-Hexa CDD	2013/07/15	1.71 J, EDL=1.25		pg/L	
			1,2,3,4,6,7,8-Hepta CDD	2013/07/15	10.1 J, EDL=1.33		pg/L	

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Apex Laboratories
Attention: Philip Nerenberg
Client Project #: A3F0664
P.O. #:
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: GB3A4675

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3272206	OBC	Method Blank	Octa CDD	2013/07/15	56.8 J,	EDL=1.30	pg/L	
			Total Tetra CDD	2013/07/15	1.33 U,	EDL=1.33	pg/L	
			Total Penta CDD	2013/07/15	1.32 U,	EDL=1.32	pg/L	
			Total Hexa CDD	2013/07/15	1.71 J,	EDL=1.29	pg/L	
			Total Hepta CDD	2013/07/15	16.4 J,	EDL=1.33	pg/L	
			2,3,7,8-Tetra CDF	2013/07/15	1.30 U,	EDL=1.30	pg/L	
			1,2,3,7,8-Penta CDF	2013/07/15	1.39 U,	EDL=1.39	pg/L	
			2,3,4,7,8-Penta CDF	2013/07/15	1.34 U,	EDL=1.34	pg/L	
			1,2,3,4,7,8-Hexa CDF	2013/07/15	1.63 U,	EDL=1.63	pg/L	
			1,2,3,6,7,8-Hexa CDF	2013/07/15	1.69 U,	EDL=1.69	pg/L	
			2,3,4,6,7,8-Hexa CDF	2013/07/15	1.67 U,	EDL=1.67	pg/L	
			1,2,3,7,8,9-Hexa CDF	2013/07/15	1.74 U,	EDL=1.74	pg/L	
			1,2,3,4,6,7,8-Hepta CDF	2013/07/15	3.06 U,	EDL=3.06 (1)	pg/L	
			1,2,3,4,7,8,9-Hepta CDF	2013/07/15	3.19 J,	EDL=1.36	pg/L	
			Octa CDF	2013/07/15	13.4 J,	EDL=1.30	pg/L	
			Total Tetra CDF	2013/07/15	1.30 U,	EDL=1.30	pg/L	
			Total Penta CDF	2013/07/15	1.37 U,	EDL=1.37	pg/L	
			Total Hexa CDF	2013/07/15	1.68 U,	EDL=1.68	pg/L	
			Total Hepta CDF	2013/07/15	3.19 J,	EDL=1.35	pg/L	

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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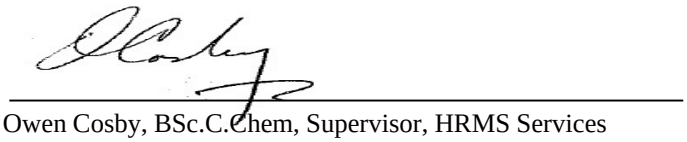
Validation Signature Page

Maxxam Job #: B3A4675

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



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

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

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Maxxam

Success Through Science®

Your Project #: A3F0670
Your C.O.C. #: na

Attention: Philip Nerenberg
Apex Laboratories
12232 SW Garden Place
Tigard, OR
USA 97223

Report Date: 2013/07/17

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B3A4694
Received: 2013/07/02, 12:48

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Dioxins/Furans in Soil (1613B) (1)	3	2013/07/09	2013/07/14	BRL SOP-00410	EPA 1613B mod.
2378TCDF Confirmation in Soil	1	N/A	2013/07/15	BRL SOP-00406	EPA 8290A mod.
Moisture	3	N/A	2013/07/03	CAM SOP-00445	R.Carter,1993

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

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

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ivana Vukovic, Env Project Manager
Email: IVukovic@maxxam.ca
Phone# (905) 817-5700

==========

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

Total cover pages: 1

Maxxam Job #: B3A4694
Report Date: 2013/07/17

Apex Laboratories
Client Project #: A3F0670

RESULTS OF ANALYSES OF SOIL

Maxxam ID		SC3184	SC3185	SC3186		
Sampling Date		2013/06/26 11:50	2013/06/26 11:50	2013/06/26 11:50		
COC Number		na	na	na		
	Units	**CL-16-1.5**	**CL-17-1.5**	**CL-17-1.5-DUP**	**RDL**	**QC Batch**
Moisture	%	39	33	33	1.0	3266651

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B3A4694
Report Date: 2013/07/17

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		SC3184						
Sampling Date		2013/06/26 11:50						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	CL-16-1.5	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	1.74	0.103	0.989	1.00	1.74		3277521
1,2,3,7,8-Penta CDD	pg/g	23.1	0.101	4.94	1.00	23.1		3277521
1,2,3,4,7,8-Hexa CDD	pg/g	77.3	0.0978	4.94	0.100	7.73		3277521
1,2,3,6,7,8-Hexa CDD	pg/g	600	0.105	4.94	0.100	60.0		3277521
1,2,3,7,8,9-Hexa CDD	pg/g	204	0.0978	4.94	0.100	20.4		3277521
1,2,3,4,6,7,8-Hepta CDD	pg/g	10800 (1)	2.07	49.4	0.0100	108		3277521
Octa CDD	pg/g	78200 (1)	3.82	98.9	0.000300	23.5		3277521
Total Tetra CDD	pg/g	27.3	0.103	0.989				3277521
Total Penta CDD	pg/g	223	0.101	4.94				3277521
Total Hexa CDD	pg/g	2710	0.101	4.94				3277521
Total Hepta CDD	pg/g	20000 (1)	2.07	49.4				3277521
2,3,7,8-Tetra CDF **	pg/g	23.5	0.108	0.989	0.100	2.35		3277521
1,2,3,7,8-Penta CDF	pg/g	46.1	0.108	4.94	0.0300	1.38		3277521
2,3,4,7,8-Penta CDF	pg/g	56.3	0.104	4.94	0.300	16.9		3277521
1,2,3,4,7,8-Hexa CDF	pg/g	256	0.0963	4.94	0.100	25.6		3277521
1,2,3,6,7,8-Hexa CDF	pg/g	97.7	0.100	4.94	0.100	9.77		3277521
2,3,4,6,7,8-Hexa CDF	pg/g	56.0	0.0988	4.94	0.100	5.60		3277521
1,2,3,7,8,9-Hexa CDF	pg/g	5.33	0.103	4.94	0.100	0.533		3277521
1,2,3,4,6,7,8-Hepta CDF	pg/g	1180	0.100	4.94	0.0100	11.8		3277521
1,2,3,4,7,8,9-Hepta CDF	pg/g	69.6	0.101	4.94	0.0100	0.696		3277521
Octa CDF	pg/g	1540	0.208	9.89	0.000300	0.462		3277521
Total Tetra CDF	pg/g	89.4	0.108	0.989				3277521
Total Penta CDF	pg/g	501	0.106	4.94				3277521
Total Hexa CDF	pg/g	2900	0.0994	4.94				3277521
Total Hepta CDF	pg/g	3490	0.101	4.94				3277521
Confirmation 2,3,7,8-Tetra CDF	pg/g	14.7	0.10	0.99	0.100	1.47		3280098
TOTAL TOXIC EQUIVALENCY	pg/g					319		

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) From 20x dilution.

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Maxxam Job #: B3A4694
Report Date: 2013/07/17

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		SC3184						
Sampling Date		2013/06/26 11:50						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	CL-16-1.5	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD *	%	117						3277521
C13-1234678 HeptaCDD	%	106 (1)						3277521
C13-1234678 HeptaCDF **	%	103						3277521
C13-123478 HexaCDD	%	75						3277521
C13-123478 HexaCDF	%	98						3277521
C13-1234789 HeptaCDF	%	93						3277521
C13-123678 HexaCDD	%	86						3277521
C13-123678 HexaCDF	%	90						3277521
C13-12378 PentaCDD	%	89						3277521
C13-12378 PentaCDF	%	101						3277521
C13-123789 HexaCDF	%	84						3277521
C13-234678 HexaCDF	%	94						3277521
C13-23478 PentaCDF	%	113						3277521
C13-2378 TetraCDD	%	81						3277521
C13-2378 TetraCDF	%	90						3277521
C13-OCDD	%	118 (1)						3277521
Confirmation C13-2378 TetraCDF	%	106						3280098

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
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(1) From 20x dilution.

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Maxxam Job #: B3A4694
Report Date: 2013/07/17

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		SC3185						
Sampling Date		2013/06/26 11:50						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	CL-17-1.5	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	0.173 U (1)	0.173	0.987	1.00	0.173		3277521
1,2,3,7,8-Penta CDD	pg/g	1.43 J	0.103	4.93	1.00	1.43		3277521
1,2,3,4,7,8-Hexa CDD	pg/g	4.80 J	0.0985	4.93	0.100	0.480		3277521
1,2,3,6,7,8-Hexa CDD	pg/g	39.5	0.106	4.93	0.100	3.95		3277521
1,2,3,7,8,9-Hexa CDD	pg/g	13.3	0.0985	4.93	0.100	1.33		3277521
1,2,3,4,6,7,8-Hepta CDD	pg/g	840	0.103	4.93	0.0100	8.40		3277521
Octa CDD	pg/g	7560 (2)	4.09	98.7	0.000300	2.27		3277521
Total Tetra CDD	pg/g	0.917 J	0.102	0.987				3277521
Total Penta CDD	pg/g	10.6	0.103	4.93				3277521
Total Hexa CDD	pg/g	173	0.102	4.93				3277521
Total Hepta CDD	pg/g	1520	0.103	4.93				3277521
2,3,7,8-Tetra CDF **	pg/g	0.981 J	0.102	0.987	0.100	0.0981		3277521
1,2,3,7,8-Penta CDF	pg/g	2.25 J	0.104	4.93	0.0300	0.0675		3277521
2,3,4,7,8-Penta CDF	pg/g	2.72 J	0.100	4.93	0.300	0.816		3277521
1,2,3,4,7,8-Hexa CDF	pg/g	12.8	0.0965	4.93	0.100	1.28		3277521
1,2,3,6,7,8-Hexa CDF	pg/g	5.04	0.100	4.93	0.100	0.504		3277521
2,3,4,6,7,8-Hexa CDF	pg/g	3.40 J	0.0990	4.93	0.100	0.340		3277521
1,2,3,7,8,9-Hexa CDF	pg/g	0.406 J	0.103	4.93	0.100	0.0406		3277521
1,2,3,4,6,7,8-Hepta CDF	pg/g	74.7	0.102	4.93	0.0100	0.747		3277521
1,2,3,4,7,8,9-Hepta CDF	pg/g	3.90 J	0.102	4.93	0.0100	0.0390		3277521
Octa CDF	pg/g	78.3	0.205	9.87	0.000300	0.0235		3277521
Total Tetra CDF	pg/g	3.26	0.102	0.987				3277521
Total Penta CDF	pg/g	20.7	0.102	4.93				3277521
Total Hexa CDF	pg/g	151	0.0995	4.93				3277521
Total Hepta CDF	pg/g	218	0.102	4.93				3277521
TOTAL TOXIC EQUIVALENCY	pg/g					22.0		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD	%	82						3277521

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
(2) From 20x dilution.

Maxxam Job #: B3A4694
Report Date: 2013/07/17

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		SC3185						
Sampling Date		2013/06/26 11:50						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	CL-17-1.5	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDD *	%	94						3277521
C13-1234678 HeptaCDF **	%	103						3277521
C13-123478 HexaCDD	%	81						3277521
C13-123478 HexaCDF	%	99						3277521
C13-1234789 HeptaCDF	%	93						3277521
C13-123678 HexaCDD	%	89						3277521
C13-123678 HexaCDF	%	92						3277521
C13-12378 PentaCDD	%	79						3277521
C13-12378 PentaCDF	%	80						3277521
C13-123789 HexaCDF	%	85						3277521
C13-234678 HexaCDF	%	98						3277521
C13-23478 PentaCDF	%	93						3277521
C13-2378 TetraCDD	%	55						3277521
C13-2378 TetraCDF	%	60						3277521
C13-OCDD	%	81 (1)						3277521

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) From 20x dilution.

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Maxxam Job #: B3A4694
Report Date: 2013/07/17

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		SC3186						
Sampling Date		2013/06/26 11:50						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	CL-17-1.5-DUP	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	0.102 U	0.102	0.986	1.00	0.102		3277521
1,2,3,7,8-Penta CDD	pg/g	1.32 J	0.103	4.93	1.00	1.32		3277521
1,2,3,4,7,8-Hexa CDD	pg/g	4.18 J	0.0976	4.93	0.100	0.418		3277521
1,2,3,6,7,8-Hexa CDD	pg/g	34.1	0.105	4.93	0.100	3.41		3277521
1,2,3,7,8,9-Hexa CDD	pg/g	12.9	0.0976	4.93	0.100	1.29		3277521
1,2,3,4,6,7,8-Hepta CDD	pg/g	741	0.106	4.93	0.0100	7.41		3277521
Octa CDD	pg/g	6480 (1)	4.08	98.6	0.000300	1.94		3277521
Total Tetra CDD	pg/g	0.936 J	0.102	0.986				3277521
Total Penta CDD	pg/g	7.15	0.103	4.93				3277521
Total Hexa CDD	pg/g	151	0.101	4.93				3277521
Total Hepta CDD	pg/g	1370	0.106	4.93				3277521
2,3,7,8-Tetra CDF **	pg/g	0.873 J	0.102	0.986	0.100	0.0873		3277521
1,2,3,7,8-Penta CDF	pg/g	1.94 J	0.105	4.93	0.0300	0.0582		3277521
2,3,4,7,8-Penta CDF	pg/g	2.17 J	0.101	4.93	0.300	0.651		3277521
1,2,3,4,7,8-Hexa CDF	pg/g	10.2	0.0998	4.93	0.100	1.02		3277521
1,2,3,6,7,8-Hexa CDF	pg/g	4.34 J	0.104	4.93	0.100	0.434		3277521
2,3,4,6,7,8-Hexa CDF	pg/g	2.63 J	0.102	4.93	0.100	0.263		3277521
1,2,3,7,8,9-Hexa CDF	pg/g	0.337 J	0.106	4.93	0.100	0.0337		3277521
1,2,3,4,6,7,8-Hepta CDF	pg/g	66.2	0.100	4.93	0.0100	0.662		3277521
1,2,3,4,7,8,9-Hepta CDF	pg/g	3.14 J	0.101	4.93	0.0100	0.0314		3277521
Octa CDF	pg/g	73.2	0.201	9.86	0.000300	0.0220		3277521
Total Tetra CDF	pg/g	2.38	0.102	0.986				3277521
Total Penta CDF	pg/g	12.8	0.103	4.93				3277521
Total Hexa CDF	pg/g	100	0.103	4.93				3277521
Total Hepta CDF	pg/g	207	0.100	4.93				3277521
TOTAL TOXIC EQUIVALENCY	pg/g					19.2		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD	%	81						3277521

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) From 20x dilution.

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Maxxam Job #: B3A4694
Report Date: 2013/07/17

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		SC3186						
Sampling Date		2013/06/26 11:50						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	CL-17-1.5-DUP	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDD *	%	89						3277521
C13-1234678 HeptaCDF **	%	64						3277521
C13-123478 HexaCDD	%	74						3277521
C13-123478 HexaCDF	%	64						3277521
C13-1234789 HeptaCDF	%	93						3277521
C13-123678 HexaCDD	%	81						3277521
C13-123678 HexaCDF	%	58						3277521
C13-12378 PentaCDD	%	78						3277521
C13-12378 PentaCDF	%	80						3277521
C13-123789 HexaCDF	%	81						3277521
C13-234678 HexaCDF	%	92						3277521
C13-23478 PentaCDF	%	94						3277521
C13-2378 TetraCDD	%	59						3277521
C13-2378 TetraCDF	%	65						3277521
C13-OCDD	%	75 (1)						3277521

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) From 20x dilution.

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Maxxam Job #: B3A4694
Report Date: 2013/07/17

Apex Laboratories
Client Project #: A3F0670

Test Summary

Maxxam ID SC3184 **Collected** 2013/06/26
Sample ID CL-16-1.5 **Shipped**
Matrix Soil **Received** 2013/07/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3277521	2013/07/09	2013/07/14	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3280098	N/A	2013/07/15	Vica Cioranic
Moisture	BAL	3266651	N/A	2013/07/03	Min Yang

Maxxam ID SC3185 **Collected** 2013/06/26
Sample ID CL-17-1.5 **Shipped**
Matrix Soil **Received** 2013/07/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3277521	2013/07/09	2013/07/14	Owen Cosby
Moisture	BAL	3266651	N/A	2013/07/03	Min Yang

Maxxam ID SC3186 **Collected** 2013/06/26
Sample ID CL-17-1.5-DUP **Shipped**
Matrix Soil **Received** 2013/07/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3277521	2013/07/09	2013/07/14	Owen Cosby
Moisture	BAL	3266651	N/A	2013/07/03	Min Yang

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Maxxam Job #: B3A4694
Report Date: 2013/07/17

Apex Laboratories
Client Project #: A3F0670

Package 1	6.9°C

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

GENERAL COMMENTS

Results relate only to the items tested.

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Apex Laboratories
Attention: Philip Nerenberg
Client Project #: A3F0670
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: GB3A4694

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3266651	JV1	RPD - Sample/Sample Dup	Moisture	2013/07/03	NC		%	20
3277521	OBC	Spiked Blank	37CL4 2378 Tetra CDD	2013/07/13		59	%	35 - 197
			C13-1234678 HeptaCDD	2013/07/13		86	%	23 - 140
			C13-1234678 HeptaCDF	2013/07/13		95	%	28 - 143
			C13-123478 HexaCDD	2013/07/13		78	%	32 - 141
			C13-123478 HexaCDF	2013/07/13		95	%	26 - 152
			C13-1234789 HeptaCDF	2013/07/13		88	%	26 - 138
			C13-123678 HexaCDD	2013/07/13		87	%	28 - 130
			C13-123678 HexaCDF	2013/07/13		95	%	26 - 123
			C13-12378 PentaCDD	2013/07/13		77	%	25 - 181
			C13-12378 PentaCDF	2013/07/13		78	%	24 - 185
			C13-123789 HexaCDF	2013/07/13		83	%	29 - 147
			C13-234678 HexaCDF	2013/07/13		98	%	28 - 136
			C13-23478 PentaCDF	2013/07/13		94	%	21 - 178
			C13-2378 TetraCDD	2013/07/13		57	%	25 - 164
			C13-2378 TetraCDF	2013/07/13		60	%	24 - 169
			C13-OCDD	2013/07/13		88	%	17 - 157
			2,3,7,8-Tetra CDD	2013/07/13		108	%	67 - 158
			1,2,3,7,8-Penta CDD	2013/07/13		111	%	70 - 142
			1,2,3,4,7,8-Hexa CDD	2013/07/13		124	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2013/07/13		120	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2013/07/13		119	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2013/07/13		113	%	70 - 140
			Octa CDD	2013/07/13		112	%	78 - 144
			2,3,7,8-Tetra CDF	2013/07/13		114	%	75 - 158
			1,2,3,7,8-Penta CDF	2013/07/13		116	%	80 - 134
			2,3,4,7,8-Penta CDF	2013/07/13		109	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2013/07/13		105	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2013/07/13		114	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2013/07/13		108	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2013/07/13		114	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2013/07/13		111	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2013/07/13		112	%	78 - 138
			Octa CDF	2013/07/13		110	%	63 - 170
		Method Blank	37CL4 2378 Tetra CDD	2013/07/13		90	%	35 - 197
			C13-1234678 HeptaCDD	2013/07/13		75	%	23 - 140
			C13-1234678 HeptaCDF	2013/07/13		76	%	28 - 143
			C13-123478 HexaCDD	2013/07/13		73	%	32 - 141
			C13-123478 HexaCDF	2013/07/13		82	%	26 - 152
			C13-1234789 HeptaCDF	2013/07/13		82	%	26 - 138
			C13-123678 HexaCDD	2013/07/13		82	%	28 - 130
			C13-123678 HexaCDF	2013/07/13		80	%	26 - 123
			C13-12378 PentaCDD	2013/07/13		68	%	25 - 181
			C13-12378 PentaCDF	2013/07/13		72	%	24 - 185
			C13-123789 HexaCDF	2013/07/13		76	%	29 - 147
			C13-234678 HexaCDF	2013/07/13		90	%	28 - 136
			C13-23478 PentaCDF	2013/07/13		87	%	21 - 178
			C13-2378 TetraCDD	2013/07/13		60	%	25 - 164
			C13-2378 TetraCDF	2013/07/13		59	%	24 - 169
			C13-OCDD	2013/07/13		72	%	17 - 157
			2,3,7,8-Tetra CDD	2013/07/13	0.104 U, EDL=0.104		pg/g	
			1,2,3,7,8-Penta CDD	2013/07/13	0.104 U, EDL=0.104		pg/g	
			1,2,3,4,7,8-Hexa CDD	2013/07/13	0.103 U, EDL=0.103		pg/g	

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Apex Laboratories
Attention: Philip Nerenberg
Client Project #: A3F0670
P.O. #:
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: GB3A4694

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3277521	OBC	Method Blank	1,2,3,6,7,8-Hexa CDD	2013/07/13	0.111 U,	EDL=0.111	pg/g	
			1,2,3,7,8,9-Hexa CDD	2013/07/13	0.103 U,	EDL=0.103	pg/g	
			1,2,3,4,6,7,8-Hepta CDD	2013/07/13	0.535 J,	EDL=0.106	pg/g	
			Octa CDD	2013/07/13	2.06 J,	EDL=0.206	pg/g	
			Total Tetra CDD	2013/07/13	0.104 U,	EDL=0.104	pg/g	
			Total Penta CDD	2013/07/13	0.104 U,	EDL=0.104	pg/g	
			Total Hexa CDD	2013/07/13	0.107 U,	EDL=0.107	pg/g	
			Total Hepta CDD	2013/07/13	0.790 J,	EDL=0.106	pg/g	
			2,3,7,8-Tetra CDF	2013/07/13	0.105 U,	EDL=0.105	pg/g	
			1,2,3,7,8-Penta CDF	2013/07/13	0.103 U,	EDL=0.103	pg/g	
			2,3,4,7,8-Penta CDF	2013/07/13	0.0998 U,	EDL=0.0998	pg/g	
			1,2,3,4,7,8-Hexa CDF	2013/07/13	0.0978 U,	EDL=0.0978	pg/g	
			1,2,3,6,7,8-Hexa CDF	2013/07/13	0.102 U,	EDL=0.102	pg/g	
			2,3,4,6,7,8-Hexa CDF	2013/07/13	0.100 U,	EDL=0.100	pg/g	
			1,2,3,7,8,9-Hexa CDF	2013/07/13	0.104 U,	EDL=0.104	pg/g	
			1,2,3,4,6,7,8-Hepta CDF	2013/07/13	0.139 U,	EDL=0.139 (1)	pg/g	
			1,2,3,4,7,8,9-Hepta CDF	2013/07/13	0.245 J,	EDL=0.107	pg/g	
			Octa CDF	2013/07/13	0.950 J,	EDL=0.203	pg/g	
			Total Tetra CDF	2013/07/13	0.105 U,	EDL=0.105	pg/g	
			Total Penta CDF	2013/07/13	0.102 U,	EDL=0.102	pg/g	
			Total Hexa CDF	2013/07/13	0.101 U,	EDL=0.101	pg/g	
			Total Hepta CDF	2013/07/13	0.245 J,	EDL=0.107	pg/g	
3280098	VCI	Method Blank	Confirmation C13-2378 TetraCDF	2013/07/15		75	%	40 - 135
			Confirmation 2,3,7,8-Tetra CDF	2013/07/15	0.11 U,	EDL=0.11	pg/g	
		RPD - Sample/Sample Dup	Confirmation 2,3,7,8-Tetra CDF	2013/07/15	NC		%	100

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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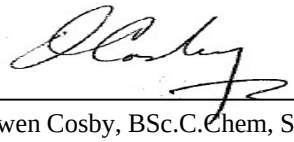
Validation Signature Page

Maxxam Job #: B3A4694

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

Cristina Carriere, Scientific Services



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

==========

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

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Success Through Science®

Your Project #: A3F0672
Your C.O.C. #: na

Attention: Philip Nerenberg
Apex Laboratories
12232 SW Garden Place
Tigard, OR
USA 97223

Report Date: 2013/07/16

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B3A4701
Received: 2013/07/02, 12:48

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Dioxins/Furans in Soil (1613B) (1)	1	2013/07/09	2013/07/14	BRL SOP-00410	EPA 1613B mod.
Moisture	1	N/A	2013/07/03	CAM SOP-00445	R.Carter,1993

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

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

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ivana Vukovic, Env Project Manager
Email: IVukovic@maxxam.ca
Phone# (905) 817-5700

==========

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

Total cover pages: 1

Maxxam Job #: B3A4701
Report Date: 2013/07/16

Apex Laboratories
Client Project #: A3F0672

RESULTS OF ANALYSES OF SOIL

Maxxam ID		SC3196		
Sampling Date		2013/06/27 10:00		
COC Number		na		
	Units	**PS-SRM-062713**	**RDL**	**QC Batch**
Moisture	%	1.7	1.0	3266651

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B3A4701
Report Date: 2013/07/16

Apex Laboratories
Client Project #: A3F0672

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		SC3196						
Sampling Date		2013/06/27 10:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	**PS-SRM-062713**	**EDL**	**RDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
2,3,7,8-Tetra CDD *	pg/g	0.871 J	0.199	1.95	1.00	0.871		3277521
1,2,3,7,8-Penta CDD	pg/g	0.730 J	0.212	9.75	1.00	0.730		3277521
1,2,3,4,7,8-Hexa CDD	pg/g	1.35 J	0.201	9.75	0.100	0.135		3277521
1,2,3,6,7,8-Hexa CDD	pg/g	5.13 J	0.216	9.75	0.100	0.513		3277521
1,2,3,7,8,9-Hexa CDD	pg/g	3.55 J	0.201	9.75	0.100	0.355		3277521
1,2,3,4,6,7,8-Hepta CDD	pg/g	146	0.209	9.75	0.0100	1.46		3277521
Octa CDD	pg/g	1400	0.400	19.5	0.000300	0.420		3277521
Total Tetra CDD	pg/g	2.32	0.199	1.95				3277521
Total Penta CDD	pg/g	2.29 J	0.212	9.75				3277521
Total Hexa CDD	pg/g	34.4	0.208	9.75				3277521
Total Hepta CDD	pg/g	316	0.209	9.75				3277521
2,3,7,8-Tetra CDF **	pg/g	1.39 J	0.196	1.95	0.100	0.139		3277521
1,2,3,7,8-Penta CDF	pg/g	0.875 J	0.215	9.75	0.0300	0.0263		3277521
2,3,4,7,8-Penta CDF	pg/g	0.644 J	0.207	9.75	0.300	0.193		3277521
1,2,3,4,7,8-Hexa CDF	pg/g	2.67 J	0.203	9.75	0.100	0.267		3277521
1,2,3,6,7,8-Hexa CDF	pg/g	0.865 J	0.210	9.75	0.100	0.0865		3277521
2,3,4,6,7,8-Hexa CDF	pg/g	1.13 J	0.208	9.75	0.100	0.113		3277521
1,2,3,7,8,9-Hexa CDF	pg/g	0.216 U	0.216	9.75	0.100	0.0216		3277521
1,2,3,4,6,7,8-Hepta CDF	pg/g	16.7	0.203	9.75	0.0100	0.167		3277521
1,2,3,4,7,8,9-Hepta CDF	pg/g	1.30 J	0.204	9.75	0.0100	0.0130		3277521
Octa CDF	pg/g	46.6	0.394	19.5	0.000300	0.0140		3277521
Total Tetra CDF	pg/g	7.10	0.196	1.95				3277521
Total Penta CDF	pg/g	6.04 J	0.211	9.75				3277521
Total Hexa CDF	pg/g	24.4	0.209	9.75				3277521
Total Hepta CDF	pg/g	56.9	0.204	9.75				3277521
TOTAL TOXIC EQUIVALENCY	pg/g					5.52		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD	%	117						3277521

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

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Maxxam Job #: B3A4701
Report Date: 2013/07/16

Apex Laboratories
Client Project #: A3F0672

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		SC3196						
Sampling Date		2013/06/27 10:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	**PS-SRM-062713**	**EDL**	**RDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
C13-1234678 HeptaCDD *	%	90						3277521
C13-1234678 HeptaCDF **	%	98						3277521
C13-123478 HexaCDD	%	79						3277521
C13-123478 HexaCDF	%	96						3277521
C13-1234789 HeptaCDF	%	91						3277521
C13-123678 HexaCDD	%	85						3277521
C13-123678 HexaCDF	%	94						3277521
C13-12378 PentaCDD	%	79						3277521
C13-12378 PentaCDF	%	84						3277521
C13-123789 HexaCDF	%	82						3277521
C13-234678 HexaCDF	%	95						3277521
C13-23478 PentaCDF	%	95						3277521
C13-2378 TetraCDD	%	76						3277521
C13-2378 TetraCDF	%	72						3277521
C13-OCDD	%	92						3277521

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

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Maxxam Job #: B3A4701
Report Date: 2013/07/16

Apex Laboratories
Client Project #: A3F0672

Test Summary

Maxxam ID SC3196
Sample ID PS-SRM-062713
Matrix Soil

Collected 2013/06/27
Shipped
Received 2013/07/02

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3277521	2013/07/09	2013/07/14	Owen Cosby
Moisture	BAL	3266651	N/A	2013/07/03	Min Yang

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

Maxxam Job #: B3A4701
Report Date: 2013/07/16

Apex Laboratories
Client Project #: A3F0672

Package 1	6.9°C

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

GENERAL COMMENTS

Results relate only to the items tested.

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

Apex Laboratories
Attention: Philip Nerenberg
Client Project #: A3F0672
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: GB3A4701

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3266651	JV1	RPD - Sample/Sample Dup	Moisture	2013/07/03	NC		%	20
3277521	OBC	Spiked Blank	37CL4 2378 Tetra CDD	2013/07/13		59	%	35 - 197
			C13-1234678 HeptaCDD	2013/07/13		86	%	23 - 140
			C13-1234678 HeptaCDF	2013/07/13		95	%	28 - 143
			C13-123478 HexaCDD	2013/07/13		78	%	32 - 141
			C13-123478 HexaCDF	2013/07/13		95	%	26 - 152
			C13-1234789 HeptaCDF	2013/07/13		88	%	26 - 138
			C13-123678 HexaCDD	2013/07/13		87	%	28 - 130
			C13-123678 HexaCDF	2013/07/13		95	%	26 - 123
			C13-12378 PentaCDD	2013/07/13		77	%	25 - 181
			C13-12378 PentaCDF	2013/07/13		78	%	24 - 185
			C13-123789 HexaCDF	2013/07/13		83	%	29 - 147
			C13-234678 HexaCDF	2013/07/13		98	%	28 - 136
			C13-23478 PentaCDF	2013/07/13		94	%	21 - 178
			C13-2378 TetraCDD	2013/07/13		57	%	25 - 164
			C13-2378 TetraCDF	2013/07/13		60	%	24 - 169
			C13-OCDD	2013/07/13		88	%	17 - 157
			2,3,7,8-Tetra CDD	2013/07/13		108	%	67 - 158
			1,2,3,7,8-Penta CDD	2013/07/13		111	%	70 - 142
			1,2,3,4,7,8-Hexa CDD	2013/07/13		124	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2013/07/13		120	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2013/07/13		119	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2013/07/13		113	%	70 - 140
			Octa CDD	2013/07/13		112	%	78 - 144
			2,3,7,8-Tetra CDF	2013/07/13		114	%	75 - 158
			1,2,3,7,8-Penta CDF	2013/07/13		116	%	80 - 134
			2,3,4,7,8-Penta CDF	2013/07/13		109	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2013/07/13		105	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2013/07/13		114	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2013/07/13		108	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2013/07/13		114	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2013/07/13		111	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2013/07/13		112	%	78 - 138
			Octa CDF	2013/07/13		110	%	63 - 170
		Method Blank	37CL4 2378 Tetra CDD	2013/07/13		90	%	35 - 197
			C13-1234678 HeptaCDD	2013/07/13		75	%	23 - 140
			C13-1234678 HeptaCDF	2013/07/13		76	%	28 - 143
			C13-123478 HexaCDD	2013/07/13		73	%	32 - 141
			C13-123478 HexaCDF	2013/07/13		82	%	26 - 152
			C13-1234789 HeptaCDF	2013/07/13		82	%	26 - 138
			C13-123678 HexaCDD	2013/07/13		82	%	28 - 130
			C13-123678 HexaCDF	2013/07/13		80	%	26 - 123
			C13-12378 PentaCDD	2013/07/13		68	%	25 - 181
			C13-12378 PentaCDF	2013/07/13		72	%	24 - 185
			C13-123789 HexaCDF	2013/07/13		76	%	29 - 147
			C13-234678 HexaCDF	2013/07/13		90	%	28 - 136
			C13-23478 PentaCDF	2013/07/13		87	%	21 - 178
			C13-2378 TetraCDD	2013/07/13		60	%	25 - 164
			C13-2378 TetraCDF	2013/07/13		59	%	24 - 169
			C13-OCDD	2013/07/13		72	%	17 - 157
			2,3,7,8-Tetra CDD	2013/07/13	0.104 U, EDL=0.104		pg/g	
			1,2,3,7,8-Penta CDD	2013/07/13	0.104 U, EDL=0.104		pg/g	
			1,2,3,4,7,8-Hexa CDD	2013/07/13	0.103 U, EDL=0.103		pg/g	

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Apex Laboratories
Attention: Philip Nerenberg
Client Project #: A3F0672
P.O. #:
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: GB3A4701

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3277521	OBC	Method Blank	1,2,3,6,7,8-Hexa CDD	2013/07/13	0.111 U,	EDL=0.111	pg/g	
			1,2,3,7,8,9-Hexa CDD	2013/07/13	0.103 U,	EDL=0.103	pg/g	
			1,2,3,4,6,7,8-Hepta CDD	2013/07/13	0.535 J,	EDL=0.106	pg/g	
			Octa CDD	2013/07/13	2.06 J,	EDL=0.206	pg/g	
			Total Tetra CDD	2013/07/13	0.104 U,	EDL=0.104	pg/g	
			Total Penta CDD	2013/07/13	0.104 U,	EDL=0.104	pg/g	
			Total Hexa CDD	2013/07/13	0.107 U,	EDL=0.107	pg/g	
			Total Hepta CDD	2013/07/13	0.790 J,	EDL=0.106	pg/g	
			2,3,7,8-Tetra CDF	2013/07/13	0.105 U,	EDL=0.105	pg/g	
			1,2,3,7,8-Penta CDF	2013/07/13	0.103 U,	EDL=0.103	pg/g	
			2,3,4,7,8-Penta CDF	2013/07/13	0.0998 U,	EDL=0.0998	pg/g	
			1,2,3,4,7,8-Hexa CDF	2013/07/13	0.0978 U,	EDL=0.0978	pg/g	
			1,2,3,6,7,8-Hexa CDF	2013/07/13	0.102 U,	EDL=0.102	pg/g	
			2,3,4,6,7,8-Hexa CDF	2013/07/13	0.100 U,	EDL=0.100	pg/g	
			1,2,3,7,8,9-Hexa CDF	2013/07/13	0.104 U,	EDL=0.104	pg/g	
			1,2,3,4,6,7,8-Hepta CDF	2013/07/13	0.139 U,	EDL=0.139 (1)	pg/g	
			1,2,3,4,7,8,9-Hepta CDF	2013/07/13	0.245 J,	EDL=0.107	pg/g	
			Octa CDF	2013/07/13	0.950 J,	EDL=0.203	pg/g	
			Total Tetra CDF	2013/07/13	0.105 U,	EDL=0.105	pg/g	
			Total Penta CDF	2013/07/13	0.102 U,	EDL=0.102	pg/g	
			Total Hexa CDF	2013/07/13	0.101 U,	EDL=0.101	pg/g	
			Total Hepta CDF	2013/07/13	0.245 J,	EDL=0.107	pg/g	

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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Validation Signature Page

Maxxam Job #: B3A4701

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

Cristina Carriere, Scientific Services

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

==========

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

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Maxxam

Success Through Science®

Your Project #: A3F0629
Your C.O.C. #: na, NA

Attention: Philip Nerenberg
Apex Laboratories
12232 SW Garden Place
Tigard, OR
USA 97223

Report Date: 2013/07/22
This report supersedes all previous reports with the same Maxxam job number

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B3A5623
Received: 2013/07/03, 14:22

Sample Matrix: SEDIMENT
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Dioxins/Furans in Soil (1613B) (1)	3	2013/07/06	2013/07/12	BRL SOP-00410	EPA 1613B mod.
Dioxins/Furans in Soil (1613B) (1)	3	2013/07/06	2013/07/15	BRL SOP-00410	EPA 1613B mod.
Dioxins/Furans in Soil (1613B) (1)	1	2013/07/06	2013/07/16	BRL SOP-00410	EPA 1613B mod.
2378TCDF Confirmation in Soil	3	N/A	2013/07/15	BRL SOP-00406	EPA 8290A mod.
2378TCDF Confirmation in Soil	4	N/A	2013/07/16	BRL SOP-00406	EPA 8290A mod.
Moisture	6	N/A	2013/07/04	CAM SOP-00445	R.Carter,1993
Moisture	1	N/A	2013/07/19	CAM SOP-00445	R.Carter,1993

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

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

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ivana Vukovic, Env Project Manager
Email: IVukovic@maxxam.ca
Phone# (905) 817-5700

==========

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

Your Project #: A3F0629
Your C.O.C. #: na, NA

Attention: Philip Nerenberg
Apex Laboratories
12232 SW Garden Place
Tigard, OR
USA 97223

Report Date: 2013/07/22
This report supersedes all previous reports with the same Maxxam job number

CERTIFICATE OF ANALYSIS

-2-

Total cover pages: 2

Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

RESULTS OF ANALYSES OF SEDIMENT

Maxxam ID		SC7084	SC7085	SC7086	SC7172		
Sampling Date		2013/07/01 18:00	2013/07/01 18:00	2013/07/01 18:00	2013/07/01 18:00		
COC Number		na	na	na	na		
	Units	**LRIS-CL-DU1C--ISM COMPOSITE**	**LRIS-CL-DU2--ISM COMPOSITE**	**LRIS-CL-DU3--ISM COMPOSITE**	**LRIS-CL-DU1A--ISM COMPOSITE**	**RDL**	**QC Batch**
Moisture	%	7.6	4.8	4.1	4.5	1.0	3269689

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		SC7173	SC7203		SC7204	SC7204		
Sampling Date		2013/07/01 18:00	2013/07/01 18:00		2013/07/02 09:30	2013/07/02 09:30		
COC Number		na	NA		NA	NA		
	Units	**LRIS-CL-DU1B--ISM COMPOSITE**	**LRIS-CL-DU4--ISM COMPOSITE**	**QC Batch**	**LRIS-CL-DU5--ISM COPOSITE**	**LRIS-CL-DU5--ISM COPOSITE Lab-Dup**	**RDL**	**QC Batch**
Moisture	%	4.9	5.0	3269689	5.0	4.5	1.0	3286123

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7084						
Sampling Date		2013/07/01 18:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	LRIS-CL-DU1C--ISM COMPOSITE	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	1.98	0.0321	0.307	1.00	1.98		3273119
1,2,3,7,8-Penta CDD	pg/g	35.8	0.0361	1.54	1.00	35.8		3273119
1,2,3,4,7,8-Hexa CDD	pg/g	88.8 (1)	0.606	30.7	0.100	8.88		3273119
1,2,3,6,7,8-Hexa CDD	pg/g	699 (1)	0.650	30.7	0.100	69.9		3273119
1,2,3,7,8,9-Hexa CDD	pg/g	237 (2)	0.607	30.7	0.100	23.7		3273119
1,2,3,4,6,7,8-Hepta CDD	pg/g	12700 (3)	0.654	30.7	0.0100	127		3273119
Octa CDD	pg/g	52100 (3)	0.637	61.5	0.000300	15.6		3273119
Total Tetra CDD	pg/g	68.5	0.0321	0.307				3273119
Total Penta CDD	pg/g	305	0.0361	1.54				3273119
Total Hexa CDD	pg/g	3140 (1)	0.627	30.7				3273119
Total Hepta CDD	pg/g	22900 (1)	0.654	30.7				3273119
2,3,7,8-Tetra CDF **	pg/g	30.7	0.0329	0.307	0.100	3.07		3273119
1,2,3,7,8-Penta CDF	pg/g	63.8	0.109	1.54	0.0300	1.91		3273119
2,3,4,7,8-Penta CDF	pg/g	70.9	0.105	1.54	0.300	21.3		3273119
1,2,3,4,7,8-Hexa CDF	pg/g	283 (4)	0.0324	1.54	0.100	28.3		3273119
1,2,3,6,7,8-Hexa CDF	pg/g	117	0.0337	1.54	0.100	11.7		3273119
2,3,4,6,7,8-Hexa CDF	pg/g	69.9	0.0332	1.54	0.100	6.99		3273119
1,2,3,7,8,9-Hexa CDF	pg/g	8.70	0.0345	1.54	0.100	0.870		3273119
1,2,3,4,6,7,8-Hepta CDF	pg/g	1310 (1)	0.633	30.7	0.0100	13.1		3273119
1,2,3,4,7,8,9-Hepta CDF	pg/g	63.4 (1)	0.636	30.7	0.0100	0.634		3273119
Octa CDF	pg/g	1120 (1)	0.665	61.5	0.000300	0.336		3273119
Total Tetra CDF	pg/g	213	0.0329	0.307				3273119
Total Penta CDF	pg/g	1520	0.107	1.54				3273119

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) Results are from 20xdilution
(2) EMPC / Merged Peak
Results are from 20xdilution
(3) Results are from 20xdilution

EMCL - PCDD/DF analysis - Exceeds Maximum Calibration Limit
(4) EMPC / Merged Peak

Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7084						
Sampling Date		2013/07/01 18:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	**LRIS-CL-DU1C--ISM COMPOSITE**	**EDL**	**RDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
Total Hexa CDF **	pg/g	4340	0.0334	1.54				3273119
Total Hepta CDF	pg/g	3760 (1)	0.635	30.7				3273119
Confirmation 2,3,7,8-Tetra CDF	pg/g	19.6	0.031	0.31	0.100	1.96		3282191
TOTAL TOXIC EQUIVALENCY	pg/g					370		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD *	%	121						3273119
C13-1234678 HeptaCDD	%	131						3273119
C13-1234678 HeptaCDF	%	122						3273119
C13-123478 HexaCDD	%	104						3273119
C13-123478 HexaCDF	%	89						3273119
C13-1234789 HeptaCDF	%	126						3273119
C13-123678 HexaCDD	%	121						3273119
C13-123678 HexaCDF	%	81						3273119
C13-12378 PentaCDD	%	86						3273119
C13-12378 PentaCDF	%	87						3273119
C13-123789 HexaCDF	%	77						3273119
C13-234678 HexaCDF	%	84						3273119
C13-23478 PentaCDF	%	97						3273119
C13-2378 TetraCDD	%	84						3273119
C13-2378 TetraCDF	%	83						3273119
C13-OCDD	%	159 (2)						3273119
Confirmation C13-2378 TetraCDF	%	95						3282191

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) Results are from 20xdilution
(2) Result exceeds method acceptance criteria 17% -157% due to matrix interference.
High levels of native OCDD present in sample

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Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7085						
Sampling Date		2013/07/01 18:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	LRIS-CL-DU2--ISM COMPOSITE	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	1.78	0.0347	0.319	1.00	1.78		3273119
1,2,3,7,8-Penta CDD	pg/g	29.6	0.0361	1.60	1.00	29.6		3273119
1,2,3,4,7,8-Hexa CDD	pg/g	97.8 (1)	2.54	31.9	0.100	9.78		3273119
1,2,3,6,7,8-Hexa CDD	pg/g	677 (1)	2.72	31.9	0.100	67.7		3273119
1,2,3,7,8,9-Hexa CDD	pg/g	243 (1)	2.54	31.9	0.100	24.3		3273119
1,2,3,4,6,7,8-Hepta CDD	pg/g	14100 (2)	0.527	31.9	0.0100	141		3273119
Octa CDD	pg/g	95300 (2)	15.4	63.9	0.000300	28.6		3273119
Total Tetra CDD	pg/g	74.9	0.0347	0.319				3273119
Total Penta CDD	pg/g	321	0.0361	1.60				3273119
Total Hexa CDD	pg/g	3460 (1)	2.63	31.9				3273119
Total Hepta CDD	pg/g	25900 (1)	0.527	31.9				3273119
2,3,7,8-Tetra CDF **	pg/g	24.0	0.0398	0.319	0.100	2.40		3273119
1,2,3,7,8-Penta CDF	pg/g	48.0	0.0785	1.60	0.0300	1.44		3273119
2,3,4,7,8-Penta CDF	pg/g	47.9	0.0758	1.60	0.300	14.4		3273119
1,2,3,4,7,8-Hexa CDF	pg/g	218	0.342	1.60	0.100	21.8		3273119
1,2,3,6,7,8-Hexa CDF	pg/g	98.8	0.355	1.60	0.100	9.88		3273119
2,3,4,6,7,8-Hexa CDF	pg/g	56.8	0.351	1.60	0.100	5.68		3273119
1,2,3,7,8,9-Hexa CDF	pg/g	6.79	0.364	1.60	0.100	0.679		3273119
1,2,3,4,6,7,8-Hepta CDF	pg/g	1390 (1)	0.626	31.9	0.0100	13.9		3273119
1,2,3,4,7,8,9-Hepta CDF	pg/g	70.9 (1)	0.629	31.9	0.0100	0.709		3273119
Octa CDF	pg/g	1370 (1)	1.07	63.9	0.000300	0.411		3273119
Total Tetra CDF	pg/g	195	0.0398	0.319				3273119
Total Penta CDF	pg/g	1170	0.0772	1.60				3273119
Total Hexa CDF	pg/g	3530	0.353	1.60				3273119
Total Hepta CDF	pg/g	4160 (1)	0.627	31.9				3273119

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 20X Dilution **
(2) ** From 20X Dilution **

EMCL - PCDD/DF analysis - Exceeds Maximum Calibration Limit

Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7085						
Sampling Date		2013/07/01 18:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	**LRIS-CL-DU2--ISM COMPOSITE**	**EDL**	**RDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
Confirmation 2,3,7,8-Tetra CDF **	pg/g	16.3	0.034	0.32	0.100	1.63		3280098
TOTAL TOXIC EQUIVALENCY	pg/g					373		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD *	%	110						3273119
C13-1234678 HeptaCDD	%	73 (1)						3273119
C13-1234678 HeptaCDF	%	71 (1)						3273119
C13-123478 HexaCDD	%	58 (1)						3273119
C13-123478 HexaCDF	%	79						3273119
C13-1234789 HeptaCDF	%	66 (1)						3273119
C13-123678 HexaCDD	%	79 (1)						3273119
C13-123678 HexaCDF	%	74						3273119
C13-12378 PentaCDD	%	74						3273119
C13-12378 PentaCDF	%	76						3273119
C13-123789 HexaCDF	%	71						3273119
C13-234678 HexaCDF	%	79						3273119
C13-23478 PentaCDF	%	87						3273119
C13-2378 TetraCDD	%	73						3273119
C13-2378 TetraCDF	%	72						3273119
C13-OCDD	%	75 (1)						3273119
Confirmation C13-2378 TetraCDF	%	99						3280098

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 20X Dilution **

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Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7086						
Sampling Date		2013/07/01 18:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	LRIS-CL-DU3--ISM COMPOSITE	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	0.291 J	0.0385	0.312	1.00	0.291		3273119
1,2,3,7,8-Penta CDD	pg/g	3.69	0.0375	1.56	1.00	3.69		3273119
1,2,3,4,7,8-Hexa CDD	pg/g	12.0	0.0325	1.56	0.100	1.20		3273119
1,2,3,6,7,8-Hexa CDD	pg/g	83.9	0.0349	1.56	0.100	8.39		3273119
1,2,3,7,8,9-Hexa CDD	pg/g	37.5	0.0325	1.56	0.100	3.75		3273119
1,2,3,4,6,7,8-Hepta CDD	pg/g	1150 (1)	0.745	15.6	0.0100	11.5		3273119
Octa CDD	pg/g	6860 (1)	2.66	31.2	0.000300	2.06		3273119
Total Tetra CDD	pg/g	6.47	0.0385	0.312				3273119
Total Penta CDD	pg/g	26.0	0.0375	1.56				3273119
Total Hexa CDD	pg/g	382	0.0336	1.56				3273119
Total Hepta CDD	pg/g	2000 (1)	0.745	15.6				3273119
2,3,7,8-Tetra CDF **	pg/g	2.26	0.0472	0.312	0.100	0.226		3273119
1,2,3,7,8-Penta CDF	pg/g	4.28	0.0565	1.56	0.0300	0.128		3273119
2,3,4,7,8-Penta CDF	pg/g	5.38	0.0545	1.56	0.300	1.61		3273119
1,2,3,4,7,8-Hexa CDF	pg/g	22.6	0.0632	1.56	0.100	2.26		3273119
1,2,3,6,7,8-Hexa CDF	pg/g	9.93	0.0656	1.56	0.100	0.993		3273119
2,3,4,6,7,8-Hexa CDF	pg/g	6.50	0.0648	1.56	0.100	0.650		3273119
1,2,3,7,8,9-Hexa CDF	pg/g	0.812 J	0.0673	1.56	0.100	0.0812		3273119
1,2,3,4,6,7,8-Hepta CDF	pg/g	154	0.0298	1.56	0.0100	1.54		3273119
1,2,3,4,7,8,9-Hepta CDF	pg/g	7.73	0.0299	1.56	0.0100	0.0773		3273119
Octa CDF	pg/g	207	0.113	3.12	0.000300	0.0621		3273119
Total Tetra CDF	pg/g	16.5	0.0472	0.312				3273119
Total Penta CDF	pg/g	94.3	0.0555	1.56				3273119
Total Hexa CDF	pg/g	312	0.0652	1.56				3273119
Total Hepta CDF	pg/g	409	0.0298	1.56				3273119
Confirmation 2,3,7,8-Tetra CDF	pg/g	1.55	0.033	0.31	0.100	0.155		3280098
TOTAL TOXIC EQUIVALENCY	pg/g					38.4		

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 10X Dilution **

Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7086						
Sampling Date		2013/07/01 18:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	**LRIS-CL-DU3--ISM COMPOSITE**	**EDL**	**RDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD *	%	106						3273119
C13-1234678 HeptaCDD	%	83 (1)						3273119
C13-1234678 HeptaCDF **	%	78						3273119
C13-123478 HexaCDD	%	69						3273119
C13-123478 HexaCDF	%	85						3273119
C13-1234789 HeptaCDF	%	74						3273119
C13-123678 HexaCDD	%	73						3273119
C13-123678 HexaCDF	%	79						3273119
C13-12378 PentaCDD	%	80						3273119
C13-12378 PentaCDF	%	82						3273119
C13-123789 HexaCDF	%	73						3273119
C13-234678 HexaCDF	%	82						3273119
C13-23478 PentaCDF	%	94						3273119
C13-2378 TetraCDD	%	73						3273119
C13-2378 TetraCDF	%	74						3273119
C13-OCDD	%	83 (1)						3273119
Confirmation C13-2378 TetraCDF	%	109						3280098

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 10X Dilution **

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Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7172						
Sampling Date		2013/07/01 18:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	LRIS-CL-DU1A--ISM COMPOSITE	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	2.61	0.0301	0.320	1.00	2.61		3273119
1,2,3,7,8-Penta CDD	pg/g	47.0	0.0432	1.60	1.00	47.0		3273119
1,2,3,4,7,8-Hexa CDD	pg/g	152 (1)	3.02	32.0	0.100	15.2		3273119
1,2,3,6,7,8-Hexa CDD	pg/g	1110 (1)	3.23	32.0	0.100	111		3273119
1,2,3,7,8,9-Hexa CDD	pg/g	332 (1)	3.02	32.0	0.100	33.2		3273119
1,2,3,4,6,7,8-Hepta CDD	pg/g	22100 (1)	0.994	32.0	0.0100	221		3273119
Octa CDD	pg/g	161000 (1)	2.43	64.1	0.000300	48.3		3273119
Total Tetra CDD	pg/g	84.3	0.0301	0.320				3273119
Total Penta CDD	pg/g	405	0.0432	1.60				3273119
Total Hexa CDD	pg/g	4910 (1)	3.12	32.0				3273119
Total Hepta CDD	pg/g	38100 (1)	0.994	32.0				3273119
2,3,7,8-Tetra CDF **	pg/g	37.5	0.0579	0.320	0.100	3.75		3273119
1,2,3,7,8-Penta CDF	pg/g	80.7	0.125	1.60	0.0300	2.42		3273119
2,3,4,7,8-Penta CDF	pg/g	89.4	0.121	1.60	0.300	26.8		3273119
1,2,3,4,7,8-Hexa CDF	pg/g	376	0.0432	1.60	0.100	37.6		3273119
1,2,3,6,7,8-Hexa CDF	pg/g	160	0.0449	1.60	0.100	16.0		3273119
2,3,4,6,7,8-Hexa CDF	pg/g	91.6	0.0443	1.60	0.100	9.16		3273119
1,2,3,7,8,9-Hexa CDF	pg/g	12.1	0.0460	1.60	0.100	1.21		3273119
1,2,3,4,6,7,8-Hepta CDF	pg/g	2360 (1)	0.902	32.0	0.0100	23.6		3273119
1,2,3,4,7,8,9-Hepta CDF	pg/g	122 (1)	0.906	32.0	0.0100	1.22		3273119
Octa CDF	pg/g	4050 (1)	2.18	64.1	0.000300	1.22		3273119
Total Tetra CDF	pg/g	271	0.0579	0.320				3273119
Total Penta CDF	pg/g	1960	0.123	1.60				3273119
Total Hexa CDF	pg/g	5590	0.0446	1.60				3273119
Total Hepta CDF	pg/g	7080	0.904	32.0				3273119
Confirmation 2,3,7,8-Tetra CDF	pg/g	22.9	0.034	0.32	0.100	2.29		3280098
TOTAL TOXIC EQUIVALENCY	pg/g					600		

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 20X Dilution **

Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7172						
Sampling Date		2013/07/01 18:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	LRIS-CL-DU1A--ISM COMPOSITE	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD *	%	107						3273119
C13-1234678 HeptaCDD	%	50 (1)						3273119
C13-1234678 HeptaCDF **	%	57 (1)						3273119
C13-123478 HexaCDD	%	52 (1)						3273119
C13-123478 HexaCDF	%	74						3273119
C13-1234789 HeptaCDF	%	58 (1)						3273119
C13-123678 HexaCDD	%	71 (1)						3273119
C13-123678 HexaCDF	%	69						3273119
C13-12378 PentaCDD	%	69						3273119
C13-12378 PentaCDF	%	73						3273119
C13-123789 HexaCDF	%	65						3273119
C13-234678 HexaCDF	%	70						3273119
C13-23478 PentaCDF	%	88						3273119
C13-2378 TetraCDD	%	73						3273119
C13-2378 TetraCDF	%	71						3273119
C13-OCDD	%	29 (1)						3273119
Confirmation C13-2378 TetraCDF	%	92						3280098

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 20X Dilution **

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Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7173						
Sampling Date		2013/07/01 18:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	LRIS-CL-DU1B--ISM COMPOSITE	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	2.09	0.0337	0.317	1.00	2.09		3273119
1,2,3,7,8-Penta CDD	pg/g	38.8	0.0338	1.58	1.00	38.8		3273119
1,2,3,4,7,8-Hexa CDD	pg/g	125 (1)	0.612	31.7	0.100	12.5		3273119
1,2,3,6,7,8-Hexa CDD	pg/g	982 (1)	0.656	31.7	0.100	98.2		3273119
1,2,3,7,8,9-Hexa CDD	pg/g	341 (2)	0.613	31.7	0.100	34.1		3273119
1,2,3,4,6,7,8-Hepta CDD	pg/g	18900 (3)	0.680	31.7	0.0100	189		3273119
Octa CDD	pg/g	76500 (3)	0.671	63.3	0.000300	23.0		3273119
Total Tetra CDD	pg/g	68.1	0.0337	0.317				3273119
Total Penta CDD	pg/g	329	0.0338	1.58				3273119
Total Hexa CDD	pg/g	4360 (1)	0.633	31.7				3273119
Total Hepta CDD	pg/g	34200 (1)	0.680	31.7				3273119
2,3,7,8-Tetra CDF **	pg/g	31.4	0.0431	0.317	0.100	3.14		3273119
1,2,3,7,8-Penta CDF	pg/g	68.0	0.128	1.58	0.0300	2.04		3273119
2,3,4,7,8-Penta CDF	pg/g	75.5	0.123	1.58	0.300	22.7		3273119
1,2,3,4,7,8-Hexa CDF	pg/g	322 (4)	0.0312	1.58	0.100	32.2		3273119
1,2,3,6,7,8-Hexa CDF	pg/g	133	0.0324	1.58	0.100	13.3		3273119
2,3,4,6,7,8-Hexa CDF	pg/g	78.5	0.0320	1.58	0.100	7.85		3273119
1,2,3,7,8,9-Hexa CDF	pg/g	9.65	0.0332	1.58	0.100	0.965		3273119
1,2,3,4,6,7,8-Hepta CDF	pg/g	1950 (1)	0.668	31.7	0.0100	19.5		3273119
1,2,3,4,7,8,9-Hepta CDF	pg/g	98.9 (1)	0.671	31.7	0.0100	0.989		3273119
Octa CDF	pg/g	1800 (1)	0.638	31.7	0.000300	0.540		3273119
Total Tetra CDF	pg/g	217	0.0431	0.317				3273119
Total Penta CDF	pg/g	1610	0.125	1.58				3273119

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) Results are from 20xdilution
(2) EMPC / Merged Peak
Results are from 20xdilution
(3) Results are from 20xdilution

EMCL - PCDD/DF analysis - Exceeds Maximum Calibration Limit
(4) EMPC / Merged Peak

Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7173						
Sampling Date		2013/07/01 18:00						
COC Number		na			TOXIC EQUIVALENCY		# of	
	Units	**LRIS-CL-DU1B--ISM COMPOSITE**	**EDL**	**RDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
Total Hexa CDF **	pg/g	4710	0.0322	1.58				3273119
Total Hepta CDF	pg/g	5640 (1)	0.670	31.7				3273119
Confirmation 2,3,7,8-Tetra CDF	pg/g	19.9	0.032	0.32	0.100	1.99		3282191
TOTAL TOXIC EQUIVALENCY	pg/g					500		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD *	%	134						3273119
C13-1234678 HeptaCDD	%	112						3273119
C13-1234678 HeptaCDF	%	101						3273119
C13-123478 HexaCDD	%	88						3273119
C13-123478 HexaCDF	%	91						3273119
C13-1234789 HeptaCDF	%	100						3273119
C13-123678 HexaCDD	%	101						3273119
C13-123678 HexaCDF	%	84						3273119
C13-12378 PentaCDD	%	89						3273119
C13-12378 PentaCDF	%	90						3273119
C13-123789 HexaCDF	%	80						3273119
C13-234678 HexaCDF	%	85						3273119
C13-23478 PentaCDF	%	96						3273119
C13-2378 TetraCDD	%	87						3273119
C13-2378 TetraCDF	%	83						3273119
C13-OCDD	%	129						3273119
Confirmation C13-2378 TetraCDF	%	88						3282191

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) Results are from 20xdilution

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Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7203						
Sampling Date		2013/07/01 18:00						
COC Number		NA			TOXIC EQUIVALENCY		# of	
	Units	LRIS-CL-DU4--ISM COMPOSITE	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	1.48	0.0394	0.330	1.00	1.48		3273119
1,2,3,7,8-Penta CDD	pg/g	21.4	0.0352	1.65	1.00	21.4		3273119
1,2,3,4,7,8-Hexa CDD	pg/g	76.0	0.0431	1.65	0.100	7.60		3273119
1,2,3,6,7,8-Hexa CDD	pg/g	499	0.0462	1.65	0.100	49.9		3273119
1,2,3,7,8,9-Hexa CDD	pg/g	186 (1)	0.0431	1.65	0.100	18.6		3273119
1,2,3,4,6,7,8-Hepta CDD	pg/g	11100 (2)	0.692	33.0	0.0100	111		3273119
Octa CDD	pg/g	81800 (3)	1.07	65.9	0.000300	24.5		3273119
Total Tetra CDD	pg/g	59.3	0.0394	0.330				3273119
Total Penta CDD	pg/g	241	0.0352	1.65				3273119
Total Hexa CDD	pg/g	2370	0.0446	1.65				3273119
Total Hepta CDD	pg/g	19500 (2)	0.692	33.0				3273119
2,3,7,8-Tetra CDF **	pg/g	18.3	0.0960	0.330	0.100	1.83		3273119
1,2,3,7,8-Penta CDF	pg/g	34.1	0.218	1.65	0.0300	1.02		3273119
2,3,4,7,8-Penta CDF	pg/g	36.1	0.211	1.65	0.300	10.8		3273119
1,2,3,4,7,8-Hexa CDF	pg/g	160 (1)	0.0325	1.65	0.100	16.0		3273119
1,2,3,6,7,8-Hexa CDF	pg/g	69.5 U (4)	69.5	1.65	0.100	6.95		3273119
2,3,4,6,7,8-Hexa CDF	pg/g	40.0	0.0333	1.65	0.100	4.00		3273119
1,2,3,7,8,9-Hexa CDF	pg/g	4.75	0.0346	1.65	0.100	0.475		3273119
1,2,3,4,6,7,8-Hepta CDF	pg/g	1060 (2)	0.665	33.0	0.0100	10.6		3273119
1,2,3,4,7,8,9-Hepta CDF	pg/g	54.1 (2)	0.668	33.0	0.0100	0.541		3273119
Octa CDF	pg/g	1610 (2)	0.663	65.9	0.000300	0.483		3273119
Total Tetra CDF	pg/g	156	0.0960	0.330				3273119
Total Penta CDF	pg/g	837	0.214	1.65				3273119

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) EMPC / Merged Peak
(2) Results are from 20xdilution
(3) Results are from 20xdilution

EMCL - PCDD/DF analysis - Exceeds Maximum Calibration Limit
(4) EMPC / DPE - Diphenylether interference present caused dibenzofuran detected to become a "non-detect" with an elevated detection limit.

Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7203						
Sampling Date		2013/07/01 18:00						
COC Number		NA			TOXIC EQUIVALENCY		# of	
	Units	**LRIS-CL-DU4--ISM COMPOSITE**	**EDL**	**RDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
Total Hexa CDF **	pg/g	1380	0.0335	1.65				3273119
Total Hepta CDF	pg/g	3050 (1)	0.666	33.0				3273119
Confirmation 2,3,7,8-Tetra CDF	pg/g	11.8	0.034	0.33	0.100	1.18		3282191
TOTAL TOXIC EQUIVALENCY	pg/g					287		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD *	%	97						3273119
C13-1234678 HeptaCDD	%	71						3273119
C13-1234678 HeptaCDF	%	79						3273119
C13-123478 HexaCDD	%	70						3273119
C13-123478 HexaCDF	%	84						3273119
C13-1234789 HeptaCDF	%	76						3273119
C13-123678 HexaCDD	%	76						3273119
C13-123678 HexaCDF	%	78						3273119
C13-12378 PentaCDD	%	82						3273119
C13-12378 PentaCDF	%	80						3273119
C13-123789 HexaCDF	%	73						3273119
C13-234678 HexaCDF	%	81						3273119
C13-23478 PentaCDF	%	91						3273119
C13-2378 TetraCDD	%	72						3273119
C13-2378 TetraCDF	%	68						3273119
C13-OCDD	%	52						3273119
Confirmation C13-2378 TetraCDF	%	79						3282191

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) Results are from 20xdilution

Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7204						
Sampling Date		2013/07/02 09:30						
COC Number		NA			TOXIC EQUIVALENCY		# of	
	Units	**LRIS-CL-DU5--ISM COPOSITE**	**EDL**	**RDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
2,3,7,8-Tetra CDD *	pg/g	0.229 J	0.0337	0.326	1.00	0.229		3273119
1,2,3,7,8-Penta CDD	pg/g	2.52	0.0354	1.63	1.00	2.52		3273119
1,2,3,4,7,8-Hexa CDD	pg/g	7.65	0.0341	1.63	0.100	0.765		3273119
1,2,3,6,7,8-Hexa CDD	pg/g	56.1	0.0366	1.63	0.100	5.61		3273119
1,2,3,7,8,9-Hexa CDD	pg/g	21.6 (1)	0.0342	1.63	0.100	2.16		3273119
1,2,3,4,6,7,8-Hepta CDD	pg/g	1100 (2)	0.174	8.16	0.0100	11.0		3273119
Octa CDD	pg/g	6540 (2)	0.168	16.3	0.000300	1.96		3273119
Total Tetra CDD	pg/g	6.66	0.0337	0.326				3273119
Total Penta CDD	pg/g	23.3	0.0354	1.63				3273119
Total Hexa CDD	pg/g	260	0.0353	1.63				3273119
Total Hepta CDD	pg/g	1930 (2)	0.174	3.26				3273119
2,3,7,8-Tetra CDF **	pg/g	2.05	0.0337	0.326	0.100	0.205		3273119
1,2,3,7,8-Penta CDF	pg/g	3.48	0.0333	1.63	0.0300	0.104		3273119
2,3,4,7,8-Penta CDF	pg/g	3.84	0.0321	1.63	0.300	1.15		3273119
1,2,3,4,7,8-Hexa CDF	pg/g	15.3 (1)	0.0346	1.63	0.100	1.53		3273119
1,2,3,6,7,8-Hexa CDF	pg/g	6.60 U (3)	6.60	1.63	0.100	0.660		3273119
2,3,4,6,7,8-Hexa CDF	pg/g	4.07	0.0355	1.63	0.100	0.407		3273119
1,2,3,7,8,9-Hexa CDF	pg/g	0.503 J	0.0368	1.63	0.100	0.0503		3273119
1,2,3,4,6,7,8-Hepta CDF	pg/g	96.4	0.0322	1.63	0.0100	0.964		3273119
1,2,3,4,7,8,9-Hepta CDF	pg/g	4.52	0.0323	1.63	0.0100	0.0452		3273119
Octa CDF	pg/g	91.6	0.0324	3.26	0.000300	0.0275		3273119
Total Tetra CDF	pg/g	16.8	0.0337	0.326				3273119
Total Penta CDF	pg/g	87.6	0.0327	1.63				3273119
Total Hexa CDF	pg/g	228	0.0357	1.63				3273119
Total Hepta CDF	pg/g	255	0.0323	1.63				3273119

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) EMPC / Merged Peak
(2) Results are from 5xdilution
(3) EMPC / DPE - Diphenylether interference present caused dibenzofuran detected to become a "non-detect" with an elevated detection limit.

Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7204						
Sampling Date		2013/07/02 09:30						
COC Number		NA			TOXIC EQUIVALENCY		# of	
	Units	**LRIS-CL-DU5--ISM COPOSITE**	**EDL**	**RDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
Confirmation 2,3,7,8-Tetra CDF **	pg/g	1.61	0.031	0.33	0.100	0.161		3280098
TOTAL TOXIC EQUIVALENCY	pg/g					29.3		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD *	%	118						3273119
C13-1234678 HeptaCDD	%	110						3273119
C13-1234678 HeptaCDF	%	84						3273119
C13-123478 HexaCDD	%	78						3273119
C13-123478 HexaCDF	%	92						3273119
C13-1234789 HeptaCDF	%	83						3273119
C13-123678 HexaCDD	%	83						3273119
C13-123678 HexaCDF	%	89						3273119
C13-12378 PentaCDD	%	79						3273119
C13-12378 PentaCDF	%	82						3273119
C13-123789 HexaCDF	%	82						3273119
C13-234678 HexaCDF	%	91						3273119
C13-23478 PentaCDF	%	92						3273119
C13-2378 TetraCDD	%	82						3273119
C13-2378 TetraCDF	%	78						3273119
C13-OCDD	%	116						3273119
Confirmation C13-2378 TetraCDF	%	101						3280098

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

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Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7204						
Sampling Date		2013/07/02 09:30						
COC Number		NA			TOXIC EQUIVALENCY		# of	
	Units	**LRIS-CL-DU5--ISM COPOSITE Lab-Dup**	**EDL**	**RDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
2,3,7,8-Tetra CDD *	pg/g	0.237 J	0.0522	0.326	1.00	0.237		3273119
1,2,3,7,8-Penta CDD	pg/g	2.01	0.0448	1.63	1.00	2.01		3273119
1,2,3,4,7,8-Hexa CDD	pg/g	6.49	0.0367	1.63	0.100	0.649		3273119
1,2,3,6,7,8-Hexa CDD	pg/g	48.0	0.0393	1.63	0.100	4.80		3273119
1,2,3,7,8,9-Hexa CDD	pg/g	19.4	0.0367	1.63	0.100	1.94		3273119
1,2,3,4,6,7,8-Hepta CDD	pg/g	921 (1)	0.599	16.3	0.0100	9.21		3273119
Octa CDD	pg/g	5980 (1)	3.09	32.6	0.000300	1.79		3273119
Total Tetra CDD	pg/g	5.99	0.0522	0.326				3273119
Total Penta CDD	pg/g	16.7	0.0448	1.63				3273119
Total Hexa CDD	pg/g	223	0.0379	1.63				3273119
Total Hepta CDD	pg/g	1660 (1)	0.599	16.3				3273119
2,3,7,8-Tetra CDF **	pg/g	1.79	0.0701	0.326	0.100	0.179		3273119
1,2,3,7,8-Penta CDF	pg/g	2.72	0.0566	1.63	0.0300	0.0816		3273119
2,3,4,7,8-Penta CDF	pg/g	2.73	0.0547	1.63	0.300	0.819		3273119
1,2,3,4,7,8-Hexa CDF	pg/g	11.4	0.0356	1.63	0.100	1.14		3273119
1,2,3,6,7,8-Hexa CDF	pg/g	5.12	0.0369	1.63	0.100	0.512		3273119
2,3,4,6,7,8-Hexa CDF	pg/g	3.80	0.0365	1.63	0.100	0.380		3273119
1,2,3,7,8,9-Hexa CDF	pg/g	0.424 J	0.0379	1.63	0.100	0.0424		3273119
1,2,3,4,6,7,8-Hepta CDF	pg/g	84.1	0.0563	1.63	0.0100	0.841		3273119
1,2,3,4,7,8,9-Hepta CDF	pg/g	3.81	0.0566	1.63	0.0100	0.0381		3273119
Octa CDF	pg/g	93.9	0.0575	3.26	0.000300	0.0282		3273119
Total Tetra CDF	pg/g	13.7	0.0701	0.326				3273119
Total Penta CDF	pg/g	61.5	0.0556	1.63				3273119
Total Hexa CDF	pg/g	177	0.0367	1.63				3273119
Total Hepta CDF	pg/g	221	0.0564	1.63				3273119
Confirmation 2,3,7,8-Tetra CDF	pg/g	1.57	0.036	0.33	0.100	0.157		3280098

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 10X Dilution **

Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SC7204						
Sampling Date		2013/07/02 09:30						
COC Number		NA			TOXIC EQUIVALENCY		# of	
	Units	**LRIS-CL-DU5--ISM COPOSITE Lab-Dup**	**EDL**	**RDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**
TOTAL TOXIC EQUIVALENCY	pg/g					24.7		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD *	%	100						3273119
C13-1234678 HeptaCDD	%	68 (1)						3273119
C13-1234678 HeptaCDF **	%	72						3273119
C13-123478 HexaCDD	%	68						3273119
C13-123478 HexaCDF	%	79						3273119
C13-1234789 HeptaCDF	%	67						3273119
C13-123678 HexaCDD	%	71						3273119
C13-123678 HexaCDF	%	73						3273119
C13-12378 PentaCDD	%	82						3273119
C13-12378 PentaCDF	%	77						3273119
C13-123789 HexaCDF	%	67						3273119
C13-234678 HexaCDF	%	77						3273119
C13-23478 PentaCDF	%	87						3273119
C13-2378 TetraCDD	%	67						3273119
C13-2378 TetraCDF	%	69						3273119
C13-OCDD	%	67 (1)						3273119
Confirmation C13-2378 TetraCDF	%	93						3280098

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 10X Dilution **

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Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

Test Summary

Maxxam ID SC7084 **Collected** 2013/07/01
Sample ID LRIS-CL-DU1C--ISM COMPOSITE **Shipped**
Matrix SEDIMENT **Received** 2013/07/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3273119	2013/07/06	2013/07/15	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3282191	N/A	2013/07/16	Vica Cioranic
Moisture	BAL	3269689	N/A	2013/07/04	Chamika Deeyagaha

Maxxam ID SC7085 **Collected** 2013/07/01
Sample ID LRIS-CL-DU2--ISM COMPOSITE **Shipped**
Matrix SEDIMENT **Received** 2013/07/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3273119	2013/07/06	2013/07/12	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3280098	N/A	2013/07/15	Vica Cioranic
Moisture	BAL	3269689	N/A	2013/07/04	Chamika Deeyagaha

Maxxam ID SC7086 **Collected** 2013/07/01
Sample ID LRIS-CL-DU3--ISM COMPOSITE **Shipped**
Matrix SEDIMENT **Received** 2013/07/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3273119	2013/07/06	2013/07/12	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3280098	N/A	2013/07/15	Vica Cioranic
Moisture	BAL	3269689	N/A	2013/07/04	Chamika Deeyagaha

Maxxam ID SC7172 **Collected** 2013/07/01
Sample ID LRIS-CL-DU1A--ISM COMPOSITE **Shipped**
Matrix SEDIMENT **Received** 2013/07/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3273119	2013/07/06	2013/07/12	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3280098	N/A	2013/07/15	Vica Cioranic
Moisture	BAL	3269689	N/A	2013/07/04	Chamika Deeyagaha

Maxxam ID SC7173 **Collected** 2013/07/01
Sample ID LRIS-CL-DU1B--ISM COMPOSITE **Shipped**
Matrix SEDIMENT **Received** 2013/07/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3273119	2013/07/06	2013/07/15	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3282191	N/A	2013/07/16	Vica Cioranic
Moisture	BAL	3269689	N/A	2013/07/04	Chamika Deeyagaha

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Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

Test Summary

Maxxam ID SC7203 **Collected** 2013/07/01
Sample ID LRIS-CL-DU4--ISM COPOSITE **Shipped**
Matrix SEDIMENT **Received** 2013/07/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3273119	2013/07/06	2013/07/15	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3282191	N/A	2013/07/16	Vica Cioranic
Moisture	BAL	3269689	N/A	2013/07/04	Chamika Deeyagaha

Maxxam ID SC7204 **Collected** 2013/07/02
Sample ID LRIS-CL-DU5--ISM COPOSITE **Shipped**
Matrix SEDIMENT **Received** 2013/07/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3273119	2013/07/06	2013/07/16	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3280098	N/A	2013/07/16	Vica Cioranic
Moisture	BAL	3286123	N/A	2013/07/19	Thoai Truyen Huynh

Maxxam ID SC7204 Dup **Collected** 2013/07/02
Sample ID LRIS-CL-DU5--ISM COPOSITE **Shipped**
Matrix SEDIMENT **Received** 2013/07/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3273119	2013/07/06	2013/07/12	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3280098	N/A	2013/07/15	Vica Cioranic
Moisture	BAL	3286123	N/A	2013/07/19	Thoai Truyen Huynh

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Maxxam Job #: B3A5623
Report Date: 2013/07/22

Apex Laboratories
Client Project #: A3F0629

Package 1	4.4°C

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

GENERAL COMMENTS

Revised report (2013/07/19): Moisture was re-analysed on sample SC7204 LRIS-CL-DU5-ISM.
VOA (D) was originally used to calculate % moisture. According to client, the % moisture for this sample is unreasonable high. The VOA for dry weight determination may have been compromised during transit. Thus moisture was redone on VOA (A) as per client's request.

Dry weight was performed on the following voas:

LRIS-CL-DU2--ISM COMPOSITE SC7085-D
LRIS-CL-DU5--ISM COPOSITESC7204-D
LRIS-CL-DU4--ISM COMPOSITE SC7203-D
LRIS-CL-DU1B--ISM COMPOSITE SC7173-E
LRIS-CL-DU1C--ISM COMPOSITE SC7084-D
LRIS-CL-DU3--ISM COMPOSITESC7086-D
LRIS-CL-DU1A--ISM COMPOSITE SC7172-F

30g Extraction was performed.

LRIS-CL-DU2--ISM COMPOSITESC7085-B
LRIS-CL-DU5--ISM COPOSITE SC7204-B
LRIS-CL-DU4--ISM COMPOSITESC7203-A
LRIS-CL-DU1B--ISM COMPOSITE SC7173-B
LRIS-CL-DU1C--ISM COMPOSITE SC7084-C
LRIS-CL-DU3--ISM COMPOSITE SC7086-B
LRIS-CL-DU1A--ISM COMPOSITESC7172- E, B & C

The EPA 1613 method uses labelled (or C13) compounds to quantitate the individual compounds. This involves spiking the samples prior to extraction with a known amount of Carbon 13 isotopes and then quantitating the recovery of them in the final extract. This recovery percentage is then used to quantitate the native compound to correct for any losses due to sample preparation. In the case of these samples, the level of the native hepta and octa compounds were too high when compared to the spiked C13 internal standards. If the extracts were diluted to bring the native compounds within the calibration range, the C13 isotopes would no longer be detectable and therefore we could no longer correct for losses from the extraction and cleanup procedures.

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Spiked Blank Dioxins/Furans in Soil (1613B): ** Native percent recoveries were calculated with respect to the Method Spike **

Results relate only to the items tested.

Apex Laboratories
Attention: Philip Nerenberg
Client Project #: A3F0629
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: GB3A5623

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3269689	JV1	RPD - Sample/Sample Dup	Moisture	2013/07/05	0.3		%	20
3273119	OBC	Matrix Spike	37CL4 2378 Tetra CDD	2013/07/16		94	%	35 - 197
		Matrix Spike DUP	37CL4 2378 Tetra CDD	2013/07/16		101	%	35 - 197
		Matrix Spike	C13-1234678 HeptaCDD	2013/07/16		38	%	23 - 140
		Matrix Spike DUP	C13-1234678 HeptaCDD	2013/07/16		43	%	23 - 140
		Matrix Spike	C13-1234678 HeptaCDF	2013/07/16		60	%	28 - 143
		Matrix Spike DUP	C13-1234678 HeptaCDF	2013/07/16		66	%	28 - 143
		Matrix Spike	C13-123478 HexaCDD	2013/07/16		63	%	32 - 141
		Matrix Spike DUP	C13-123478 HexaCDD	2013/07/16		67	%	32 - 141
		Matrix Spike	C13-123478 HexaCDF	2013/07/16		77	%	26 - 152
		Matrix Spike DUP	C13-123478 HexaCDF	2013/07/16		81	%	26 - 152
		Matrix Spike	C13-1234789 HeptaCDF	2013/07/16		62	%	26 - 138
		Matrix Spike DUP	C13-1234789 HeptaCDF	2013/07/16		68	%	26 - 138
		Matrix Spike	C13-123678 HexaCDD	2013/07/16		68	%	28 - 130
		Matrix Spike DUP	C13-123678 HexaCDD	2013/07/16		75	%	28 - 130
		Matrix Spike	C13-123678 HexaCDF	2013/07/16		72	%	26 - 123
		Matrix Spike DUP	C13-123678 HexaCDF	2013/07/16		75	%	26 - 123
		Matrix Spike	C13-12378 PentaCDD	2013/07/16		75	%	25 - 181
		Matrix Spike DUP	C13-12378 PentaCDD	2013/07/16		83	%	25 - 181
		Matrix Spike	C13-12378 PentaCDF	2013/07/16		74	%	24 - 185
		Matrix Spike DUP	C13-12378 PentaCDF	2013/07/16		83	%	24 - 185
		Matrix Spike	C13-123789 HexaCDF	2013/07/16		54	%	29 - 147
		Matrix Spike DUP	C13-123789 HexaCDF	2013/07/16		72	%	29 - 147
		Matrix Spike	C13-234678 HexaCDF	2013/07/16		73	%	28 - 136
		Matrix Spike DUP	C13-234678 HexaCDF	2013/07/16		79	%	28 - 136
		Matrix Spike	C13-23478 PentaCDF	2013/07/16		84	%	21 - 178
		Matrix Spike DUP	C13-23478 PentaCDF	2013/07/16		95	%	21 - 178
		Matrix Spike	C13-2378 TetraCDD	2013/07/16		68	%	25 - 164
		Matrix Spike DUP	C13-2378 TetraCDD	2013/07/16		69	%	25 - 164
		Matrix Spike	C13-2378 TetraCDF	2013/07/16		63	%	24 - 169
		Matrix Spike DUP	C13-2378 TetraCDF	2013/07/16		71	%	24 - 169
		Matrix Spike	C13-OCDD	2013/07/16		24	%	17 - 157
		Matrix Spike DUP	C13-OCDD	2013/07/16		26	%	17 - 157
		Matrix Spike (SC7172)	2,3,7,8-Tetra CDD	2013/07/16		116	%	67 - 158
		Matrix Spike DUP (SC7172)	2,3,7,8-Tetra CDD	2013/07/16		126	%	67 - 158
		MS/MSD RPD	2,3,7,8-Tetra CDD	2013/07/16	8.3		%	25
		Matrix Spike (SC7172)	1,2,3,7,8-Penta CDD	2013/07/16		108	%	70 - 142
		Matrix Spike DUP (SC7172)	1,2,3,7,8-Penta CDD	2013/07/16		112	%	70 - 142
		MS/MSD RPD	1,2,3,7,8-Penta CDD	2013/07/16	3.6		%	25
		Matrix Spike (SC7172)	1,2,3,4,7,8-Hexa CDD	2013/07/16		100	%	70 - 164
		Matrix Spike DUP (SC7172)	1,2,3,4,7,8-Hexa CDD	2013/07/16		110	%	70 - 164
		MS/MSD RPD	1,2,3,4,7,8-Hexa CDD	2013/07/16	9.5		%	25
		Matrix Spike (SC7172)	1,2,3,6,7,8-Hexa CDD	2013/07/16		299 (1)	%	76 - 134
		Matrix Spike DUP (SC7172)	1,2,3,6,7,8-Hexa CDD	2013/07/16		145 (1)	%	76 - 134
		MS/MSD RPD	1,2,3,6,7,8-Hexa CDD	2013/07/16	69.4 (1)		%	25

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Quality Assurance Report (Continued)

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QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3273119	OBC	Matrix Spike (SC7172)	1,2,3,7,8,9-Hexa CDD	2013/07/16		201 (1)	%	64 - 162
		Matrix Spike DUP (SC7172)	1,2,3,7,8,9-Hexa CDD	2013/07/16		201 (1)	%	64 - 162
		MS/MSD RPD	1,2,3,7,8,9-Hexa CDD	2013/07/16	0 (1)		%	25
		Matrix Spike (SC7172)	1,2,3,4,6,7,8-Hepta CDD	2013/07/16		NC (2)	%	70 - 140
		Matrix Spike DUP (SC7172)	1,2,3,4,6,7,8-Hepta CDD	2013/07/16		NC (2)	%	70 - 140
		MS/MSD RPD	1,2,3,4,6,7,8-Hepta CDD	2013/07/16	NC (2)		%	25
		Matrix Spike (SC7172)	Octa CDD	2013/07/16		NC (2)	%	78 - 144
		Matrix Spike DUP (SC7172)	Octa CDD	2013/07/16		NC (2)	%	78 - 144
		MS/MSD RPD	Octa CDD	2013/07/16	NC (2)		%	25
		Matrix Spike (SC7172)	Total Tetra CDD	2013/07/16		10	%	N/A
		Matrix Spike DUP (SC7172)	Total Tetra CDD	2013/07/16		11	%	N/A
		MS/MSD RPD	Total Tetra CDD	2013/07/16	5.8		%	25
		Matrix Spike (SC7172)	Total Penta CDD	2013/07/16		81	%	N/A
		Matrix Spike DUP (SC7172)	Total Penta CDD	2013/07/16		83	%	N/A
		MS/MSD RPD	Total Penta CDD	2013/07/16	1.5		%	25
		Matrix Spike (SC7172)	Total Hexa CDD	2013/07/16		1790	%	N/A
		Matrix Spike DUP (SC7172)	Total Hexa CDD	2013/07/16		1740	%	N/A
		MS/MSD RPD	Total Hexa CDD	2013/07/16	2.6		%	25
		Matrix Spike (SC7172)	Total Hepta CDD	2013/07/16		10100	%	N/A
		Matrix Spike DUP (SC7172)	Total Hepta CDD	2013/07/16		9350	%	N/A
		MS/MSD RPD	Total Hepta CDD	2013/07/16	7.2		%	25
		Matrix Spike (SC7172)	2,3,7,8-Tetra CDF	2013/07/16		112	%	75 - 158
		Matrix Spike DUP (SC7172)	2,3,7,8-Tetra CDF	2013/07/16		108	%	75 - 158
		MS/MSD RPD	2,3,7,8-Tetra CDF	2013/07/16	3.6		%	25
		Matrix Spike (SC7172)	1,2,3,7,8-Penta CDF	2013/07/16		122	%	80 - 134
		Matrix Spike DUP (SC7172)	1,2,3,7,8-Penta CDF	2013/07/16		119	%	80 - 134
		MS/MSD RPD	1,2,3,7,8-Penta CDF	2013/07/16	2.5		%	25
		Matrix Spike (SC7172)	2,3,4,7,8-Penta CDF	2013/07/16		114	%	68 - 160
		Matrix Spike DUP (SC7172)	2,3,4,7,8-Penta CDF	2013/07/16		112	%	68 - 160
		MS/MSD RPD	2,3,4,7,8-Penta CDF	2013/07/16	1.8		%	25
		Matrix Spike (SC7172)	1,2,3,4,7,8-Hexa CDF	2013/07/16		122	%	72 - 134
		Matrix Spike DUP (SC7172)	1,2,3,4,7,8-Hexa CDF	2013/07/16		110	%	72 - 134
		MS/MSD RPD	1,2,3,4,7,8-Hexa CDF	2013/07/16	10.3		%	25

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Quality Assurance Report (Continued)

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QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3273119	OBC	Matrix Spike (SC7172)	1,2,3,6,7,8-Hexa CDF	2013/07/16		109	%	84 - 130
		Matrix Spike DUP (SC7172)	1,2,3,6,7,8-Hexa CDF	2013/07/16		108	%	84 - 130
		MS/MSD RPD	1,2,3,6,7,8-Hexa CDF	2013/07/16	0.9		%	25
		Matrix Spike (SC7172)	2,3,4,6,7,8-Hexa CDF	2013/07/16		130	%	70 - 156
		Matrix Spike DUP (SC7172)	2,3,4,6,7,8-Hexa CDF	2013/07/16		119	%	70 - 156
		MS/MSD RPD	2,3,4,6,7,8-Hexa CDF	2013/07/16	8.8		%	25
		Matrix Spike (SC7172)	1,2,3,7,8,9-Hexa CDF	2013/07/16		63 (3)	%	78 - 130
		Matrix Spike DUP (SC7172)	1,2,3,7,8,9-Hexa CDF	2013/07/16		98	%	78 - 130
		MS/MSD RPD	1,2,3,7,8,9-Hexa CDF	2013/07/16	43.5 (4)		%	25
		Matrix Spike (SC7172)	1,2,3,4,6,7,8-Hepta CDF	2013/07/16		NC (2)	%	82 - 122
		Matrix Spike DUP (SC7172)	1,2,3,4,6,7,8-Hepta CDF	2013/07/16		NC (2)	%	82 - 122
		MS/MSD RPD	1,2,3,4,6,7,8-Hepta CDF	2013/07/16	NC (2)		%	25
		Matrix Spike (SC7172)	1,2,3,4,7,8,9-Hepta CDF	2013/07/16		123	%	78 - 138
		Matrix Spike DUP (SC7172)	1,2,3,4,7,8,9-Hepta CDF	2013/07/16		130	%	78 - 138
		MS/MSD RPD	1,2,3,4,7,8,9-Hepta CDF	2013/07/16	5.5		%	25
		Matrix Spike (SC7172)	Octa CDF	2013/07/16		170	%	63 - 170
		Matrix Spike DUP (SC7172)	Octa CDF	2013/07/16		NC (2)	%	63 - 170
		MS/MSD RPD	Octa CDF	2013/07/16	NC (2)		%	25
		Matrix Spike (SC7172)	Total Tetra CDF	2013/07/16		45	%	N/A
		Matrix Spike DUP (SC7172)	Total Tetra CDF	2013/07/16		44	%	N/A
		MS/MSD RPD	Total Tetra CDF	2013/07/16	0.6		%	25
		Matrix Spike (SC7172)	Total Penta CDF	2013/07/16		246	%	N/A
		Matrix Spike DUP (SC7172)	Total Penta CDF	2013/07/16		244	%	N/A
		MS/MSD RPD	Total Penta CDF	2013/07/16	0.8		%	25
		Matrix Spike (SC7172)	Total Hexa CDF	2013/07/16		775	%	N/A
		Matrix Spike DUP (SC7172)	Total Hexa CDF	2013/07/16		778	%	N/A
		MS/MSD RPD	Total Hexa CDF	2013/07/16	0.5		%	25
		Matrix Spike (SC7172)	Total Hepta CDF	2013/07/16		2310	%	N/A
		Matrix Spike DUP (SC7172)	Total Hepta CDF	2013/07/16		2180	%	N/A
		MS/MSD RPD	Total Hepta CDF	2013/07/16	5.7		%	25
		Spiked Blank	37CL4 2378 Tetra CDD	2013/07/12		107	%	35 - 197
			C13-1234678 HeptaCDD	2013/07/12		79	%	23 - 140
			C13-1234678 HeptaCDF	2013/07/12		88	%	28 - 143
			C13-123478 HexaCDD	2013/07/12		76	%	32 - 141
			C13-123478 HexaCDF	2013/07/12		94	%	26 - 152

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Quality Assurance Report (Continued)

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QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3273119	OBC	Spiked Blank	C13-1234789 HeptaCDF	2013/07/12		78	%	26 - 138
			C13-123678 HexaCDD	2013/07/12		87	%	28 - 130
			C13-123678 HexaCDF	2013/07/12		93	%	26 - 123
			C13-12378 PentaCDD	2013/07/12		83	%	25 - 181
			C13-12378 PentaCDF	2013/07/12		87	%	24 - 185
			C13-123789 HexaCDF	2013/07/12		80	%	29 - 147
			C13-234678 HexaCDF	2013/07/12		95	%	28 - 136
			C13-23478 PentaCDF	2013/07/12		98	%	21 - 178
			C13-2378 TetraCDD	2013/07/12		74	%	25 - 164
			C13-2378 TetraCDF	2013/07/12		76	%	24 - 169
			C13-OCDD	2013/07/12		71	%	17 - 157
			2,3,7,8-Tetra CDD	2013/07/12		116	%	67 - 158
			1,2,3,7,8-Penta CDD	2013/07/12		121	%	70 - 142
			1,2,3,4,7,8-Hexa CDD	2013/07/12		131	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2013/07/12		118	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2013/07/12		121	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2013/07/12		117	%	70 - 140
			Octa CDD	2013/07/12		123	%	78 - 144
			2,3,7,8-Tetra CDF	2013/07/12		122	%	75 - 158
			1,2,3,7,8-Penta CDF	2013/07/12		118	%	80 - 134
			2,3,4,7,8-Penta CDF	2013/07/12		109	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2013/07/12		109	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2013/07/12		114	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2013/07/12		110	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2013/07/12		113	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2013/07/12		118	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2013/07/12		118	%	78 - 138
			Octa CDF	2013/07/12		119	%	63 - 170
		Method Blank	37CL4 2378 Tetra CDD	2013/07/12		67	%	35 - 197
			C13-1234678 HeptaCDD	2013/07/12		59	%	23 - 140
			C13-1234678 HeptaCDF	2013/07/12		65	%	28 - 143
			C13-123478 HexaCDD	2013/07/12		55	%	32 - 141
			C13-123478 HexaCDF	2013/07/12		65	%	26 - 152
			C13-1234789 HeptaCDF	2013/07/12		61	%	26 - 138
			C13-123678 HexaCDD	2013/07/12		60	%	28 - 130
			C13-123678 HexaCDF	2013/07/12		65	%	26 - 123
			C13-12378 PentaCDD	2013/07/12		60	%	25 - 181
			C13-12378 PentaCDF	2013/07/12		63	%	24 - 185
			C13-123789 HexaCDF	2013/07/12		60	%	29 - 147
			C13-234678 HexaCDF	2013/07/12		68	%	28 - 136
			C13-23478 PentaCDF	2013/07/12		68	%	21 - 178
			C13-2378 TetraCDD	2013/07/12		49	%	25 - 164
			C13-2378 TetraCDF	2013/07/12		51	%	24 - 169
			C13-OCDD	2013/07/12		58	%	17 - 157
			2,3,7,8-Tetra CDD	2013/07/12	0.0478 U, EDL=0.0478		pg/g	
			1,2,3,7,8-Penta CDD	2013/07/12	0.0514 U, EDL=0.0514		pg/g	
			1,2,3,4,7,8-Hexa CDD	2013/07/12	0.0633 J, EDL=0.0289		pg/g	
			1,2,3,6,7,8-Hexa CDD	2013/07/12	0.0669 J, EDL=0.0310		pg/g	
			1,2,3,7,8,9-Hexa CDD	2013/07/12	0.0985 J, EDL=0.0289		pg/g	
			1,2,3,4,6,7,8-Hepta CDD	2013/07/12	0.280 J, EDL=0.0274		pg/g	
			Octa CDD	2013/07/12	1.24 J, EDL=0.0499		pg/g	
			Total Tetra CDD	2013/07/12	0.0478 U, EDL=0.0478		pg/g	
			Total Penta CDD	2013/07/12	0.0514 U, EDL=0.0514		pg/g	
			Total Hexa CDD	2013/07/12	0.281 J, EDL=0.0299		pg/g	
			Total Hepta CDD	2013/07/12	0.509 J, EDL=0.0274		pg/g	

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Quality Assurance Report (Continued)

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QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3273119	OBC	Method Blank	2,3,7,8-Tetra CDF	2013/07/12	0.0360 U, EDL=0.0360		pg/g	
			1,2,3,7,8-Penta CDF	2013/07/12	0.0485 U, EDL=0.0485		pg/g	
			2,3,4,7,8-Penta CDF	2013/07/12	0.0468 U, EDL=0.0468		pg/g	
			1,2,3,4,7,8-Hexa CDF	2013/07/12	0.0724 J, EDL=0.0357		pg/g	
			1,2,3,6,7,8-Hexa CDF	2013/07/12	0.0558 J, EDL=0.0370		pg/g	
			2,3,4,6,7,8-Hexa CDF	2013/07/12	0.0882 U, EDL=0.0882 (5)		pg/g	
			1,2,3,7,8,9-Hexa CDF	2013/07/12	0.112 J, EDL=0.0380		pg/g	
			1,2,3,4,6,7,8-Hepta CDF	2013/07/12	0.191 J, EDL=0.0326		pg/g	
			1,2,3,4,7,8,9-Hepta CDF	2013/07/12	0.281 J, EDL=0.0327		pg/g	
			Octa CDF	2013/07/12	0.910 J, EDL=0.0340		pg/g	
			Total Tetra CDF	2013/07/12	0.0360 U, EDL=0.0360		pg/g	
			Total Penta CDF	2013/07/12	0.0477 U, EDL=0.0477		pg/g	
			Total Hexa CDF	2013/07/12	0.240 J, EDL=0.0368		pg/g	
			Total Hepta CDF	2013/07/12	0.473 J, EDL=0.0326		pg/g	
		RPD - Sample/Sample Dup	2,3,7,8-Tetra CDD	2013/07/12	NC		%	25
			1,2,3,7,8-Penta CDD	2013/07/12	NC		%	25
			1,2,3,4,7,8-Hexa CDD	2013/07/12	NC		%	25
			1,2,3,6,7,8-Hexa CDD	2013/07/12	15.6		%	25
			1,2,3,7,8,9-Hexa CDD	2013/07/12	10.7		%	25
			1,2,3,4,6,7,8-Hepta CDD	2013/07/12	17.9 (6)		%	25
			Octa CDD	2013/07/12	9.0 (6)		%	25
			Total Tetra CDD	2013/07/12	10.6		%	25
			Total Penta CDD	2013/07/12	32.6 (4)		%	25
			Total Hexa CDD	2013/07/12	15.4		%	25
			Total Hepta CDD	2013/07/12	15.3 (6)		%	25
			2,3,7,8-Tetra CDF	2013/07/12	13.4		%	25
			1,2,3,7,8-Penta CDF	2013/07/12	NC		%	25
			2,3,4,7,8-Penta CDF	2013/07/12	NC		%	25
			1,2,3,4,7,8-Hexa CDF	2013/07/12	29.0 (4)		%	25
			1,2,3,6,7,8-Hexa CDF	2013/07/12	NC		%	25
			2,3,4,6,7,8-Hexa CDF	2013/07/12	NC		%	25
			1,2,3,7,8,9-Hexa CDF	2013/07/12	NC		%	25
			1,2,3,4,6,7,8-Hepta CDF	2013/07/12	13.6		%	25
			1,2,3,4,7,8,9-Hepta CDF	2013/07/12	NC		%	25
			Octa CDF	2013/07/12	2.5		%	25
			Total Tetra CDF	2013/07/12	20.6		%	25
			Total Penta CDF	2013/07/12	34.9 (4)		%	25
			Total Hexa CDF	2013/07/12	25.5 (4)		%	25
			Total Hepta CDF	2013/07/12	14.3		%	25
3280098	VCI	Method Blank	Confirmation C13-2378 TetraCDF	2013/07/15		75	%	40 - 135
			Confirmation 2,3,7,8-Tetra CDF	2013/07/15	0.11 U, EDL=0.11		pg/g	
		RPD - Sample/Sample Dup	Confirmation 2,3,7,8-Tetra CDF	2013/07/15	NC		%	100
3282191	VCI	Method Blank	Confirmation C13-2378 TetraCDF	2013/07/16		63	%	40 - 135
			Confirmation 2,3,7,8-Tetra CDF	2013/07/16	0.54 J, EDL=0.11		pg/g	
3286123	THT	RPD - Sample/Sample Dup	Moisture	2013/07/19	NC		%	20

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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Apex Laboratories
Attention: Philip Nerenberg
Client Project #: A3F0629
P.O. #:
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: GB3A5623

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.
(1) Recovery exceed method acceptance criteria 80% - 140% due to matrix interference and sample heterogenity
(2) Recovery was not calculated .
The natural sample had a high level of native present as compared to the spike added and was heterogeneous.
(3) Recovery below method acceptance criteria 80% - 140% due to matrix interference and
sample heterogenity.
(4) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.
(5) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
(6) ** From 10X Dilution **

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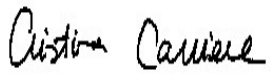
Validation Signature Page

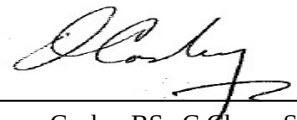
Maxxam Job #: B3A5623

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

Brad Newman, Scientific Specialist



Cristina Carriere, Scientific Services



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

==========

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

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Maxxam

Success Through Science®

Your Project #: A3F0670

Attention: Kent Patton
Apex Laboratories
12232 SW Garden Place
Tigard, OR
USA 97223

Report Date: 2013/08/26

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B3D6144
Received: 2013/08/16, 20:59

Sample Matrix: SEDIMENT
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Dioxins/Furans in Soil (1613B) (1)	4	2013/08/18	2013/08/21	BRL SOP-00410	EPA 1613B mod.
Dioxins/Furans in Soil (1613B) (1)	1	2013/08/20	2013/08/25	BRL SOP-00410	EPA 1613B mod.
2378TCDF Confirmation in Soil	4	N/A	2013/08/22	BRL SOP-00406	EPA 8290A mod.
2378TCDF Confirmation in Soil	1	N/A	2013/08/26	BRL SOP-00406	EPA 8290A mod.
Moisture	4	N/A	2013/08/17	CAM SOP-00445	R.Carter,1993
Moisture	1	N/A	2013/08/21	CAM SOP-00445	R.Carter,1993

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

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

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ivana Vukovic, Env Project Manager
Email: IVukovic@maxxam.ca
Phone# (905) 817-5700

==========

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

Maxxam Analytics Inc. is a NELAC accredited laboratory. Certificate # CANA001. Use of the NELAC logo however does not insure that

Your Project #: A3F0670

Attention: Kent Patton
Apex Laboratories
12232 SW Garden Place
Tigard, OR
USA 97223

Report Date: 2013/08/26

CERTIFICATE OF ANALYSIS

Total cover pages: 2

Maxxam Job #: B3D6144
Report Date: 2013/08/26

Apex Laboratories
Client Project #: A3F0670

RESULTS OF ANALYSES OF SEDIMENT

Maxxam ID		SR7534	SR7535	SR7536	SR7537		SS5504		
Sampling Date		2013/06/26 12:00	2013/06/26 11:10	2013/06/26 10:53	2013/06/26 10:55		2013/06/26 11:10		
	Units	**CL-16-2.5**	**CL-18**	**CL-19**	**CL-22**	**QC Batch**	**CL-23**	**RDL**	**QC Batch**
Moisture	%	30	41	56	42	3318690	45	1.0	3321934

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B3D6144
Report Date: 2013/08/26

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SR7534						
Sampling Date		2013/06/26 12:00			TOXIC EQUIVALENCY		# of	
	Units	CL-16-2.5	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	0.224 J	0.110	1.00	1.00	0.224		3321976
1,2,3,7,8-Penta CDD	pg/g	3.10 J	0.106	5.00	1.00	3.10		3321976
1,2,3,4,7,8-Hexa CDD	pg/g	10.4	0.124	5.00	0.100	1.04		3321976
1,2,3,6,7,8-Hexa CDD	pg/g	86.2	0.133	5.00	0.100	8.62		3321976
1,2,3,7,8,9-Hexa CDD	pg/g	37.6	0.135	5.00	0.100	3.76		3321976
1,2,3,4,6,7,8-Hepta CDD	pg/g	1640	0.0837	5.00	0.0100	16.4		3321976
Octa CDD	pg/g	11900 (1)	2.00	200	0.000300	3.57		3321976
Total Tetra CDD	pg/g	3.16	0.110	1.00				3321976
Total Penta CDD	pg/g	20.4	0.106	5.00				3321976
Total Hexa CDD	pg/g	380	0.133	5.00				3321976
Total Hepta CDD	pg/g	2940	0.0837	5.00				3321976
2,3,7,8-Tetra CDF **	pg/g	2.71	0.106	1.00	0.100	0.271		3321976
1,2,3,7,8-Penta CDF	pg/g	5.50	0.105	5.00	0.0300	0.165		3321976
2,3,4,7,8-Penta CDF	pg/g	6.49	0.103	5.00	0.300	1.95		3321976
1,2,3,4,7,8-Hexa CDF	pg/g	32.8	0.0691	5.00	0.100	3.28		3321976
1,2,3,6,7,8-Hexa CDF	pg/g	11.6	0.0719	5.00	0.100	1.16		3321976
2,3,4,6,7,8-Hexa CDF	pg/g	6.77	0.0652	5.00	0.100	0.677		3321976
1,2,3,7,8,9-Hexa CDF	pg/g	0.935 J	0.0742	5.00	0.100	0.0935		3321976
1,2,3,4,6,7,8-Hepta CDF	pg/g	154	0.0937	5.00	0.0100	1.54		3321976
1,2,3,4,7,8,9-Hepta CDF	pg/g	9.02	0.0949	5.00	0.0100	0.0902		3321976
Octa CDF	pg/g	157	0.172	10.0	0.000300	0.0471		3321976
Total Tetra CDF	pg/g	11.0	0.106	1.00				3321976
Total Penta CDF	pg/g	51.2	0.104	5.00				3321976
Total Hexa CDF	pg/g	363	0.0699	5.00				3321976
Total Hepta CDF	pg/g	458	0.0943	5.00				3321976
Confirmation 2,3,7,8-Tetra CDF	pg/g	2.3	0.10	1.0	0.100	0.230		3323848
TOTAL TOXIC EQUIVALENCY	pg/g					45.9		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD	%	150						3321976

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 20X Dilution Run **

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Maxxam Job #: B3D6144
Report Date: 2013/08/26

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SR7534						
Sampling Date		2013/06/26 12:00			TOXIC EQUIVALENCY		# of	
	Units	CL-16-2.5	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDD *	%	139						3321976
C13-1234678 HeptaCDF **	%	121						3321976
C13-123478 HexaCDD	%	101						3321976
C13-123478 HexaCDF	%	95						3321976
C13-1234789 HeptaCDF	%	127						3321976
C13-123678 HexaCDD	%	91						3321976
C13-123678 HexaCDF	%	94						3321976
C13-12378 PentaCDD	%	147						3321976
C13-12378 PentaCDF	%	134						3321976
C13-123789 HexaCDF	%	113						3321976
C13-234678 HexaCDF	%	114						3321976
C13-23478 PentaCDF	%	151						3321976
C13-2378 TetraCDD	%	105						3321976
C13-2378 TetraCDF	%	119						3321976
C13-OCDD	%	107 (1)						3321976
Confirmation C13-2378 TetraCDF	%	98						3323848

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 20X Dilution Run **

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Maxxam Job #: B3D6144
Report Date: 2013/08/26

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SR7535						
Sampling Date		2013/06/26 11:10			TOXIC EQUIVALENCY		# of	
	Units	CL-18	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	0.608 J	0.0995	1.00	1.00	0.608		3321976
1,2,3,7,8-Penta CDD	pg/g	9.31	0.0972	5.00	1.00	9.31		3321976
1,2,3,4,7,8-Hexa CDD	pg/g	30.5	0.285	5.00	0.100	3.05		3321976
1,2,3,6,7,8-Hexa CDD	pg/g	224	0.308	5.00	0.100	22.4		3321976
1,2,3,7,8,9-Hexa CDD	pg/g	104	0.311	5.00	0.100	10.4		3321976
1,2,3,4,6,7,8-Hepta CDD	pg/g	3960 (1)	1.00	100	0.0100	39.6		3321976
Octa CDD	pg/g	32700 (1)	2.05	200	0.000300	9.81		3321976
Total Tetra CDD	pg/g	16.8	0.0995	1.00				3321976
Total Penta CDD	pg/g	86.2	0.0972	5.00				3321976
Total Hexa CDD	pg/g	1090	0.308	5.00				3321976
Total Hepta CDD	pg/g	7410 (1)	1.00	100				3321976
2,3,7,8-Tetra CDF **	pg/g	7.43	0.111	1.00	0.100	0.743		3321976
1,2,3,7,8-Penta CDF	pg/g	14.0	0.0968	5.00	0.0300	0.420		3321976
2,3,4,7,8-Penta CDF	pg/g	15.2	0.0945	5.00	0.300	4.56		3321976
1,2,3,4,7,8-Hexa CDF	pg/g	74.4	0.0737	5.00	0.100	7.44		3321976
1,2,3,6,7,8-Hexa CDF	pg/g	29.6	0.0767	5.00	0.100	2.96		3321976
2,3,4,6,7,8-Hexa CDF	pg/g	16.7	0.0695	5.00	0.100	1.67		3321976
1,2,3,7,8,9-Hexa CDF	pg/g	2.18 J	0.0792	5.00	0.100	0.218		3321976
1,2,3,4,6,7,8-Hepta CDF	pg/g	397	0.254	5.00	0.0100	3.97		3321976
1,2,3,4,7,8,9-Hepta CDF	pg/g	22.7	0.258	5.00	0.0100	0.227		3321976
Octa CDF	pg/g	487	0.119	10.0	0.000300	0.146		3321976
Total Tetra CDF	pg/g	41.0	0.111	1.00				3321976
Total Penta CDF	pg/g	138	0.0956	5.00				3321976
Total Hexa CDF	pg/g	986	0.0746	5.00				3321976
Total Hepta CDF	pg/g	1180	0.256	5.00				3321976
Confirmation 2,3,7,8-Tetra CDF	pg/g	6.0	0.10	1.0	0.100	0.600		3323848
TOTAL TOXIC EQUIVALENCY	pg/g					117		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD	%	146						3321976

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 20X Dilution Run **

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Maxxam Job #: B3D6144
Report Date: 2013/08/26

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SR7535						
Sampling Date		2013/06/26 11:10			TOXIC EQUIVALENCY		# of	
	Units	CL-18	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDD *	%	139 (1)						3321976
C13-1234678 HeptaCDF **	%	130						3321976
C13-123478 HexaCDD	%	101						3321976
C13-123478 HexaCDF	%	101						3321976
C13-1234789 HeptaCDF	%	131						3321976
C13-123678 HexaCDD	%	96						3321976
C13-123678 HexaCDF	%	98						3321976
C13-12378 PentaCDD	%	146						3321976
C13-12378 PentaCDF	%	138						3321976
C13-123789 HexaCDF	%	111						3321976
C13-234678 HexaCDF	%	112						3321976
C13-23478 PentaCDF	%	152						3321976
C13-2378 TetraCDD	%	103						3321976
C13-2378 TetraCDF	%	119						3321976
C13-OCDD	%	127 (1)						3321976
Confirmation C13-2378 TetraCDF	%	95						3323848

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 20X Dilution Run **

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Maxxam Job #: B3D6144
Report Date: 2013/08/26

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SR7536						
Sampling Date		2013/06/26 10:53			TOXIC EQUIVALENCY		# of	
	Units	CL-19	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	0.202 J	0.113	0.998	1.00	0.202		3321976
1,2,3,7,8-Penta CDD	pg/g	1.78 J	0.111	4.99	1.00	1.78		3321976
1,2,3,4,7,8-Hexa CDD	pg/g	6.51	0.0797	4.99	0.100	0.651		3321976
1,2,3,6,7,8-Hexa CDD	pg/g	46.4	0.0859	4.99	0.100	4.64		3321976
1,2,3,7,8,9-Hexa CDD	pg/g	23.1	0.0868	4.99	0.100	2.31		3321976
1,2,3,4,6,7,8-Hepta CDD	pg/g	950	0.0848	4.99	0.0100	9.50		3321976
Octa CDD	pg/g	6930 (1)	2.09	200	0.000300	2.08		3321976
Total Tetra CDD	pg/g	3.03	0.113	0.998				3321976
Total Penta CDD	pg/g	15.5	0.111	4.99				3321976
Total Hexa CDD	pg/g	241	0.0859	4.99				3321976
Total Hepta CDD	pg/g	1710	0.0848	4.99				3321976
2,3,7,8-Tetra CDF **	pg/g	1.66	0.103	0.998	0.100	0.166		3321976
1,2,3,7,8-Penta CDF	pg/g	2.90 J	0.0842	4.99	0.0300	0.0870		3321976
2,3,4,7,8-Penta CDF	pg/g	2.97 J	0.0823	4.99	0.300	0.891		3321976
1,2,3,4,7,8-Hexa CDF	pg/g	15.4	0.0826	4.99	0.100	1.54		3321976
1,2,3,6,7,8-Hexa CDF	pg/g	6.11	0.0859	4.99	0.100	0.611		3321976
2,3,4,6,7,8-Hexa CDF	pg/g	3.51 J	0.0779	4.99	0.100	0.351		3321976
1,2,3,7,8,9-Hexa CDF	pg/g	0.459 J	0.0887	4.99	0.100	0.0459		3321976
1,2,3,4,6,7,8-Hepta CDF	pg/g	85.0	0.0893	4.99	0.0100	0.850		3321976
1,2,3,4,7,8,9-Hepta CDF	pg/g	4.72 J	0.0905	4.99	0.0100	0.0472		3321976
Octa CDF	pg/g	90.3	0.0998	9.98	0.000300	0.0271		3321976
Total Tetra CDF	pg/g	7.36	0.103	0.998				3321976
Total Penta CDF	pg/g	22.4	0.0832	4.99				3321976
Total Hexa CDF	pg/g	173	0.0836	4.99				3321976
Total Hepta CDF	pg/g	232	0.0899	4.99				3321976
Confirmation 2,3,7,8-Tetra CDF	pg/g	1.5	0.10	1.0	0.100	0.150		3323848
TOTAL TOXIC EQUIVALENCY	pg/g					25.8		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD	%	128						3321976

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 20X Dilution Run **

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Maxxam Job #: B3D6144
Report Date: 2013/08/26

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SR7536						
Sampling Date		2013/06/26 10:53			TOXIC EQUIVALENCY		# of	
	Units	CL-19	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDD *	%	126						3321976
C13-1234678 HeptaCDF **	%	108						3321976
C13-123478 HexaCDD	%	83						3321976
C13-123478 HexaCDF	%	83						3321976
C13-1234789 HeptaCDF	%	118						3321976
C13-123678 HexaCDD	%	79						3321976
C13-123678 HexaCDF	%	83						3321976
C13-12378 PentaCDD	%	128						3321976
C13-12378 PentaCDF	%	114						3321976
C13-123789 HexaCDF	%	94						3321976
C13-234678 HexaCDF	%	95						3321976
C13-23478 PentaCDF	%	126						3321976
C13-2378 TetraCDD	%	90						3321976
C13-2378 TetraCDF	%	100						3321976
C13-OCDD	%	111 (1)						3321976
Confirmation C13-2378 TetraCDF	%	72						3323848

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 20X Dilution Run **

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Maxxam Job #: B3D6144
Report Date: 2013/08/26

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SR7537						
Sampling Date		2013/06/26 10:55			TOXIC EQUIVALENCY		# of	
	Units	CL-22	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	0.242 J	0.0997	0.999	1.00	0.242		3321976
1,2,3,7,8-Penta CDD	pg/g	2.65 J	0.0812	5.00	1.00	2.65		3321976
1,2,3,4,7,8-Hexa CDD	pg/g	9.02	0.156	5.00	0.100	0.902		3321976
1,2,3,6,7,8-Hexa CDD	pg/g	63.5	0.168	5.00	0.100	6.35		3321976
1,2,3,7,8,9-Hexa CDD	pg/g	32.8	0.170	5.00	0.100	3.28		3321976
1,2,3,4,6,7,8-Hepta CDD	pg/g	1320	0.0737	5.00	0.0100	13.2		3321976
Octa CDD	pg/g	9290 (1)	2.01	200	0.000300	2.79		3321976
Total Tetra CDD	pg/g	3.25	0.0997	0.999				3321976
Total Penta CDD	pg/g	19.1	0.0812	5.00				3321976
Total Hexa CDD	pg/g	322	0.168	5.00				3321976
Total Hepta CDD	pg/g	2340	0.0737	5.00				3321976
2,3,7,8-Tetra CDF **	pg/g	2.04	0.116	0.999	0.100	0.204		3321976
1,2,3,7,8-Penta CDF	pg/g	3.84 J	0.0863	5.00	0.0300	0.115		3321976
2,3,4,7,8-Penta CDF	pg/g	4.21 J	0.0843	5.00	0.300	1.26		3321976
1,2,3,4,7,8-Hexa CDF	pg/g	22.8	0.125	5.00	0.100	2.28		3321976
1,2,3,6,7,8-Hexa CDF	pg/g	8.93	0.130	5.00	0.100	0.893		3321976
2,3,4,6,7,8-Hexa CDF	pg/g	5.13	0.118	5.00	0.100	0.513		3321976
1,2,3,7,8,9-Hexa CDF	pg/g	0.635 J	0.135	5.00	0.100	0.0635		3321976
1,2,3,4,6,7,8-Hepta CDF	pg/g	116	0.126	5.00	0.0100	1.16		3321976
1,2,3,4,7,8,9-Hepta CDF	pg/g	6.53	0.127	5.00	0.0100	0.0653		3321976
Octa CDF	pg/g	125	0.100	9.99	0.000300	0.0375		3321976
Total Tetra CDF	pg/g	8.58	0.116	0.999				3321976
Total Penta CDF	pg/g	29.1	0.0853	5.00				3321976
Total Hexa CDF	pg/g	223	0.127	5.00				3321976
Total Hepta CDF	pg/g	322	0.127	5.00				3321976
Confirmation 2,3,7,8-Tetra CDF	pg/g	1.8	0.11	1.0	0.100	0.180		3323848
TOTAL TOXIC EQUIVALENCY	pg/g					36.0		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD	%	159						3321976

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 20X Dilution Run **

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Maxxam Job #: B3D6144
Report Date: 2013/08/26

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SR7537						
Sampling Date		2013/06/26 10:55			TOXIC EQUIVALENCY		# of	
	Units	CL-22	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDD *	%	139						3321976
C13-1234678 HeptaCDF **	%	117						3321976
C13-123478 HexaCDD	%	99						3321976
C13-123478 HexaCDF	%	85						3321976
C13-1234789 HeptaCDF	%	135						3321976
C13-123678 HexaCDD	%	91						3321976
C13-123678 HexaCDF	%	83						3321976
C13-12378 PentaCDD	%	155						3321976
C13-12378 PentaCDF	%	148						3321976
C13-123789 HexaCDF	%	116						3321976
C13-234678 HexaCDF	%	110						3321976
C13-23478 PentaCDF	%	160						3321976
C13-2378 TetraCDD	%	115						3321976
C13-2378 TetraCDF	%	126						3321976
C13-OCDD	%	152 (1)						3321976
Confirmation C13-2378 TetraCDF	%	94						3323848

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** From 20X Dilution Run **

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Maxxam Job #: B3D6144
Report Date: 2013/08/26

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SS5504						
Sampling Date		2013/06/26 11:10			TOXIC EQUIVALENCY		# of	
	Units	CL-23	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg/g	0.128 U (1)	0.128	0.997	1.00	0.128		3326936
1,2,3,7,8-Penta CDD	pg/g	1.85 J	0.107	4.99	1.00	1.85		3326936
1,2,3,4,7,8-Hexa CDD	pg/g	6.34	0.0939	4.99	0.100	0.634		3326936
1,2,3,6,7,8-Hexa CDD	pg/g	44.4	0.103	4.99	0.100	4.44		3326936
1,2,3,7,8,9-Hexa CDD	pg/g	19.6	0.101	4.99	0.100	1.96		3326936
1,2,3,4,6,7,8-Hepta CDD	pg/g	879	0.105	4.99	0.0100	8.79		3326936
Octa CDD	pg/g	6210 (2)	0.502	9.97	0.000300	1.86		3326936
Total Tetra CDD	pg/g	1.20	0.101	0.997				3326936
Total Penta CDD	pg/g	13.2	0.107	4.99				3326936
Total Hexa CDD	pg/g	228	0.101	4.99				3326936
Total Hepta CDD	pg/g	1640	0.105	4.99				3326936
2,3,7,8-Tetra CDF **	pg/g	1.36	0.100	0.997	0.100	0.136		3326936
1,2,3,7,8-Penta CDF	pg/g	2.62 J	0.106	4.99	0.0300	0.0786		3326936
2,3,4,7,8-Penta CDF	pg/g	2.93 J	0.102	4.99	0.300	0.879		3326936
1,2,3,4,7,8-Hexa CDF	pg/g	14.6	0.101	4.99	0.100	1.46		3326936
1,2,3,6,7,8-Hexa CDF	pg/g	6.03	0.104	4.99	0.100	0.603		3326936
2,3,4,6,7,8-Hexa CDF	pg/g	3.09 J	0.0943	4.99	0.100	0.309		3326936
1,2,3,7,8,9-Hexa CDF	pg/g	0.369 J	0.108	4.99	0.100	0.0369		3326936
1,2,3,4,6,7,8-Hepta CDF	pg/g	79.6	0.106	4.99	0.0100	0.796		3326936
1,2,3,4,7,8,9-Hepta CDF	pg/g	3.96 J	0.106	4.99	0.0100	0.0396		3326936
Octa CDF	pg/g	82.7	0.109	9.97	0.000300	0.0248		3326936
Total Tetra CDF	pg/g	3.71	0.100	0.997				3326936
Total Penta CDF	pg/g	15.3	0.104	4.99				3326936
Total Hexa CDF	pg/g	142	0.102	4.99				3326936
Total Hepta CDF	pg/g	219	0.106	4.99				3326936
Confirmation 2,3,7,8-Tetra CDF	pg/g	1.5	0.10	1.0	0.100	0.150		3327856
TOTAL TOXIC EQUIVALENCY	pg/g					24.0		

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
(2) Results are from 5xdiln

Maxxam Job #: B3D6144
Report Date: 2013/08/26

Apex Laboratories
Client Project #: A3F0670

DIOXINS AND FURANS BY HRMS (SEDIMENT)

Maxxam ID		SS5504						
Sampling Date		2013/06/26 11:10			TOXIC EQUIVALENCY		# of	
	Units	CL-23	EDL	RDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD *	%	101						3326936
C13-1234678 HeptaCDD	%	117						3326936
C13-1234678 HeptaCDF **	%	105						3326936
C13-123478 HexaCDD	%	100						3326936
C13-123478 HexaCDF	%	92						3326936
C13-1234789 HeptaCDF	%	108						3326936
C13-123678 HexaCDD	%	99						3326936
C13-123678 HexaCDF	%	93						3326936
C13-12378 PentaCDD	%	100						3326936
C13-12378 PentaCDF	%	92						3326936
C13-123789 HexaCDF	%	102						3326936
C13-234678 HexaCDF	%	117						3326936
C13-23478 PentaCDF	%	114						3326936
C13-2378 TetraCDD	%	77						3326936
C13-2378 TetraCDF	%	74						3326936
C13-OCDD	%	116 (1)						3326936
Confirmation C13-2378 TetraCDF	%	80						3327856

RDL = Reportable Detection Limit
EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) Results are from 5xdiln

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Maxxam Job #: B3D6144
Report Date: 2013/08/26

Apex Laboratories
Client Project #: A3F0670

Test Summary

Maxxam ID SR7534 **Collected** 2013/06/26
Sample ID CL-16-2.5 **Shipped**
Matrix SEDIMENT **Received** 2013/08/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3321976	2013/08/18	2013/08/21	Kay Shaw
2378TCDF Confirmation in Soil	HRMS/MS	3323848	N/A	2013/08/22	Vica Cioranic
Moisture	BAL	3318690	N/A	2013/08/17	Min Yang

Maxxam ID SR7535 **Collected** 2013/06/26
Sample ID CL-18 **Shipped**
Matrix SEDIMENT **Received** 2013/08/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3321976	2013/08/18	2013/08/21	Kay Shaw
2378TCDF Confirmation in Soil	HRMS/MS	3323848	N/A	2013/08/22	Vica Cioranic
Moisture	BAL	3318690	N/A	2013/08/17	Min Yang

Maxxam ID SR7536 **Collected** 2013/06/26
Sample ID CL-19 **Shipped**
Matrix SEDIMENT **Received** 2013/08/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3321976	2013/08/18	2013/08/21	Kay Shaw
2378TCDF Confirmation in Soil	HRMS/MS	3323848	N/A	2013/08/22	Vica Cioranic
Moisture	BAL	3318690	N/A	2013/08/17	Min Yang

Maxxam ID SR7537 **Collected** 2013/06/26
Sample ID CL-22 **Shipped**
Matrix SEDIMENT **Received** 2013/08/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3321976	2013/08/18	2013/08/21	Kay Shaw
2378TCDF Confirmation in Soil	HRMS/MS	3323848	N/A	2013/08/22	Vica Cioranic
Moisture	BAL	3318690	N/A	2013/08/17	Min Yang

Maxxam ID SS5504 **Collected** 2013/06/26
Sample ID CL-23 **Shipped**
Matrix SEDIMENT **Received** 2013/08/16

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (1613B)	HRMS/MS	3326936	2013/08/20	2013/08/25	Kay Shaw
2378TCDF Confirmation in Soil	HRMS/MS	3327856	N/A	2013/08/26	Owen Cosby
Moisture	BAL	3321934	N/A	2013/08/21	Chun Yan

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Maxxam Job #: B3D6144
Report Date: 2013/08/26

Apex Laboratories
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GENERAL COMMENTS

Results relate only to the items tested.

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Apex Laboratories
Attention: Kent Patton
Client Project #: A3F0670
P.O. #:
Site Location:

Quality Assurance Report

Maxxam Job Number: GB3D6144

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3318690	THT	RPD - Sample/Sample Dup	Moisture	2013/08/17	1.5		%	20
3321934	JV1	RPD - Sample/Sample Dup	Moisture	2013/08/21	2.2		%	20
3321976	KKS	Spiked Blank	37CL4 2378 Tetra CDD	2013/08/21		187	%	35 - 197
		Spiked Blank DUP	37CL4 2378 Tetra CDD	2013/08/21		149	%	35 - 197
		Spiked Blank	C13-1234678 HeptaCDD	2013/08/21		147 (1)	%	23 - 140
		Spiked Blank DUP	C13-1234678 HeptaCDD	2013/08/21		117	%	23 - 140
		Spiked Blank	C13-1234678 HeptaCDF	2013/08/21		129	%	28 - 143
		Spiked Blank DUP	C13-1234678 HeptaCDF	2013/08/21		111	%	28 - 143
		Spiked Blank	C13-123478 HexaCDD	2013/08/21		114	%	32 - 141
		Spiked Blank DUP	C13-123478 HexaCDD	2013/08/21		98	%	32 - 141
		Spiked Blank	C13-123478 HexaCDF	2013/08/21		102	%	26 - 152
		Spiked Blank DUP	C13-123478 HexaCDF	2013/08/21		91	%	26 - 152
		Spiked Blank	C13-1234789 HeptaCDF	2013/08/21		143 (2)	%	26 - 138
		Spiked Blank DUP	C13-1234789 HeptaCDF	2013/08/21		107	%	26 - 138
		Spiked Blank	C13-123678 HexaCDD	2013/08/21		106	%	28 - 130
		Spiked Blank DUP	C13-123678 HexaCDD	2013/08/21		90	%	28 - 130
		Spiked Blank	C13-123678 HexaCDF	2013/08/21		100	%	26 - 123
		Spiked Blank DUP	C13-123678 HexaCDF	2013/08/21		89	%	26 - 123
		Spiked Blank	C13-12378 PentaCDD	2013/08/21		169	%	25 - 181
		Spiked Blank DUP	C13-12378 PentaCDD	2013/08/21		143	%	25 - 181
		Spiked Blank	C13-12378 PentaCDF	2013/08/21		156	%	24 - 185
		Spiked Blank DUP	C13-12378 PentaCDF	2013/08/21		131	%	24 - 185
		Spiked Blank	C13-123789 HexaCDF	2013/08/21		127	%	29 - 147
		Spiked Blank DUP	C13-123789 HexaCDF	2013/08/21		106	%	29 - 147
		Spiked Blank	C13-234678 HexaCDF	2013/08/21		128	%	28 - 136
		Spiked Blank DUP	C13-234678 HexaCDF	2013/08/21		108	%	28 - 136
		Spiked Blank	C13-23478 PentaCDF	2013/08/21		173	%	21 - 178
		Spiked Blank DUP	C13-23478 PentaCDF	2013/08/21		152	%	21 - 178
		Spiked Blank	C13-2378 TetraCDD	2013/08/21		126	%	25 - 164
		Spiked Blank DUP	C13-2378 TetraCDD	2013/08/21		104	%	25 - 164
		Spiked Blank	C13-2378 TetraCDF	2013/08/21		132	%	24 - 169
		Spiked Blank DUP	C13-2378 TetraCDF	2013/08/21		114	%	24 - 169
		Spiked Blank	C13-OCDD	2013/08/21		141	%	17 - 157
		Spiked Blank DUP	C13-OCDD	2013/08/21		102	%	17 - 157
		Spiked Blank	2,3,7,8-Tetra CDD	2013/08/21		107	%	67 - 158
		Spiked Blank DUP	2,3,7,8-Tetra CDD	2013/08/21		106	%	67 - 158
		RPD	2,3,7,8-Tetra CDD	2013/08/21	0.9		%	25
		Spiked Blank	1,2,3,7,8-Penta CDD	2013/08/21		99	%	70 - 142
		Spiked Blank DUP	1,2,3,7,8-Penta CDD	2013/08/21		100	%	70 - 142
		RPD	1,2,3,7,8-Penta CDD	2013/08/21	1.0		%	25
		Spiked Blank	1,2,3,4,7,8-Hexa CDD	2013/08/21		101	%	70 - 164
		Spiked Blank DUP	1,2,3,4,7,8-Hexa CDD	2013/08/21		99	%	70 - 164
		RPD	1,2,3,4,7,8-Hexa CDD	2013/08/21	2.0		%	25
		Spiked Blank	1,2,3,6,7,8-Hexa CDD	2013/08/21		104	%	76 - 134
		Spiked Blank DUP	1,2,3,6,7,8-Hexa CDD	2013/08/21		102	%	76 - 134
		RPD	1,2,3,6,7,8-Hexa CDD	2013/08/21	1.9		%	25
		Spiked Blank	1,2,3,7,8,9-Hexa CDD	2013/08/21		124	%	64 - 162
		Spiked Blank DUP	1,2,3,7,8,9-Hexa CDD	2013/08/21		122	%	64 - 162
		RPD	1,2,3,7,8,9-Hexa CDD	2013/08/21	1.6		%	25
		Spiked Blank	1,2,3,4,6,7,8-Hepta CDD	2013/08/21		99	%	70 - 140
		Spiked Blank DUP	1,2,3,4,6,7,8-Hepta CDD	2013/08/21		99	%	70 - 140

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Apex Laboratories
Attention: Kent Patton
Client Project #: A3F0670
P.O. #:
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: GB3D6144

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3321976	KKS	RPD	1,2,3,4,6,7,8-Hepta CDD	2013/08/21	0		%	25
		Spiked Blank	Octa CDD	2013/08/21		101	%	78 - 144
		Spiked Blank DUP	Octa CDD	2013/08/21		98	%	78 - 144
		RPD	Octa CDD	2013/08/21	3.0		%	25
		Spiked Blank	2,3,7,8-Tetra CDF	2013/08/21		108	%	75 - 158
		Spiked Blank DUP	2,3,7,8-Tetra CDF	2013/08/21		104	%	75 - 158
		RPD	2,3,7,8-Tetra CDF	2013/08/21	3.8		%	25
		Spiked Blank	1,2,3,7,8-Penta CDF	2013/08/21		97	%	80 - 134
		Spiked Blank DUP	1,2,3,7,8-Penta CDF	2013/08/21		98	%	80 - 134
		RPD	1,2,3,7,8-Penta CDF	2013/08/21	1.0		%	25
		Spiked Blank	2,3,4,7,8-Penta CDF	2013/08/21		95	%	68 - 160
		Spiked Blank DUP	2,3,4,7,8-Penta CDF	2013/08/21		94	%	68 - 160
		RPD	2,3,4,7,8-Penta CDF	2013/08/21	1.1		%	25
		Spiked Blank	1,2,3,4,7,8-Hexa CDF	2013/08/21		103	%	72 - 134
		Spiked Blank DUP	1,2,3,4,7,8-Hexa CDF	2013/08/21		101	%	72 - 134
		RPD	1,2,3,4,7,8-Hexa CDF	2013/08/21	2.0		%	25
		Spiked Blank	1,2,3,6,7,8-Hexa CDF	2013/08/21		97	%	84 - 130
		Spiked Blank DUP	1,2,3,6,7,8-Hexa CDF	2013/08/21		96	%	84 - 130
		RPD	1,2,3,6,7,8-Hexa CDF	2013/08/21	1.0		%	25
		Spiked Blank	2,3,4,6,7,8-Hexa CDF	2013/08/21		89	%	70 - 156
		Spiked Blank DUP	2,3,4,6,7,8-Hexa CDF	2013/08/21		88	%	70 - 156
		RPD	2,3,4,6,7,8-Hexa CDF	2013/08/21	1.1		%	25
		Spiked Blank	1,2,3,7,8,9-Hexa CDF	2013/08/21		101	%	78 - 130
		Spiked Blank DUP	1,2,3,7,8,9-Hexa CDF	2013/08/21		100	%	78 - 130
		RPD	1,2,3,7,8,9-Hexa CDF	2013/08/21	1		%	25
		Spiked Blank	1,2,3,4,6,7,8-Hepta CDF	2013/08/21		99	%	82 - 122
		Spiked Blank DUP	1,2,3,4,6,7,8-Hepta CDF	2013/08/21		97	%	82 - 122
		RPD	1,2,3,4,6,7,8-Hepta CDF	2013/08/21	2.0		%	25
		Spiked Blank	1,2,3,4,7,8,9-Hepta CDF	2013/08/21		102	%	78 - 138
		Spiked Blank DUP	1,2,3,4,7,8,9-Hepta CDF	2013/08/21		99	%	78 - 138
		RPD	1,2,3,4,7,8,9-Hepta CDF	2013/08/21	3.0		%	25
		Spiked Blank	Octa CDF	2013/08/21		100	%	63 - 170
		Spiked Blank DUP	Octa CDF	2013/08/21		85	%	63 - 170
		RPD	Octa CDF	2013/08/21	16.2		%	25
		Method Blank	37CL4 2378 Tetra CDD	2013/08/21		157	%	35 - 197
			C13-1234678 HeptaCDD	2013/08/21		126	%	23 - 140
			C13-1234678 HeptaCDF	2013/08/21		117	%	28 - 143
			C13-123478 HexaCDD	2013/08/21		99	%	32 - 141
			C13-123478 HexaCDF	2013/08/21		91	%	26 - 152
			C13-1234789 HeptaCDF	2013/08/21		123	%	26 - 138
			C13-123678 HexaCDD	2013/08/21		94	%	28 - 130
			C13-123678 HexaCDF	2013/08/21		85	%	26 - 123
			C13-12378 PentaCDD	2013/08/21		151	%	25 - 181
			C13-12378 PentaCDF	2013/08/21		136	%	24 - 185
			C13-123789 HexaCDF	2013/08/21		115	%	29 - 147
			C13-234678 HexaCDF	2013/08/21		112	%	28 - 136
			C13-23478 PentaCDF	2013/08/21		155	%	21 - 178
			C13-2378 TetraCDD	2013/08/21		107	%	25 - 164
			C13-2378 TetraCDF	2013/08/21		112	%	24 - 169
			C13-OCDD	2013/08/21		117	%	17 - 157
			2,3,7,8-Tetra CDD	2013/08/21	0.100 U, EDL=0.100		pg/g	
			1,2,3,7,8-Penta CDD	2013/08/21	0.0911 U, EDL=0.0911		pg/g	
			1,2,3,4,7,8-Hexa CDD	2013/08/21	0.0820 U, EDL=0.0820		pg/g	
			1,2,3,6,7,8-Hexa CDD	2013/08/21	0.0884 U, EDL=0.0884		pg/g	
			1,2,3,7,8,9-Hexa CDD	2013/08/21	0.0893 U, EDL=0.0893		pg/g	

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Apex Laboratories
Attention: Kent Patton
Client Project #: A3F0670
P.O. #:
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: GB3D6144

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3321976	KKS	Method Blank	1,2,3,4,6,7,8-Hepta CDD	2013/08/21	0.0888 U, EDL=0.0888		pg/g	
			Octa CDD	2013/08/21	0.105 J, EDL=0.101		pg/g	
			Total Tetra CDD	2013/08/21	0.100 U, EDL=0.100		pg/g	
			Total Penta CDD	2013/08/21	0.0911 U, EDL=0.0911		pg/g	
			Total Hexa CDD	2013/08/21	0.0884 U, EDL=0.0884		pg/g	
			Total Hepta CDD	2013/08/21	0.0888 U, EDL=0.0888		pg/g	
			2,3,7,8-Tetra CDF	2013/08/21	0.0735 U, EDL=0.0735		pg/g	
			1,2,3,7,8-Penta CDF	2013/08/21	0.100 U, EDL=0.100		pg/g	
			2,3,4,7,8-Penta CDF	2013/08/21	0.0981 U, EDL=0.0981		pg/g	
			1,2,3,4,7,8-Hexa CDF	2013/08/21	0.0425 U, EDL=0.0425		pg/g	
			1,2,3,6,7,8-Hexa CDF	2013/08/21	0.0442 U, EDL=0.0442		pg/g	
			2,3,4,6,7,8-Hexa CDF	2013/08/21	0.0401 U, EDL=0.0401		pg/g	
			1,2,3,7,8,9-Hexa CDF	2013/08/21	0.0456 U, EDL=0.0456		pg/g	
			1,2,3,4,6,7,8-Hepta CDF	2013/08/21	0.0531 U, EDL=0.0531		pg/g	
			1,2,3,4,7,8,9-Hepta CDF	2013/08/21	0.0539 U, EDL=0.0539		pg/g	
			Octa CDF	2013/08/21	0.0857 U, EDL=0.0857		pg/g	
			Total Tetra CDF	2013/08/21	0.0735 U, EDL=0.0735		pg/g	
			Total Penta CDF	2013/08/21	0.0993 U, EDL=0.0993		pg/g	
			Total Hexa CDF	2013/08/21	0.0430 U, EDL=0.0430		pg/g	
			Total Hepta CDF	2013/08/21	0.0535 U, EDL=0.0535		pg/g	
3326936	KKS	Spiked Blank	37CL4 2378 Tetra CDD	2013/08/25		103	%	35 - 197
			C13-1234678 HeptaCDD	2013/08/25		105	%	23 - 140
			C13-1234678 HeptaCDF	2013/08/25		105	%	28 - 143
			C13-123478 HexaCDD	2013/08/25		100	%	32 - 141
			C13-123478 HexaCDF	2013/08/25		98	%	26 - 152
			C13-1234789 HeptaCDF	2013/08/25		104	%	26 - 138
			C13-123678 HexaCDD	2013/08/25		98	%	28 - 130
			C13-123678 HexaCDF	2013/08/25		101	%	26 - 123
			C13-12378 PentaCDD	2013/08/25		105	%	25 - 181
			C13-12378 PentaCDF	2013/08/25		91	%	24 - 185
			C13-123789 HexaCDF	2013/08/25		98	%	29 - 147
			C13-234678 HexaCDF	2013/08/25		112	%	28 - 136
			C13-23478 PentaCDF	2013/08/25		118	%	21 - 178
			C13-2378 TetraCDD	2013/08/25		73	%	25 - 164
			C13-2378 TetraCDF	2013/08/25		76	%	24 - 169
			C13-OCDD	2013/08/25		95	%	17 - 157
			2,3,7,8-Tetra CDD	2013/08/25		98	%	67 - 158
			1,2,3,7,8-Penta CDD	2013/08/25		92	%	70 - 142
			1,2,3,4,7,8-Hexa CDD	2013/08/25		94	%	70 - 164
			1,2,3,6,7,8-Hexa CDD	2013/08/25		98	%	76 - 134
			1,2,3,7,8,9-Hexa CDD	2013/08/25		99	%	64 - 162
			1,2,3,4,6,7,8-Hepta CDD	2013/08/25		94	%	70 - 140
			Octa CDD	2013/08/25		95	%	78 - 144
			2,3,7,8-Tetra CDF	2013/08/25		97	%	75 - 158
			1,2,3,7,8-Penta CDF	2013/08/25		97	%	80 - 134
			2,3,4,7,8-Penta CDF	2013/08/25		90	%	68 - 160
			1,2,3,4,7,8-Hexa CDF	2013/08/25		97	%	72 - 134
			1,2,3,6,7,8-Hexa CDF	2013/08/25		93	%	84 - 130
			2,3,4,6,7,8-Hexa CDF	2013/08/25		84	%	70 - 156
			1,2,3,7,8,9-Hexa CDF	2013/08/25		95	%	78 - 130
			1,2,3,4,6,7,8-Hepta CDF	2013/08/25		92	%	82 - 122
			1,2,3,4,7,8,9-Hepta CDF	2013/08/25		89	%	78 - 138
			Octa CDF	2013/08/25		85	%	63 - 170
		Method Blank	37CL4 2378 Tetra CDD	2013/08/25		89	%	35 - 197
			C13-1234678 HeptaCDD	2013/08/25		102	%	23 - 140

Apex Laboratories
Attention: Kent Patton
Client Project #: A3F0670
P.O. #:
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: GB3D6144

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3326936	KKS	Method Blank	C13-1234678 HeptaCDF	2013/08/25		104	%	28 - 143
			C13-123478 HexaCDD	2013/08/25		99	%	32 - 141
			C13-123478 HexaCDF	2013/08/25		94	%	26 - 152
			C13-1234789 HeptaCDF	2013/08/25		100	%	26 - 138
			C13-123678 HexaCDD	2013/08/25		91	%	28 - 130
			C13-123678 HexaCDF	2013/08/25		97	%	26 - 123
			C13-12378 PentaCDD	2013/08/25		104	%	25 - 181
			C13-12378 PentaCDF	2013/08/25		87	%	24 - 185
			C13-123789 HexaCDF	2013/08/25		98	%	29 - 147
			C13-234678 HexaCDF	2013/08/25		111	%	28 - 136
			C13-23478 PentaCDF	2013/08/25		107	%	21 - 178
			C13-2378 TetraCDD	2013/08/25		69	%	25 - 164
			C13-2378 TetraCDF	2013/08/25		70	%	24 - 169
			C13-OCDD	2013/08/25		93	%	17 - 157
			2,3,7,8-Tetra CDD	2013/08/25	0.104 U,	EDL=0.104	pg/g	
			1,2,3,7,8-Penta CDD	2013/08/25	0.0953 U,	EDL=0.0953	pg/g	
			1,2,3,4,7,8-Hexa CDD	2013/08/25	0.0834 U,	EDL=0.0834	pg/g	
			1,2,3,6,7,8-Hexa CDD	2013/08/25	0.0912 U,	EDL=0.0912	pg/g	
			1,2,3,7,8,9-Hexa CDD	2013/08/25	0.0898 U,	EDL=0.0898	pg/g	
			1,2,3,4,6,7,8-Hepta CDD	2013/08/25	0.103 U,	EDL=0.103	pg/g	
			Octa CDD	2013/08/25	0.130 J,	EDL=0.109	pg/g	
			Total Tetra CDD	2013/08/25	0.104 U,	EDL=0.104	pg/g	
			Total Penta CDD	2013/08/25	0.0953 U,	EDL=0.0953	pg/g	
			Total Hexa CDD	2013/08/25	0.0899 U,	EDL=0.0899	pg/g	
			Total Hepta CDD	2013/08/25	0.103 U,	EDL=0.103	pg/g	
			2,3,7,8-Tetra CDF	2013/08/25	0.0833 U,	EDL=0.0833	pg/g	
			1,2,3,7,8-Penta CDF	2013/08/25	0.105 U,	EDL=0.105	pg/g	
			2,3,4,7,8-Penta CDF	2013/08/25	0.101 U,	EDL=0.101	pg/g	
			1,2,3,4,7,8-Hexa CDF	2013/08/25	0.0701 U,	EDL=0.0701	pg/g	
			1,2,3,6,7,8-Hexa CDF	2013/08/25	0.0726 U,	EDL=0.0726	pg/g	
			2,3,4,6,7,8-Hexa CDF	2013/08/25	0.0657 U,	EDL=0.0657	pg/g	
			1,2,3,7,8,9-Hexa CDF	2013/08/25	0.0754 U,	EDL=0.0754	pg/g	
			1,2,3,4,6,7,8-Hepta CDF	2013/08/25	0.106 U,	EDL=0.106	pg/g	
			1,2,3,4,7,8,9-Hepta CDF	2013/08/25	0.106 U,	EDL=0.106	pg/g	
			Octa CDF	2013/08/25	0.104 U,	EDL=0.104	pg/g	
			Total Tetra CDF	2013/08/25	0.0833 U,	EDL=0.0833	pg/g	
			Total Penta CDF	2013/08/25	0.103 U,	EDL=0.103	pg/g	
			Total Hexa CDF	2013/08/25	0.0708 U,	EDL=0.0708	pg/g	
			Total Hepta CDF	2013/08/25	0.106 U,	EDL=0.106	pg/g	
3327856	OBC	Method Blank	Confirmation C13-2378 TetraCDF	2013/08/25		85	%	40 - 135
			Confirmation 2,3,7,8-Tetra CDF	2013/08/25	0.39 U,	EDL=0.39	pg/g	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
(1) Recovery meets EPA 1613B acceptance criteria for OPR (LCS) 26% - 166%
(2) Recovery meets EPA 1613B acceptance criteria for OPR (LCS) 20% - 186%

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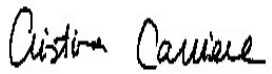
Validation Signature Page

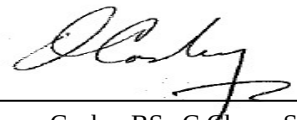
Maxxam Job #: B3D6144

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

Brad Newman, Scientific Specialist



Cristina Carriere, Scientific Services



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

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

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APPENDIX C

DATA VALIDATION MEMORANDUM

DATA QUALITY ASSURANCE/QUALITY CONTROL REVIEW

PROJECT NO. 9003.01.40 | AUGUST 5, 2013 | PORT OF RIDGEFIELD

This report provides the results of the review of analytical results for sediment and rinsate samples collected by Maul Foster & Alongi, Inc. (MFA) in Carty Lake, Washington, offshore of the Port of Ridgefield-owned Lake River Industrial Site. The samples were collected in June 2013.

Apex Labs (Apex) and Maxxam Analytics Inc. (Maxxam) performed the analyses. Apex report numbers A3F0664 FINAL 07 16 13 1724 (A3F0664), A3F0672 FINAL 07 17 13 1626 (A3F0672), A3F0629 FINAL 07 26 13 1157 (A3F0629), and A3F0670 Amended FINAL 08 28 1433 (A3F0670), and Maxxam report numbers B3A4694-R2013-07-17_11-03-41_R006 (B3A4694), B3A5623-R2013-07-22_09-45-21_R006 (B3A5623), B3A4675-R2013-07-16_15-19-19_R006 (B3A4675), B3A4701-R2013-07-16_16-39-27_R006 (B3A4701), and B3D6144-R2013-08-26_16-41-05_R006 (B3D6144) were reviewed.

Decision unit samples received by Apex were processed following incremental sampling methodology (ISM) identified in the Carty Lake predesign sampling and analysis plan (MFA, 2013). ISM-prepared decision unit samples were provided to Maxxam by Apex for analysis of chlorinated dibenzo-p-dioxins and dibenzofurans (dioxins). The analyses performed on rinsate blanks, discrete and ISM-processed, decision unit samples are listed below.

Analysis	Reference
Total organic carbon	PSEP/SM 5310B Modified
Dioxins	USEPA Method 1613B/8290A Modified
Pentachlorophenol	USEPA Method 8270D
Total metals	USEPA Method 6020A

PSEP = Puget Sound Estuary Protocols (PSEP, 1997).
SM = Standard Methods for the Examination of Water and Wastewater.
USEPA = U.S. Environmental Protection Agency.

DATA QUALIFICATIONS

Analytical results were evaluated according to applicable sections of USEPA procedures (USEPA, 2008, 2010, 2011); appropriate laboratory, method-specific guidelines (Apex, 2013; Maxxam, 2013; USEPA, 1986); and the dioxin rules memorandum (MFA, 2012) developed by MFA and approved by the Washington State Department of Ecology.

Data validation procedures were modified, as appropriate, to accommodate quality-control requirements for methods not specifically addressed by the functional guidelines (i.e., total organic carbon).

USEPA Method 1613B Modified detected results that were reported as an estimated maximum potential concentration (EMPC) were assigned a "U" qualifier (non-detect) at the reported EMPC value.

Report	Sample	Analyte	Original Result (pg/g)	Qualified Result (pg/g)
B3A5623	LRIS-CL-DU1C—ISM Composite	1,2,3,7,8,9-HxCDD	237 EMPC	237 U
B3A5623	LRIS-CL-DU1C—ISM Composite	1,2,3,4,7,8-HxCDF	283 EMPC	283 U
B3A5623	LRIS-CL-DU1B—ISM Composite	1,2,3,7,8,9-HxCDD	341 EMPC	341 U
B3A5623	LRIS-CL-DU1B—ISM Composite	1,2,3,4,7,8-HxCDF	322 EMPC	322 U
B3A5623	LRIS-CL-DU4—ISM Composite	1,2,3,7,8,9-HxCDD	186 EMPC	186 U
B3A5623	LRIS-CL-DU4—ISM Composite	1,2,3,4,7,8-HxCDF	160 EMPC	160 U
B3A5623	LRIS-CL-DU4—ISM Composite	1,2,3,6,7,8-HxCDF	69.5 EMPC	69.5 U
B3A5623	LRIS-CL-DU5—ISM Composite	1,2,3,7,8,9-HxCDD	21.6 EMPC	21.6 U
B3A5623	LRIS-CL-DU5—ISM Composite	1,2,3,4,7,8-HxCDF	15.3 EMPC	15.3 U
B3A5623	LRIS-CL-DU5—ISM Composite	1,2,3,6,7,8-HxCDF	6.60 EMPC	6.60 U

EMPC = estimated maximum potential concentration.
J = Result is an estimate.
pg/g = picograms per gram.
U = non-detect.

In Maxxam report B3A5623, the laboratory noted that high-volume extraction was performed for USEPA Method 1613B Modified, and that some analytes exceeded instrument calibration range. These samples could not be further diluted without significant loss of the C13 labeled standards, which are added to each sample prior to extraction in order to quantify the individual target compounds. The compounds that exceeded instrument calibration range were flagged by the laboratory as exceeding the maximum calibration limit (EMCL) and have been qualified "J" as estimated. These compounds were also qualified "J" as estimated for sediment reference material (SRM) exceedances.

Report	Sample	Analyte	Original Result (pg/g)	Qualified Result (pg/g)
B3A5623	LRIS-CL-DU1C—ISM Composite	1,2,3,4,6,7,8-HpCDD	12700 EMCL	12700 J
B3A5623	LRIS-CL-DU1C—ISM Composite	OCDD	52100 EMCL	52100 J
B3A5623	LRIS-CL-DU2—ISM Composite	1,2,3,4,6,7,8-HpCDD	14100 EMCL	14100 J
B3A5623	LRIS-CL-DU2—ISM Composite	OCDD	95300 EMCL	95300 J
B3A5623	LRIS-CL-DU1B—ISM Composite	1,2,3,4,6,7,8-HpCDD	18900 EMCL	18900 J
B3A5623	LRIS-CL-DU1B—ISM Composite	OCDD	76500 EMCL	76500 J
B3A5623	LRIS-CL-DU4—ISM Composite	OCDD	81800 EMCL	81800 J

EMCL = exceeds maximum calibration limit.
J = Result is an estimated value.
pg/g = picograms per gram.

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

HOLDING TIMES, PRESERVATION, AND SAMPLE STORAGE

Holding Times

In Apex report A3F0670, samples CL-18 and CL-19 were removed from hold and extracted for pentachlorophenol (PCP) by USEPA Method 8270D after the recommended 14-day holding time; however, the laboratory extended the hold time by storing the samples at -18°C prior to the holding time exceedance. The results were not qualified.

All remaining extractions and analyses were performed within the recommended holding time criteria.

Preservation and Sample Storage

The samples were preserved and stored appropriately. Apex indicated that hold times were extended by freezing samples at -18°C. Before freezing, the total time that samples spent at 4°C was less than the standard hold time.

In Maxxam reports B3A4675, B3A4694, B3A4701, and BA5623 the samples were received at the laboratory above the upper recommended temperature limit of 4°C. The temperature exceedances were minor; thus, the results were not qualified.

In Maxxam report B3A5623, sample LRIS-CL-DU5--ISM COMPOSITE was reanalyzed for percent moisture because of an unusually high, post-ISM processing, percent moisture result. Upon further investigation, it was discovered that water had leaked into the sample because of improper sealing during transport from Apex to Maxxam. The reanalyzed percent moisture results were reported. The remaining samples had percent moisture results within the expected range and were not reanalyzed.

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.

Various method blank results associated with the USEPA Method 1613B analyses exhibited a blank detection between the estimated detection limit (EDL) and the reporting limit (RL) for various compounds. No actions were taken when the sample result was greater than five times the blank result or had already been qualified as non-detect because of laboratory qualification as an EMPC. Sample results that were not greater than five times the method blank detections resulted in the following qualifications:

Report	Sample	Analyte	Original Result (pg/g)	Qualified Result (pg/g)
B3A4675	RB-062413	1,2,3,4,6,7,8-HpCDD	7.78 J	7.78 U
B3A4675	RB-062413	OCDD	64.4 J	64.4 U
B3A4675	RB-062413	Total HpCDD	13.1 J	13.1 U
B3A4675	RB-062413	OCDF	5.93 J	5.93 U
B3A4675	RB-062413	Total HpCDF	1.36 J	1.36 U
B3A4675	RB-062513	1,2,3,4,6,7,8-HpCDD	5.81 J	5.81 U
B3A4675	RB-062513	OCDD	43.8 J	43.8 U
B3A4675	RB-062513	Total HpCDD	10.1 J	10.1 U
B3A4675	RB-062513	OCDF	3.16 J	3.16 U
B3A4675	RB-062613	1,2,3,4,6,7,8-HpCDD	5.27 J	5.27 U
B3A4675	RB-062613	OCDD	39.0 J	39.0 U
B3A4675	RB-062613	Total HpCDD	9.00 J	9.00 U
B3A5623	LRIS-CL-DU5—ISM-COMPOSITE	1,2,3,7,8,9-HxCDF	0.503 J	0.503 U

J = Result is an estimate.
pg/g = picograms per gram.
U = non-detect.

Trip Blanks

Trip blanks were not required for this sampling event.

Equipment Rinsate Blanks

Equipment rinsate blanks were collected for this sampling event. Low levels of OCDD and OCDF were detected; however, no qualifications were made based on the rinsate blank results, as all associated sample results were either significantly higher or, because of method blank contamination, were previously qualified as not detected.

Total organic carbon was detected in two of the equipment rinsate blanks; no actions were taken, as sample results were greater than five times the concentrations found in the rinsate blanks.

All other rinsate blank results were non-detect.

SURROGATE RECOVERY RESULTS

The samples were spiked with surrogate compounds to evaluate laboratory performance on individual samples.

Various surrogate recoveries associated with PCP results in Apex report A3F0629 were reported as estimated because of continuing calibration verification (CCV) surrogate recoveries above the upper control limit; no actions were taken, as all other batch quality

control (QC), including the surrogate recoveries from the associated samples themselves, met acceptance criteria.

All other surrogate recoveries were within acceptance limits.

LABELED ANALOG STANDARD RECOVERY RESULTS

All USEPA Method 1613B Modified and 8260A Modified samples were spiked with C13 labeled analog standards to quantify the recovery of individual target compounds.

In Maxxam report B3A5623, the C13-OCDD standard for sample LRIS-CL-DU1C—ISM COMPOSITE exceeded the upper acceptance limit because of matrix interference. The sample had high levels of OCDD, which were qualified "J" as estimated because of exceedances of the upper instrument calibration range and reference standard material recovery.

All other C13 labeled analog standard recoveries were within acceptance limits.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

MS/MSD results are used to evaluate laboratory precision and accuracy. MS/MSD samples were extracted and analyzed at the frequencies required by each analytical method.

Because of lack of rinsate blank volume, the laboratory prepared and analyzed a blank spike duplicate (a laboratory control sample duplicate, or LCSD) instead of an MS/MSD for certain samples in report A3F0664. All recoveries of the LCSD were within acceptance limits for percent recovery and relative percent differences (RPDs).

In Maxxam report B3A5623, the USEPA Method 1613B Modified MS/MSD exceeded percent recovery and RPD for some compounds. The laboratory noted that the exceedances were due to matrix interference and sample heterogeneity. Some MS/MSD recoveries and RPDs were not calculated because of high levels of analyte present in the sample. The remaining batch QC had acceptable recoveries, so no associated sample results were qualified.

All recoveries were within acceptance limits for percent recovery and RPDs.

LABORATORY DUPLICATE RESULTS

Duplicate results are used to evaluate laboratory precision. Duplicate samples were extracted and analyzed at the frequencies required by each analytical method. Laboratory duplicate samples are not required for USEPA Method 1613B Modified; however, a laboratory duplicate was included in Maxxam report B3A5623. The USEPA Method 1613B Modified laboratory duplicate exceeded RPD acceptance limits for some compounds, and the laboratory noted that the overall QC for the analysis was acceptable. The RPD exceedances were relatively minor; thus, the associated results were not qualified.

All remaining laboratory duplicate RPDs were within acceptance limits.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RESULTS

An 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.

In Apex report B3D6144, the LCS for batch 3321976 exceeded the upper acceptance limits for some compounds. The laboratory noted that the LCS recovery met USEPA Method 1613B acceptance criteria; thus, no associated results were qualified.

All remaining LCS/LCSD analytes were within acceptance limits for percent recovery.

FIELD DUPLICATE SAMPLE

Field duplicate samples measure both field and laboratory precision. A field duplicate was submitted for analysis for Apex report A3F0670 and Maxxam report B3A4694 (CL-17-1.5/CL-17-1.5-DUP), meeting the project-specific criteria.

MFA uses acceptance criteria of less than 100 percent RPD for results that are less than five times the RL, or less than 50 percent RPD for results that are greater than five times the RL. Non-detect data, data qualified as EMPCs, and/or data already qualified as estimates (J) are not qualified based on the RPD calculated for field duplicate results. Only field duplicate pairs were qualified based on RPD exceedances. Sample results that failed to meet RPD criteria for field duplicate pairs were qualified as estimates (J). Primary and field duplicate results and RPDs are summarized in the following table:

Sample	Field Duplicate	Analyte	Units	Sample Result	Field Duplicate Result	RPD
CL-17-1.5	CL-17-1.5-DUP	Pentachlorophenol	µg/kg	177 U	165 U	7.0
CL-17-1.5	CL-17-1.5-DUP	Arsenic	mg/kg	2.55	2.16	17
CL-17-1.5	CL-17-1.5-DUP	Chromium	mg/kg	27.7	29.8	7.3
CL-17-1.5	CL-17-1.5-DUP	Total Organic Carbon	%	0.88	0.61	36
CL-17-1.5	CL-17-1.5-DUP	Percent Solids	%	70.1	70.7	0.85
CL-17-1.5	CL-17-1.5-DUP	2,3,7,8-TCDD	pg/g	0.173 U	0.102 U	52
CL-17-1.5	CL-17-1.5-DUP	1,2,3,7,8-PeCDD	pg/g	1.43 J	1.32 J	8.0
CL-17-1.5	CL-17-1.5-DUP	1,2,3,4,7,8-HxCDD	pg/g	4.80 J	4.18 J	14
CL-17-1.5	CL-17-1.5-DUP	1,2,3,6,7,8-HxCDD	pg/g	39.5	34.1	15
CL-17-1.5	CL-17-1.5-DUP	1,2,3,7,8,9-HxCDD	pg/g	13.3	12.9	3.1
CL-17-1.5	CL-17-1.5-DUP	1,2,3,4,6,7,8-HpCDD	pg/g	840	741	13
CL-17-1.5	CL-17-1.5-DUP	OCDD	pg/g	7560	6480	15
CL-17-1.5	CL-17-1.5-DUP	Total TCDD	pg/g	0.917 J	0.936 J	2.1
CL-17-1.5	CL-17-1.5-DUP	Total PeCDD	pg/g	10.6	7.15	39

Sample	Field Duplicate	Analyte	Units	Sample Result	Field Duplicate Result	RPD
CL-17-1.5	CL-17-1.5-DUP	Total HxCDD	pg/g	173	151	14
CL-17-1.5	CL-17-1.5-DUP	Total HpCDD	pg/g	1520	1370	10
CL-17-1.5	CL-17-1.5-DUP	2,3,7,8-TCDF	pg/g	0.981 J	0.873 J	12
CL-17-1.5	CL-17-1.5-DUP	1,2,3,7,8-PeCDF	pg/g	2.25 J	1.94 J	15
CL-17-1.5	CL-17-1.5-DUP	2,3,4,7,8-PeCDF	pg/g	2.72 J	2.17 J	22
CL-17-1.5	CL-17-1.5-DUP	1,2,3,4,7,8-HxCDF	pg/g	12.8	10.2	23
CL-17-1.5	CL-17-1.5-DUP	1,2,3,6,7,8-HxCDF	pg/g	5.04	4.34 J	15
CL-17-1.5	CL-17-1.5-DUP	2,3,4,6,7,8-HxCDF	pg/g	3.40 J	2.63 J	26
CL-17-1.5	CL-17-1.5-DUP	1,2,3,7,8,9-HxCDF	pg/g	0.406 J	0.337 J	19
CL-17-1.5	CL-17-1.5-DUP	1,2,3,4,6,7,8-HpCDF	pg/g	74.7	66.2	12
CL-17-1.5	CL-17-1.5-DUP	1,2,3,4,7,8,9-HpCDF	pg/g	3.90 J	3.14 J	22
CL-17-1.5	CL-17-1.5-DUP	OCDF	pg/g	78.3	73.2	6.7
CL-17-1.5	CL-17-1.5-DUP	Total TCDF	pg/g	3.26	2.38	31
CL-17-1.5	CL-17-1.5-DUP	Total PeCDF	pg/g	20.7	12.8	47
CL-17-1.5	CL-17-1.5-DUP	Total HxCDF	pg/g	151	100	41
CL-17-1.5	CL-17-1.5-DUP	Total HpCDF	pg/g	218	207	5.2

J = Result is an estimate.
mg/kg = milligrams per kilogram.
µg/kg = micrograms per kilogram.
pg/g = picograms per gram.
RPD = relative percent difference.
U = non-detect.

ISM REPLICATE EVALUATION

A duplicate and triplicate composite sample collected from the same decision unit were submitted to Maxxam for USEPA 1613B Modified and to Apex for USEPA 8270D, USEPA 6020A, and PSEP/SM 5310B Modified (LRIS-CL-DU1A—ISM COMPOSITE / LRIS-CL-DU1B—ISM COMPOSITE / LRIS-CL-DU1C—ISM COMPOSITE). The relative standard deviation (RSD) for the triplicate dioxin and furan congener results was calculated.

Sample		LRIS-CL-DU1A—ISM COMPOSITE	LRIS-CL-DU1B—ISM COMPOSITE	LRIS-CL-DU1C—ISM COMPOSITE	
Analyte	Units	Original Result	Original Result	Original Result	RSD (%)
1,2,3,4,6,7,8-HpCDD	pg/g	22100	18900 J	12700 J	27
1,2,3,4,6,7,8-HpCDF	pg/g	2360	1950	1310	28
1,2,3,4,7,8,9-HpCDF	pg/g	122	98.9	63.4	31
1,2,3,4,7,8-HxCDD	pg/g	152	125	88.8	26

Sample		LRIS-CL-DU1A—ISM COMPOSITE	LRIS-CL-DU1B—ISM COMPOSITE	LRIS-CL-DU1C—ISM COMPOSITE	
1,2,3,4,7,8-HxCDF	pg/g	376	322 U	283 U	14
1,2,3,6,7,8-HxCDD	pg/g	1110	982	699	23
1,2,3,6,7,8-HxCDF	pg/g	160	133	117	16
1,2,3,7,8,9-HxCDD	pg/g	332	341 U	237 U	19
1,2,3,7,8,9-HxCDF	pg/g	12.1	9.65	8.7	17
1,2,3,7,8-PeCDD	pg/g	47	38.8	35.8	14
1,2,3,7,8-PeCDF	pg/g	80.7	68	63.8	12
2,3,4,6,7,8-HxCDF	pg/g	91.6	78.5	69.9	14
2,3,4,7,8-PeCDF	pg/g	89.4	75.5	70.9	12
2,3,7,8-TCDD	pg/g	2.61	2.09	1.98	15
2,3,7,8-TCDF	pg/g	37.5	31.4	30.7	11
OCDD	pg/g	161000	76500 J	52100 J	59
OCDF	pg/g	4050	1800	1120	66
Dioxin TEQ	pg/g	601	468	345	27
Total HpCDD	pg/g	38100	34200	22900	25
Total HpCDF	pg/g	7080	5640	3760	30
Total HxCDD	pg/g	4910	4360	3140	22
Total HxCDF	pg/g	5590	4710	4340	13
Total PeCDD	pg/g	405	329	305	15
Total PeCDF	pg/g	1960	1610	1520	14
Total TCDD	pg/g	84.3	68.1	68.5	13
Total TCDF	pg/g	271	217	213	14
PCP	µg/kg	293	331	334	7.2
Arsenic	mg/kg	12.1	10.1	10.9	9.1
Chromium	mg/kg	38.2	35.7	37.2	3.4

J = Result is an estimate.
mg/kg = milligrams per kilogram.
µg/kg = micrograms per kilogram.
pg/g = pictograms per gram.
RSD = relative standard deviation.
TEQ = toxicity equivalency.
U = non-detect.

With the exception of OCDD and OCDF, congener RSDs were below the 35% RSD criteria. The RSD for OCDD was 59 percent and the RSD for OCDF was 66 percent. All TEQ RSDs were below the 35 percent RSD criteria. OCDD results have been qualified because of an SRM exceedance, which is discussed below. OCDF results were qualified with "J" as estimated:

Report	Sample	Analyte	Original Result (pg/g)	Qualified Result (pg/g)
B3A5623	LRIS-CL-DU1C—ISM COMPOSITE	OCDF	1120	1120 J

Report	Sample	Analyte	Original Result (pg/g)	Qualified Result (pg/g)
B3A5623	LRIS-CL-DU2—ISM COMPOSITE	OCDF	1370	1370 J
B3A5623	LRIS-CL-DU3—ISM COMPOSITE	OCDF	207	207 J
B3A5623	LRIS-CL-DU1A—ISM COMPOSITE	OCDF	4050	4050 J
B3A5623	LRIS-CL-DU1B—ISM COMPOSITE	OCDF	1800	1800 J
B3A5623	LRIS-CL-DU4—ISM COMPOSITE	OCDF	1610	1610 J
B3A5623	LRIS-CL-DU5—ISM COMPOSITE	OCDF	91.6	91.6 J

J = Result is an estimate.
pg/g = picograms per gram.

SEDIMENT REFERENCE MATERIAL

An SRM is used to help assess laboratory measurement accuracy and monitor laboratory performance when analyzing for dioxins. A Puget Sound SRM was prepared and analyzed by USEPA Method 1613B for each analytical batch. Sample results associated with SRM results that fell outside the acceptance limits set forth by the U.S. Army Corps of Engineers (COE, 2012) were qualified as estimates (J). Various results were qualified in each delivery group. Only detected concentrations were qualified as a result of SRM criteria exceedances. The following table lists SRM criteria exceedances:

SRM Prep Date	Report	Exceeding Analyte
06/27/2013	B3A4701	1,2,3,4,6,7,8-HpCDD
06/27/2013	B3A4701	1,2,3,7,8,9-HxCDF
06/27/2013	B3A4701	OCDD

Sample results exceeding SRM criteria were flagged as estimates (J) if detected. Some results associated with SRM exceedances were already flagged as estimates because of calibration limit exceedances, and are tabulated in the "Data Qualifications" section of this report.

Report	Sample	Analyte	Original Result (pg/g)	Qualified Result (pg/g)
BA4694	CL-16-1.5	1,2,3,4,6,7,8-HpCDD	10800	10800 J
BA4694	CL-16-1.5	1,2,3,7,8,9-HxCDF	5.33	5.33 J
BA4694	CL-16-1.5	OCDD	78200	78200 J
BA4694	CL-17-1.5	1,2,3,4,6,7,8-HpCDD	840	840 J
BA4694	CL-17-1.5	OCDD	7560	7560 J
BA4694	CL-17-1.5-DUP	1,2,3,4,6,7,8-HpCDD	741	741 J
BA4694	CL-17-1.5-DUP	OCDD	6480	6480 J
B3A5623	LRIS-CL-DU1C—ISM COMPOSITE	1,2,3,4,6,7,8-HpCDD	12700	12700 J
B3A5623	LRIS-CL-DU1C—ISM COMPOSITE	1,2,3,7,8,9-HxCDF	8.70	8.70 J

Report	Sample	Analyte	Original Result (pg/g)	Qualified Result (pg/g)
B3A5623	LRIS-CL-DU1C—ISM COMPOSITE	OCDD	52100	52100 J
B3A5623	LRIS-CL-DU2—ISM COMPOSITE	1,2,3,4,6,7,8-HpCDD	14100	14100 J
B3A5623	LRIS-CL-DU2—ISM COMPOSITE	1,2,3,7,8,9-HxCDF	6.79	6.79 J
B3A5623	LRIS-CL-DU2—ISM COMPOSITE	OCDD	95300	95300 J
B3A5623	LRIS-CL-DU3—ISM COMPOSITE	1,2,3,4,6,7,8-HpCDD	1150	1150 J
B3A5623	LRIS-CL-DU3—ISM COMPOSITE	OCDD	6860	6860 J
B3A5623	LRIS-CL-DU1A—ISM COMPOSITE	1,2,3,4,6,7,8-HpCDD	22100	22100 J
B3A5623	LRIS-CL-DU1A—ISM COMPOSITE	1,2,3,7,8,9-HxCDF	12.1	12.1 J
B3A5623	LRIS-CL-DU1A—ISM COMPOSITE	OCDD	161000	161000 J
B3A5623	LRIS-CL-DU1B—ISM COMPOSITE	1,2,3,4,6,7,8-HpCDD	18900	18900 J
B3A5623	LRIS-CL-DU1B—ISM COMPOSITE	1,2,3,7,8,9-HxCDF	9.65	9.65 J
B3A5623	LRIS-CL-DU1B—ISM COMPOSITE	OCDD	76500	76500 J
B3A5623	LRIS-CL-DU4—ISM COMPOSITE	1,2,3,4,6,7,8-HpCDD	11100	11100 J
B3A5623	LRIS-CL-DU4—ISM COMPOSITE	1,2,3,7,8,9-HxCDF	4.75	4.75 J
B3A5623	LRIS-CL-DU4—ISM COMPOSITE	OCDD	81800	81800 J
B3A5623	LRIS-CL-DU5—ISM COMPOSITE	1,2,3,4,6,7,8-HpCDD	1100	1100 J
B3A5623	LRIS-CL-DU5—ISM COMPOSITE	OCDD	6540	6540 J
B3D6144	CL-16-2.5	1,2,3,4,6,7,8-HpCDD	1640	1640 J
B3D6144	CL-16-2.5	OCDD	11900	11900 J
B3D6144	CL-18	1,2,3,4,6,7,8-HpCDD	3960	3960 J
B3D6144	CL-18	OCDD	32700	32700 J
B3D6144	CL-19	1,2,3,4,6,7,8-HpCDD	950	950 J
B3D6144	CL-19	OCDD	6930	6930 J
B3D6144	CL-22	1,2,3,4,6,7,8-HpCDD	1320	1320 J
B3D6144	CL-22	OCDD	9290	9290 J
B3D6144	CL-23	1,2,3,4,6,7,8-HpCDD	879	879 J
B3D6144	CL-23	OCDD	6210	6210 J

J = Result is an estimate.
pg/g = picograms per gram.

CONTINUING CALIBRATION VERIFICATION RESULTS

CCV results are used to demonstrate instrument precision and accuracy through the end of the sample batch. In Apex report A3F0629, the laboratory reported USEPA Method 8270D upper limit CCV exceedances for samples LRIS-CL-DU1C—ISM Composite and LRIS-CL-DU2—ISM Composite. The results may be biased high, and have been qualified "J" as estimated:

Report	Sample	Analyte	Original Result (µg/kg)	Qualified Result (µg/kg)
A3F0629	LRIS-CL-DU1C—ISM Composite	PCP	334	334 J
A3F0629	LRIS-CL-DU2—ISM Composite	PCP	266	266 J

J = Result is an estimate.
µg/kg = micrograms per kilogram.

REPORTING LIMITS

Apex and Maxxam used routine RLs and EDLs for non-detect results. Samples requiring dilutions because of high analyte concentrations and/or matrix interferences had adjusted RLs and EDLs.

Samples in reports A3F0629 and B3A5623 were extracted with increased sample volumes for USEPA Method 8270D and USEPA Method 1613B/8290A Modified, in order to achieve lower EDLs, method detection limits, and method reporting limits. The laboratories then diluted these samples prior to analysis. In report A3F0629, diluted samples LRIS-CL-DU3—ISM Composite and LRIS-CL-DU5—ISM Composite were non-detect for PCP by USEPA Method 8270D.

DATA PACKAGE

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

In report B3A5623, the sample name for Maxxam sample ID SC7204 should be "LRIS-CL-DU5—ISM COMPOSITE."

No additional issues were found.

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

USEPA. 2011. USEPA contract laboratory program national functional guidelines for chlorinated dibenzo-p-dioxins (CDDs) and chlorinated dibenzofurans (CDFs) data review. EPA-540-R-11-016. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. September.

APPENDIX D

DIOXIN AND FURAN ANALYSIS, DATA VALIDATION, AND TEQ CALCULATION RULES

MEMORANDUM

To: File Date: September 28, 2012

From: Erik Naylor Project: 9003.01.40

RE: Dioxin and Furan Analysis, Data Validation, and TEQ Calculation Rules

The term dioxin is used to refer to a family of toxic chemicals that share a similar chemical structure and a common mechanism of toxic action. While there are 210 dioxin congeners, typically only the 17 most toxic congeners are reported by laboratories. The reported concentrations of the 17 dioxin congeners typically are validated to assess usability and then a toxicity equivalent concentration (TEQ) is calculated from the reported results to evaluate the toxicity of these compounds as a whole. The purpose of this memo is to provide an approach for dioxin data validation and TEQ calculation for the former Pacific Wood Treating site. Further, analytical method recommendations and requirements for laboratory deliverables are provided to enable consistent data validation and TEQ calculation using data from a variety of laboratories.

Critical to consistent data use is consistent use of terminology. Terms used in this memorandum are defined below.

- Method Detection Limit (MDL)—The minimum concentration of a compound that can be measured and reported with 99 percent confidence that the value is greater than zero according to the Washington State Department of Ecology's (Ecology), Model Toxics Control Act (MTCA) (Ecology, 2007).
- Estimated Detection Limit (EDL)—The sample- and analyte-specific EDL is an estimate made by the laboratory of the concentration of a given analyte that would have to be present to produce a signal with a peak height of at least 2.5 times the background noise signal level (U.S. Environmental Protection Agency [USEPA], 2005).
- Practical Quantitation Limit (PQL)—The lowest concentration that can be reliably measured within specified limits of precision, accuracy, representativeness, completeness, and comparability during routine laboratory operating conditions, using Ecology-approved methods (Ecology, 2007). This value is usually the lowest concentration used to calibrate the instrument after being adjusted for sample volume, sample extract volume, cleanups performed, and injection volume. PQLs should be no greater than 10 times the MDL (Ecology, 2007) and no greater than what is established by the USEPA in 40 Code of Federal Regulations (CFR) 136, 40 CFR 141-143, or 40 CFR 260-270.

- Estimated Maximum Potential Concentration (EMPC)—An EMPC is a value calculated for a reported analyte when the signal-to-noise ratio is at least 2.5:1 for both quantitation ions, but the ion abundance ratio criteria used for analyte confirmation are not met (USEPA, 2005). An EMPC value represents the maximum possible result of an analyte that could not be positively identified. The inability to positively identify the analyte could be a result of matrix interference, a coeluting compound, or low response.
- Toxic Equivalency Factor (TEF)—The factor by which each congener is multiplied in order to calculate its toxicity relative to 2,3,7,8-TCDD (Ecology, 2007). These values are summed to calculate the TEQ. TEFs depend on the endpoint being examined (i.e., birds, fish, mammals).
- TEQs—Concentrations of each congener are adjusted and summed to reflect their potency relative to 2,3,7,8-TCDD, one of the most toxic congeners. The TEQ is the sum of congener results multiplied by their specific TEF (Ecology, 2007).

ANALYTICAL METHODS

Dioxins are analyzed generally by USEPA Method 1613B or 8290, using a high-resolution gas chromatograph paired with a high-resolution mass spectrometer. A laboratory's PQL is usually the same for both methods. While the methods are very similar, Method 1613B is preferred, as it requires more rigorous quality assurance and quality control (QA/QC) through the use of six more internal standards than Method 8290. Because analytical technology and methodology have advanced rapidly since the methods were written, many laboratories combine elements of both methods to obtain the best results possible (Hoffman, E., and D. Fox 2010). Often the preparation and analyses are run using Method 1613B (for the additional QA/QC), while the calculations will be performed by Method 8290 (in order to obtain the sample- and analyte-specific EDLs). Method 1613B with calculated EDLs is the preferred method.

LABORATORY DELIVERABLES

It is important to work closely with the laboratory performing the dioxin analyses because different laboratories report data in different ways. The following items should be requested to ensure that the analytical report and electronic data deliverable (EDD) will contain all of the requisite information to validation the data and calculate TEQs:

- EDLs[1] and PQLs should be included in the final analytical report. EDLs, MDLs, and PQLs should all be included in the EDD.
- Results should be reported to the sample- and analyte-specific EDL. Results below the PQL but above the EDL will be qualified as estimates (J).

[1] Note that USEPA Method 1613B does not provide for the calculation of EDLs; therefore, the laboratory must use the calculation approach provided in Method 8290 to report the required limits.

- EMPC results should be reported at the EMPC value (EMPC values will be assigned a "U" qualifier [the analyte was not detected at or above the concentration qualified] at the time of validation).

TEQ concentrations will not be requested from the laboratory. If the laboratory provides TEQ concentrations, they will not be used because the data have not been validated TEQs should be calculated only after the data are validated.

VALIDATION

Dioxin data are validated much like other organic data, but there are a few issues that do not typically arise in other organic data sets. In addition to standard validation procedures (USEPA 2005), the following scenarios should be addressed in the fashion described below, consistent with other Ecology sites (Ecology and Environment and G. L. Glass, 2011):

- EMPC reported values should be assigned a U qualifier at the reported EMPC value.
- EMPC values that appear to be significantly elevated should be investigated further with the laboratory and may be assigned an R qualifier (unusable) when applicable.
- Non-detected results should be assigned a U qualifier and reported at the EDL value.

Further dioxin validation guidelines can be found in the National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review (USEPA 2005). Data must be validated before TEQs are calculated.

TEQS

To express the overall toxicity of the 17 reported dioxins, the concentration of each congener is adjusted based on its toxicity relative to the most toxic congener, 2,3,7,8-TCDD, and then all 17 are added together. The adjustment factors, the TEFs, are provided by the 2005 World Health Organization. TEQs are commonly calculated by one of the following two methods:

- Non-detected values (U) are set as one half of the EDL. Values that are detected, even as estimates (J), should be used at face value. Multiply congener values by their corresponding TEF and then sum all of the products.
- Non-detected values (U) are set as 0. Values that are detected, even as estimates (J), should be used at face value. Multiply congener values by their corresponding TEF and then sum all of the products.

These methods result in two different TEQ values that can be shown as TEQ (U=1/2) and TEQ (U=0). TEQs should not be calculated to more significant figures than the original data. The table below illustrates these methods:

Dioxin	Result (ng/kg)	TEC[1] (U=1/2) (ng/kg)	TEC[1] (U=0) (ng/kg)	TEF Mammals
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	44	44	44	0.0003
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	3000 J	3000	3000	0.0003
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	41	41	41	0.01
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	510	510	510	0.01
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	2.9 U	1.45	0	0.01
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	6.9 U	3.45	0	0.1
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	7.4	7.4	7.4	0.1
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	5.2 U	2.6	0	0.1
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	27	27	27	0.1
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.5 U	0.25	0	0.1
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	22	22	22	0.1
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	3.4 U	1.7	0	0.03
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	3.2 U	1.6	0	1
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	2.4	2.4	2.4	0.1
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	3 U	1.5	0	0.3
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	1.4 U	0.7	0	0.1
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.23 U	0.115	0	1
Total Heptachlorodibenzofuran (HpCDF)	99	99	99	--
Total Heptachlorodibenzo-p-dioxin (HpCDD)	1,100	1100	1100	--
Total Hexachlorodibenzofuran (HxCDF)	97 J	97	97	--
Total Hexachlorodibenzo-p-dioxin (HxCDD)	250	250	250	--
Total Pentachlorodibenzofuran (PeCDF)	44	44	44	--
Total Pentachlorodibenzo-p-dioxin (PeCDD)	32 J	32	32	--
Total Tetrachlorodibenzofuran (TCDF)	19	19	19	--
Total Tetrachlorodibenzo-p-dioxin (TCDD)	8.2	8.2	8.2	--
TEQ (U=1/2)	**15.2**	--	--	--
TEQ (U=0)	**12.3**	--	--	--

NOTES:
-- = no value.
ng/kg = nanograms per kilogram.
[1]TEC is analyte-specific TEF adjusted concentration.

The difference between TEQ (U=1/2) and TEQ (U=0) values gives data reviewers an idea of how much the EDL substitution affects the TEQ summation (Hoffman, E., and D. Fox 2010). While

MTCA does not specify using the TEQ (U=1/2) method, it is the method that has been historically used at the Port of Ridgefield and will continue to be used.

SUMMARY

- USEPA Method 1613B is recommended for dioxin analysis (with Method 8290 EDL calculations).
- The laboratory must report a PQL and EDL for each sample and each congener, and provide a PQL, EDL, and MDL for each sample and each congener in the EDD.
- Results should be reported to the sample- and analyte-specific EDL. Results below the PQL but above the EDL will be qualified as estimates (J).
- EMPC results should be reported at the EMPC value (EMPC values will be assigned a "U" qualifier at the time of validation). However, if the EMPC is significantly elevated, additional qualification may be appropriate.
- Non-detected results should be assigned a U qualifier and reported at the EDL value.
- Laboratory data must be validated before a TEQ is calculated.
- TEQs should be calculated as follows: non-detected values (U) are set as one half of the EDL. Values that are detected, even as estimates (J), should be used at face value. Multiply congener values by their corresponding TEF and then sum all of the products.

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