Report

September 2018

Kopeopeo Canal Pre-Remediation Eel Monitoring Results

Submitted to:
Bay of Plenty Regional Council

freshsolutions water
environmental consultants

Quality Assurance

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1.0 Introduction

1.1 Background

The Bay of Plenty Regional Council (BoPRC) has been granted resource consents to carry out remediation works in the Kopeopeo Canal to remove dioxin contaminated sediment. Condition 25 states:

25.6 The Consent Holder shall monitor eels annually for 5 years following the completion of works within the Kopeopeo Canal in accordance with conditions 25.7 and 25.8 of this consent.

25.7 The eel sampling required by condition 25.6 shall be undertaken in accordance with the methods set out in the Environmental Monitoring and Validation Plan referred to in condition 4.5 of this consent and the methods in section 2.2 of the report entitled Investigation of Organic Contamination in the Kopeopeo Canal prepared by Mr Stephen Park referenced as Environment Bay of Plenty Environmental Publication 2005/23 and dated November 2005 (the latter shall prevail if there is any inconsistency).

25.8 Eel sampling shall be undertaken at the locations identified in the Environmental Monitoring and Validation Plan except that Location 1 shall be relocated so as to be undertaken a further 1.0km upstream in the Orini Canal than that shown on Figure 12.4 of the Kopeopeo Canal Remediation - Proposed Environmental Monitoring and Validation Plan (Draft B dated 18 October 2013) prepared by SKM.

25.9 Within 60 days of annual sampling, the Consent Holder shall provide a report to the Chief Executives of the BoPRC and WDC and the Medical Officer of Health with the results of the eel sampling.

Following a review of the past eel monitoring surveys (Park 2005, SKM 2013, ToxConsult 2013 and Scobie 1988), Golder Associates (2017) prepared a draft methodology for sampling eels in the Kopeopeo Canal to monitor dioxin levels prior to and following remediation. In December 2017 Freshwater Solutions prepared and BoPRC approved a detailed work plan for the removal and monitoring of fish associated with the Kopeopeo Canal remedial works (Freshwater Solutions 2017).

This report adds to the data and assessments that have been previously reported relating to dioxin in eels from the Kopeopeo Canal and associated watercourses. Those data and assessments are found in the following reports:

- Whakatane Wood Waste Sites: Investigation of Contaminants in the Receiving Environment (Park & Futter, 2005).
- Investigation of Organic Contaminants in the Kopeopeo Canal (Park, 2005).
- Abbreviated Assessment of Human Health Impact from Whakatane Old Sawmill Site (ESR, 2006).
- Kopeopeo Canal Removal, Remediation and Disposal of Canal Sediments: Bay of Plenty Reginal Council District and Regional Council Resource Consent Application and Assessment of Environmental Effects (SKM. 2013).
- Kopeopeo Canal dioxin survey (ToxConsult, 2013).

This report presents the data on the analysis of PCDD/Fs in eels captured from the remediation sites in December 2017 prior to the commencement of any Kopeopeo Canal remedial works and from control sites in March 2018.

1.2 Dioxins

The term 'dioxins' (hereafter referred to as PCDD/Fs) is widely used to refer to a series of chemical compounds that are polychlorinated dibenzo-para-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). There are numerous different structures possible for both PCDDs and PCDFs and these different compounds are referred to as congeners, which means members of a similar group.

The tetra- through octa- PCDD/F congeners have received considerable attention in the scientific literature largely due to their toxicity to animals and humans at low concentrations and their persistence in the environment.

The analysis of PCDD/Fs in the environment, humans, animals and foodstuffs, and the interpretation of those data, has been the subject of numerous international publications. There are several New Zealand studies that are considered seminal and relevant background reading (Bates et al., 1990; Buckland et al., 1998; Buckland et al., 2000; Buckland et al., 2001; Bates et al., 2001; Smith and Lopipero, 2001; MfE. 2011a; 't Mannetje, 2012; and, 't Mannetje et al., 2013).

2.0 Field Methods

2.1 Eel sampling locations

Key eel sampling locations have previously been identified in the Investigation of Organic Contamination in the Kopeopeo Canal (Park, 2005) and the Environmental Monitoring and Validation Plan (SKM, 2013, Appendix P).

Park and Futter (2005) conducted eel sampling at two sites on the Orini Canal; at Site 23b just upstream of the confluence with the Kopeopeo Canal and Site 19, at Wano Rd approximately 3 km upstream of the confluence with the Kopeopeo Canal. In addition, eel samples were taken from Site 4 on the Kopeopeo Canal (referred to by the authors as Site 2, which is adjacent to a wood dump denoted Site 38). Eels were also sampled at two control sites on the Waioho Stream, one at Rewatu Rd and the other at White Pine Bush (referred to by the authors as Site 6,7,8). Park (2005) collected a further eel sample from Site 6 on the Kopeopeo Canal, which is in the proximity of various historic stormwater outfalls.

Based on the work of Park and Fuller (2005), Park (2005) and their own sediment sampling SKM (2013) identified 10 eel sampling locations albeit with some differences in site naming, notably: Sites 1 - 3 were on the Orini Canal with Site 3 approximately 20 m upstream of the confluence with the Kopeopeo Canal, and Site 2 and Site 1 approximately 500 m and 1,000 m further upstream, respectively; Site 4 in the current study corresponds approximately to Site 2 surveyed by Park (2005).

The pre-remediation eel sampling locations (Sites 4, 5, 6 and 10) were selected from the identified sampling locations. In addition, three new control locations were selected. Hence, eel sampling was undertaken at seven sites, five on the Kopeopeo Canal (Sites, 4, 5, 6, 10 and a new control site upstream of Site 10), one on the Orini Canal (Site 19) and

one on the Te Rahu Canal (Table 1 and Figure 1). All sampling locations, including those used by Park and Futter 2005), Park (2005) and SKM (2013), are shown on Figure 1. In this report the site naming convention follows that of SKM (2013).

Table 1: Location of eel sampling sites.

Location	Description	Comment
Te Rahu Canal	At Te Rahu Road Bridge	New site
Orini Canal	At Wano Road Bridge	Same as Park & Futter (2005) Site 19
Kopeopeo Canal, Site 4	Approximately 1 km upstream of the Orini Canal confluence, within the remediation zone	Same as SKM (2013) Site 4
Kopeopeo Canal, Site 5	Approximately 2 km upstream of the Orini Canal confluence, within the remediation zone	Same as SKM (2013) Site 5
Kopeopeo Canal, Site 6	Approximately 3 km upstream of the Orini Canal confluence, within the remediation zone	Same as SKM (2013) Site 6
Kopeopeo Canal, Site 10	Approximately 2.2 km upstream of the remediation zone	Slightly upstream of SKM (2013) Site 10
Upper Kopeopeo Canal, control	Approximately 5 km upstream of the remediation zone	New site

2.2 Eel capture methods

Following a review of the past eel monitoring surveys (Park 2005, SKM 2013, ToxConsult 2013 and Scobie 1988), Golder Associates (2017) prepared a methodology for eel capture in the Kopeopeo Canal and associated watercourses.

Two water level control structures were installed at either end of the remediation zone that prevented non climbing fish species from entering the project site. Eel capture at Sites 4, 5 and 6 took place in December 2017 and in March 2018 at the Control Sites and Site 10.

Eel capture was undertaken in accordance with the BoPRC's Special Permit 534 issued by the Ministry for Primary Industries. Eels were captured using fine mesh and commercial eel fyke nets baited with chicken. Nets were cleared the following morning and the eels that were selected (shortfin eels between 350 – 450 mm) to form the sample from each site were placed in a new and clean plastic lidded bucket with ice and transported back to Containment Site 1 for processing.

2.3 Field handling of eels

A total of three replicate composite samples were collected from each site with each replicate composite sample comprising five individual eels for a total of 15 individual shortfin eels per site.

The methodology for handling of eels collected to monitor PCDD/F concentrations is based on the USEPA Field Operations Manual (1998) and the recommendations set out in Golder (2017); generally, this involved the use of clean equipment and clean-handling techniques, notably:

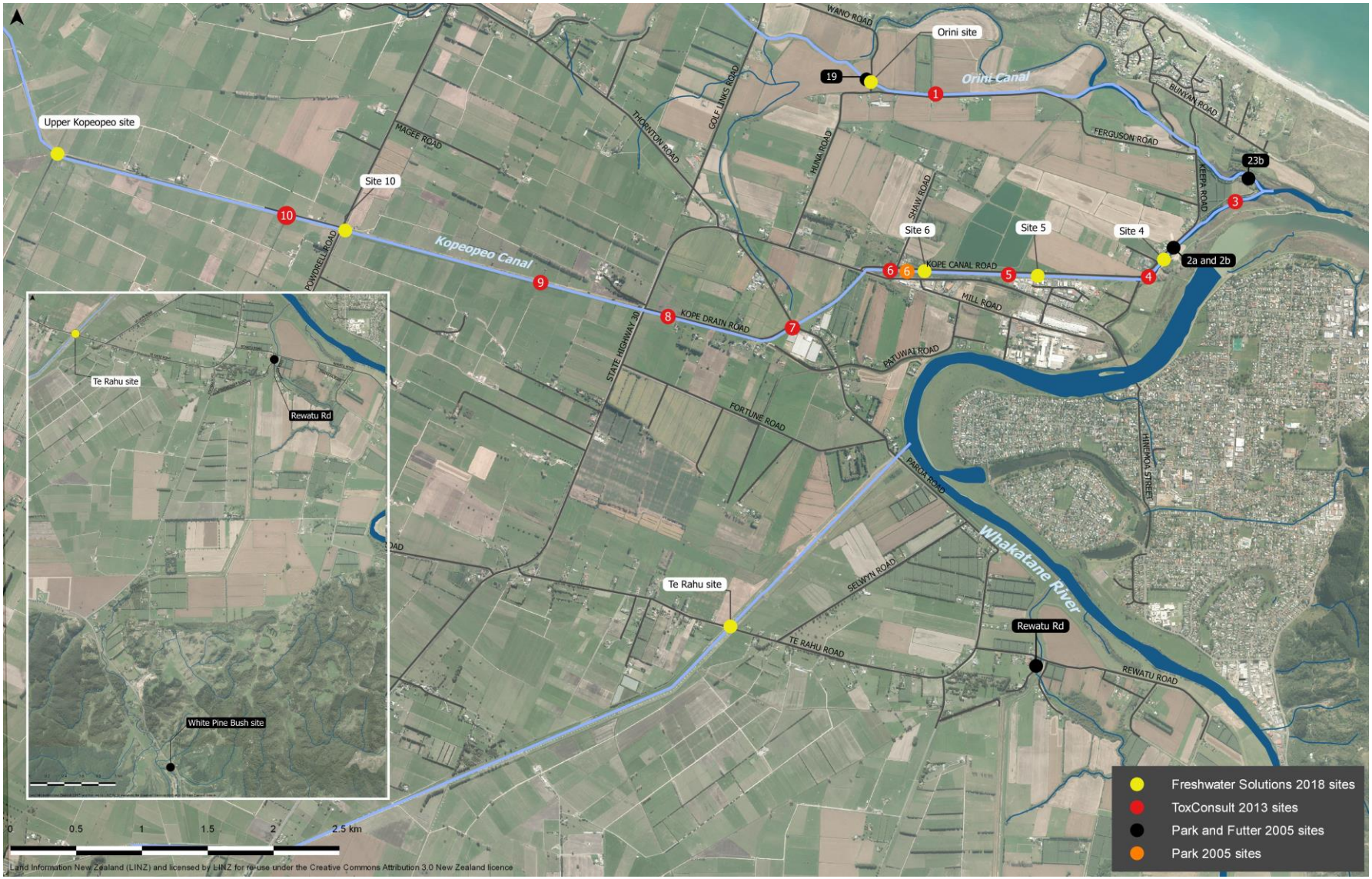

Figure 1: Eel Sampling Locations.

- All samples were processed in the field by the same technicians using the same procedure and in the same location.
- Upon capture eels were chilled to approximately 2 °C before being rinsed with de-ionised water three times prior to being wrapped individually in 2 sheets of aluminium. One new (clean) bucket was used for each site and rinsed with de-ionised water prior to rinsing each eel individually.
- The five bagged eels forming a composite site sample were bagged again, serving to double-bag the composite eel bags. The double bag contained a verifying label that confirms that the five bags in the double bag contain eels from a particular site.
- Each composite site sample bag from each site was placed in a clean unused poly bin and placed in a freezer and chilled to -20 °C.

Each poly bin was packed with freezer packs and shipped to AsureQuality in April 2018 using an urgent courier that delivered the samples to the laboratory frozen.

3.0 Laboratory Handling and PCDD/F Analysis

All sample preparation and PCDD/F analysis was performed by AsureQuality, Wellington, an ISO accredited laboratory (NZS ISO/IEC 17025:2005) and their scope of accreditation includes the analysis of PCDD/Fs in foodstuffs, including fish.

3.1 Eel handling

The laboratory weighed and measured each eel before removing a fillet and then removing the skin for tissue analysis. The handling and analysis of eels was undertaken in accordance with Section 7 of Golder (2017) and includes:

- Duplicate analysis of two eel samples and analysis of two Certified Reference Material (CRM) samples.
- Retention of sufficient homogenised tissue sample for future analysis.
- Retention of the head of each eel in case aging of otoliths is undertaken.

Eels were cleaned, gutted, prepared and composited using AsureQuality's in-house method (DX-PREP01).

3.2 Methods of analysis

Analysis of PCDDs and PCDFs was by USEPA Method 1613B, Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution High Resolution Gas Chromatography/High Resolution Mass Spectrometry (USEPA, 1994)

Lipid Determination was by gravimetric analysis (AsureQuality in-house method, DX-LIPD01).

3.3 QA/QC

The numbers of eel samples were such that AsureQuality conducted their analysis in two separate batches. QA/QC samples included with each batch were a laboratory reagent

blank and an eel duplicate. In addition, a Certified Reference Material (CRM) sample was included in each batch.

3.4 Eel condition factor

The condition factor for isometric growth of each eel was calculated using the following equation reported in Chisnall (1989):

$K = 10^6 W/L^3$

Where W = weight in grams and L = length in mm.

4.0 Results

The reporting of results has been undertaken in accordance with that detailed by Golder (2017):

- All individual eel length and weight data is provided in Appendix A.
- The complete laboratory report for all PCDD/F data for composite samples is provided in Appendix B.
- The laboratory CRM report is provided in Appendix C.

4.1 PCDD/F results

The analysis of PCDD/F in eels collected during pre-remediation monitoring is summarised in Table 2 (congener results) and Table 3 (Total PCDD/PCDF and TEQ results). All results are on a wet-weight basis.

4.1.1 Blank results

Two blank samples were processed by AsureQuality at the same time eel analyses were conducted, which occurred in two batch runs (refer Appendix B). The total of PCDD/Fs was 0.690 pg/g (medium bound) and the WHO-TEQ 0.154 pg/g (medium bound) for the blank relating to samples 1–10, 22 and 24, and the total of PCDD/F was 0.860 pg/g (medium bound) and the WHO-TEQ 0.211 pg/g (medium bound) for the blank relating to samples 11–21, 23 and 25. Individual PCDD/Fs were not detected in either blank. The positive medium bound concentrations and medium bound TEQs reported for the blanks result from the convention for calculating total PCDD/F concentrations and TEQ values for congeners that are not detected. Due to the toxicity of PCDD/F many agencies choose to report worst-case concentrations and TEQ values. Any result that is not detected substitutes either zero or detection limit into the summation formula. The results are referred to as the lower bound and upper bound, respectively. In reality, the actual value is somewhere from the lower bound to the upper bound, i.e., the medium bound, but it is not known where.

4.1.2 Control sites: Te Rahu Canal and Orini Canal

Eels captured from the control sites on the Te Rahu Canal and the Orini Canal, contain low concentrations of PCDD/Fs. PCDD/F congeners were not detected in one of the Te Rahu Canal composites (sample 16A), whereas low concentrations of a single congener (OCDD)

were detected in Te Rahu Canal composites 17A and 18A. The medium bound total PCDD/Fs and WHO-TEQs for the Te Rahu Canal composites, 16A, 17A and 18A are: 0.513 pg/g and 0.138 pg/g, 0.669 pg/g and 0.181 pg/g, and 0.599 pg/g and 0.147 pg/g, respectively. In all cases the Te Rahu Canal medium bound results are lower than the corresponding blank that was processed during the analysis.

Low concentrations of OCDD were detected in all of the Site 19 Orini Canal composites and a low concentration of HpCDD was detected in sample 20A. The medium bound total PCDD/F concentrations and WHO-TEQs for the Orini Canal composites, 19A, 20A and 21A are: 0.770 pg/g and 0.168 pg/g, 1.11 pg/g and 0.171 pg/g, and 0.806 pg/g and 0.185 pg/g, respectively. The Orini Canal composites 19A and 21A medium bound PCDD/F results are lower than the corresponding blank that was processed during the analysis, whereas composite 20A is slightly higher, 1.11 pg/g versus 0.860 pg/g. All Orini Canal medium bound WHO-TEQ results are lower than the blank result.

4.1.3 Upper Kopeopeo Canal

Eels collected from a new sampling site on the Upper Kopeopeo Canal, approximately 5 km upstream of the remediation zone, contained low concentrations of PCDD/Fs. HxCDD, HpCDD and OCDD congeners were found in all composite samples. The medium bound total PCDD/F concentrations and WHO-TEQs for the Upper Kopeopeo Canal composites, 1A, 2A and 3A are:1.38 pg/g and 0.178 pg/g, 0.909 pg/g and 0.174 pg/g, and 1.12 pg/g and 0.159 pg/g, respectively. Hence, the Upper Kopeopeo Canal composites medium bound PCDD/F results are 1.3–2.0 times higher than the blank that was processed during the analysis. The Upper Kopeopeo Canal medium bound WHO-TEQ results are 0.005–0.024 pg/g greater than the blank.

4.1.4 Kopeopeo Canal Site 10

Closer to, but not within, the remediation zone, eels collected from Site 10 show elevated concentrations of PCDD/Fs compared with eels from the Te Rahu Canal and Orini Canal control sites, and the Upper Kopeopeo Canal site. A broader distribution of PCDD/PCDF congeners is observed in all Site 10 eels. The medium bound total PCDD/F concentrations and WHO-TEQs for the Site 10 composites. 10A, 11A and 12A are:2.92 pg/g and 0.297 pg/g, 4.30 pg/g and 0.538 pg/g, and 3.59 pg/g and 0.455 pg/g, respectively. Hence, the Site 10 composites medium bound PCDD/F results are 4.2–5.0 times higher than the blank that was processed during the analysis and the medium bound WHO-TEQ results are 0.143–0.384 pg/g greater than the blank results.

4.1.5 Within the remediation zone: Kopeopeo Canal sites 4, 5 and 6

Within the remediation zone, eels collected from Sites 4, 5 and 6 show elevated concentrations of PCDD/Fs and, in empirical terms, a general consistency. A broad distribution of PCDD/PCDF congeners is observed. The averages of the medium bound total PCDD/F concentrations are 5.50 pg/g, 5.59 pg/g and 5.59 pg/g for Site 4, Site 5 and Site 6 composites, respectively. Likewise, the averages of the medium bound WHO-TEQs are 0.45 pg/g, 0.48 pg/g and 0.39 pg/g for Site 4, Site 5 and Site 6 composites, respectively. Hence, eels collected from the remediation zone have average PCDD/F concentrations that are 6.5–8.1 times higher than the blank that was processed during the analysis and the medium bound average WHO-TEQ results are 0.238–0.323 pg/g greater than the blank results.

4.2 QA/QC

In addition to the laboratory reagent blanks previously discussed, QA/QC samples included duplicates of two samples and two CRM samples. The medium bound total PCDD/F concentrations in sample 1A (Upper Kopeopeo Canal) and its duplicate are 1.38 pg/g and 1.25 pg/g respectively, and the medium bound total PCDD/F concentrations in sample 18A (Te Rahu Canal) and its duplicate are 0.599 pg/g and 0.688 pg/g respectively. Hence, both duplicate results are within 5–7% of the paired sample.

AsureQuality's results for PCDD/F congeners in the CARP-2 Reference Fish Tissue are consistent with the certified concentrations (Appendix C). Although the reported concentrations for some congeners fall marginally outside the reference range, the associated analytical uncertainty of the results is such that all congener concentrations are with the CRM reference ranges.

4.3 Eel condition

All eels selected for analysis were in a healthy condition with no lesions, abnormalities or signs of poor health. The mean condition factor of the 15 eels selected for analysis from each site was very similar among the sites (Figure 2) with no evidence of the 15 eels from each of the Kopeopeo Canal sites having lower condition factors compared to control sites.

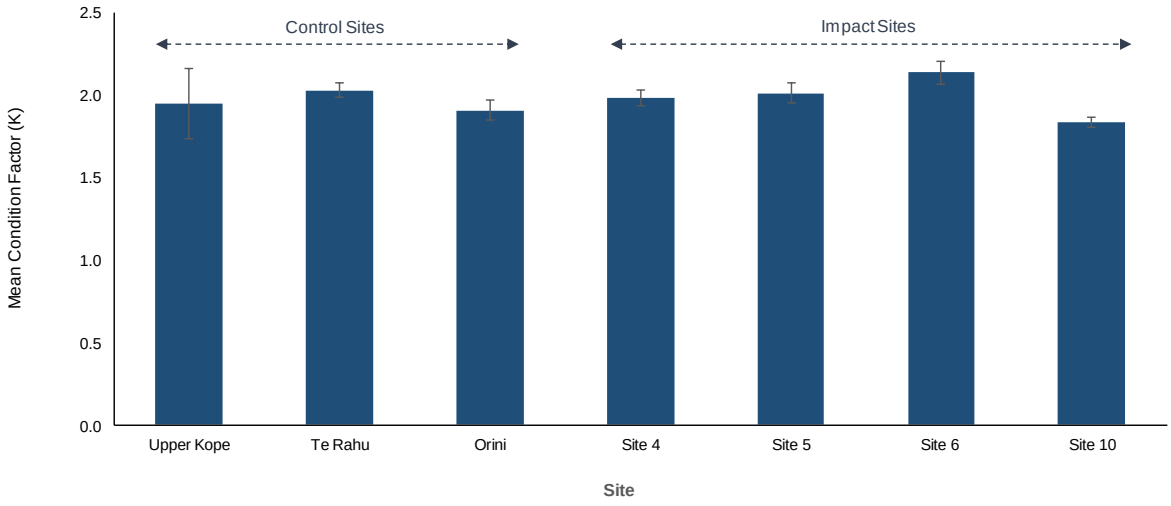

Figure 2: Mean eel condition factor of samples analysed for PCDD/F.

Table 2: Congener results, with greater than detection limit results highlighted

Sample ID	Site Description	Total TCDF	Total TCDD	Total PeCDF	Total PeCDD	Total HxCDF	Total HxCDD	Total HpCDF	Total HpCDD	OCDF	OCDD
1A	Upper Kopeopeo	<0.0458	<0.103	<0.0589	<0.108	<0.138	0.255	<0.116	0.254	<0.187	0.496
1A	Duplicate	<0.0725	<0.0975	<0.0662	<0.0819	<0.147	0.171	<0.120	0.206	<0.160	0.503
2A	Upper Kopeopeo	<0.0529	<0.111	<0.0725	<0.108	<0.168	0.113	<0.126	0.155	<0.117	0.263
3A	Upper Kopeopeo	<0.0605	<0.120	<0.0759	<0.0867	<0.111	0.114	<0.225	0.113	<0.168	0.472
4A	Site 6	<0.0763	<0.100	<0.0757	<0.107	<0.129	0.634	<0.161	0.585	<0.152	2.08
5A	Site 6	<0.0721	<0.158	0.118	0.264	0.209	2.19	0.223	1.96	<0.212	2.69
6A	Site 6	<0.0815	<0.121	0.0659	0.0927	0.110	0.895	0.649	0.745	<0.165	2.46
7A	Site 4	<0.0547	<0.155	<0.0788	0.149	<0.582	1.99	<0.321	1.55	<0.180	2.73
8A	Site 4	<0.0668	<0.0967	<0.120	0.129	0.123	1.18	0.126	0.868	<0.201	2.17
9A	Site 4	<0.0585	<0.107	<0.0724	<0.326	<0.167	1.26	<0.444	0.986	<0.223	1.63
10A	Site 10	<0.0861	<0.125	<0.0821	0.110	<0.156	0.643	<0.123	0.562	<0.156	1.24
11A	Site 10	<0.110	0.0965	0.103	0.250	<0.152	1.30	<0.163	1.08	<0.106	1.21
12A	Site 10	<0.123	0.0795	<0.111	0.180	<0.313	0.991	<0.175	0.765	<0.181	1.12
13A	Site 5	<0.0667	<0.0960	<0.0380	<0.0971	<0.130	0.463	<0.149	0.471	<0.157	0.873
14A	Site 5	<0.0771	<0.110	<0.124	0.374	<0.253	3.31	0.226	2.12	<0.165	3.07
15A	Site 5	<0.0742	<0.0936	<0.0504	<0.207	0.154	1.60	0.134	1.08	<0.156	1.88
16A	Te Rahu	<0.0715	<0.0883	<0.0562	<0.102	<0.0730	<0.118	<0.118	<0.0752	<0.115	<0.209
17A	Te Rahu	<0.0913	<0.113	<0.0668	<0.145	<0.115	<0.109	<0.129	<0.0554	<0.104	0.205
18A	Te Rahu	<0.102	<0.0996	<0.0672	<0.0883	<0.122	<0.106	<0.134	<0.112	<0.0990	0.134
18A	Duplicate	<0.0800	<0.104	<0.0651	<0.122	<0.0883	<0.127	<0.102	<0.0754	<0.103	0.255
19A	Orini	<0.0842	<0.0832	<0.0675	<0.136	<0.150	<0.108	<0.164	<0.284	<0.101	0.181
20A	Orini	<0.0740	<0.0816	<0.0932	<0.118	<0.114	0.193	<0.107	0.224	<0.112	0.340
21A	Orini	<0.0758	<0.104	<0.110	<0.157	<0.0948	<0.103	<0.249	<0.144	<0.182	0.196

Table 3: Total PCDD/PCDF and TEQ Results

Sample ID	Site Description	Total PCDD/Fs		Total PCDD/Fs WHO-TEQ		Total PCDD/Fs I-TEQ	
		Medium	Range	Medium	Range	Medium	Range
1A	Upper Kopeopeo	1.38	1.00, 1.76	0.178	0.0282, 0.327	0.158	0.0285, 0.287
1A	Duplicate	1.25	0.880, 1.63	0.161	0.0193, 0.303	0.148	0.0197, 0.277
2A	Upper Kopeopeo	0.909	0.531, 1.29	0.174	0.0129, 0.335	0.155	0.0131, 0.297
3A	Upper Kopeopeo	1.12	0.699, 1.55	0.159	0.0127, 0.305	0.145	0.0130, 0.278
4A	Site 6	3.70	3.30, 4.10	0.220	0.0699, 0.371	0.203	0.0713, 0.335
5A	Site 6	7.88	7.65, 8.10	0.656	0.521, 0.792	0.534	0.391, 0.678
6A	Site 6	5.20	5.02, 5.39	0.299	0.203, 0.395	0.260	0.158, 0.363
7A	Site 4	7.10	6.42, 7.79	0.570	0.364, 0.775	0.506	0.292, 0.720
8A	Site 4	4.84	4.60, 5.08	0.373	0.270, 0.476	0.323	0.207, 0.44
9A	Site 4	4.57	3.88, 5.27	0.413	0.136, 0.69	0.341	0.137, 0.544
10A	Site 10	2.92	2.56, 3.28	0.297	0.180, 0.414	0.252	0.126, 0.378
11A	Site 10	4.30	4.04, 4.57	0.538	0.487, 0.588	0.423	0.363, 0.483
12A	Site 10	3.59	3.14, 4.04	0.455	0.367, 0.544	0.378	0.277, 0.479
13A	Site 5	2.17	1.81, 2.54	0.193	0.0513, 0.334	0.173	0.0519, 0.295
14A	Site 5	9.46	9.10, 9.83	0.856	0.729, 0.982	0.685	0.544, 0.825
15A	Site 5	5.14	4.85, 5.43	0.383	0.188, 0.577	0.338	0.189, 0.486
16A	Te Rahu	0.513	0.00, 1.03	0.138	0.00, 0.276	0.119	0.00, 0.238
17A	Te Rahu	0.669	0.205, 1.13	0.181	0.0000615, 0.361	0.152	0.000205, 0.303
18A	Te Rahu	0.599	0.134, 1.06	0.147	0.0000402, 0.293	0.132	0.000134, 0.264
18A	Duplicate	0.688	0.255, 1.12	0.162	0.0000765, 0.324	0.139	0.000255, 0.278
19A	Orini	0.770	0.181, 1.36	0.168	0.0000543, 0.336	0.142	0.000181, 0.283
20A	Orini	1.11	0.757, 1.46	0.171	0.0216, 0.320	0.152	0.0219, 0.281
21A	Orini	0.806	0.196, 1.42	0.185	0.0000588, 0.371	0.158	0.000196, 0.317

5.0 Discussion

Various agencies helped to develop the concept of Toxic Equivalency Factors (TEFs) in order to assist in the interpretation of the toxicity of PCDD/Fs and, ultimately, TEFs were derived for various PCDD/Fs by evaluating the toxicity of any given congener relative to 2,3,7,8-tetrachlorodibenzo-*para*-dioxin (2,3,7,8-TCDD). International TEFs (I-TEFs) refer to those initially developed by a working group of the North Atlantic Treaty Organization, or NATO, (Barnes et al., 1990) and WHO-TEFs refer to those developed by the World Health Organisation International Program on Chemical Safety (Van den Berg et al., 2006).

TEFs are used to calculate one overall value of Toxic Equivalency (TEQ) for all PCDDs and PCDFs in a mixture, hence: TEQ = ∑ (TEF x concentration).

The WHO-TEFs differ from the I-TEFs due to a difference in the individual TEFs of two pentachlorodibenzofuran (PeCDF) congeners, octachlorodibenzofuran (OCDF) and octachlorodibenzo-*para*-dioxin (OCDD). The overall effect of these differences is, generally, that the WHO-TEQ is more conservative than the I-TEQ, hence in this report the discussion of TEQs is with reference to WHO-TEQs.

5.1 Congener analysis

Previous reports have provided comment on the distribution of PCDD/F congeners in eels from the Kopeopeo Canal and associated watercourses, noting OCDD, HpCDD and HxCDD as the most prevalent congeners, which is consistent with the PCDD/F contamination profile of the timber treatment chemical pentachlorophenol (PCP), the primary source of PCDD/F in the Kopeopeo Canal (Park 2005; Park & Futter, 2005; SKM, 2013).

This work further confirms OCDD, HpCDD and HxCDD as the main PCDD/F congeners in Kopeopeo Canal eels.

5.2 PCDD/Fs in eels

PCDD/F concentrations of eels from the Kopeopeo Canal and associated watercourses have been reported previously (Park and Futter, 2005; Park, 2005; ToxConsult, 2013). TEQ data from those reports and this study are summarised in Table 4.

The control or distant site data presented in this report are consistent with the previous control and distant site data, with Te Rahu Canal and Orini Canal eels registering low medium bound concentrations of total PCDD/Fs in the range 0.513–1.11 pg/g (lower than or close to the blank) and WHO-TEQs in the range 0.138–0.185 pg/g. Te Rahu Canal and Orini Canal eels in this study report higher TEQs than the Waioho Stream controls, although eels from the latter sites also contained PCDD/F congeners. Differences in medium bound TEQs in samples containing very low PCDD/F concentrations are often attributable to different congener detection limits between samples.

Table 4: Eel WHO-TEQ Results: Summary of Previous studies

Site	Park & Futter, 2005	Park, 2005	ToxConsult, 2013	This Study
Control or distant sites				
Waioho Stream (Rewatu Rd)	0.0965			
Waioho Stream (White Pine Bush)	0.112			
Te Rahu Canal				0.155
Site 1			0.159	
Site 19	0.711			0.175
Upper Kopeopeo Canal				0.170
Kopeopeo Canal and affected sites				
Site 23b	1.72			
Site 3			0.352	
Site 4 (Park & Futter, 2005, Site 2)	3.56		0.362	0.452
Site 5			1.07	0.477
Site 6		2.37	0.437	0.392
Site 7			0.485	
Site 8			0.502	
Site 9			0.712	
Site 10			0.498	0.430

Note: results are WHO-TEQ medium bounds.

Eels collected from the Upper Kopeopeo Canal had medium bound concentrations of total PCDD/Fs in the range 0.909–1.38 pg/g (1.3 - 2.0 times higher than the blank) and WHO-TEQs in the range 0.159–0.178 pg/g. This demonstrates that eels the Upper Kopeopeo Canal show signs of slight PCDD/F contamination. The impression, based on TEQs, that Upper Kopeopeo Canal eels are less contaminated than those collected from the Orini Canal (Site 19) is false; the lower average medium bound TEQ in Upper Kopeopeo Canal eels is due to lower congener detection limits compared with Orini Canal (Site 19) eels. By way of example, the comparative average lower bound WHO-TEQs (which are not affected by differing detection limits) are 0.0179 pg/g and 0.00724 pg/g, respectively, reflecting higher PCDD/F concentrations in Kopeopeo Canal eels,

Results on eels from within the remediation zone (Sites 4, 5 and 6) show consistent and elevated concentrations of PCDD/Fs. Eels collected from Site 4 demonstrate a 7.9 times decrease in WHO-TEQ compared with that found by Park and Fuller (2005) (0.452 pg/g compared with 3.56 ppg/g), and the WHO-TEQ is similar to that found by ToxConsult in 2013 (0.362 pg/g). Similarly, eels collected from Site 6 report a WHO-TEQ comparable with that found by ToxConsult (0.392 pg/g versus 0.437 pg/g). However, there is an approximately two-fold difference in the WHO-TEQ for eels at Site 5 (0.477 pg/g) compared with that found by ToxConsult (1.07 pg/g).

The TEQ result for eels collected from Site 10, which although outside the remediation zone is, for all intents and purposes, the same as that observed for Sites 4, 5, 6. The point of

distinction between Site 10 eels and Sites 4, 5 and 6 eels is the congener profile, and of particular note is the detection of TCDD (just above the detection limit) in Site 10 eels, whereas TCDD was not detected in eels from Sites 4, 5 and 6. In reality, based on a comparison of OCDD results at these four sites, Site 10 eels demonstrate less contamination than eels from Sites 4, 5 and 6, reinforcing the fact that TEQ results must be interpreted with care.

There are two sites where eels were collected in both 2005 and 2018 that allow comparison, affording insight into how eel TEQs have been subject to temporal change. The WHO-ITEQ of eels from Site 4 was 3.56 pg/g in 2005 compared with 0.458 in this study, and the WHO-ITEQ of eels from Site 19 was 0.711 pg/g in 2005 compared with 0.175 in this study. Although the biological half-life of PCDD/Fs in fish subjected to one-off exposures may be relatively short (Niimi and Oliver, 1986), in an environment of on-going PCDD/F exposures via sediment, the water column and the food chain, estimates of how PCDD/F concentrations in eels might decrease over time are potentially fraught. However, some guidance may be drawn from a recent publication by Pagano et al. (2018), who have reported PCDD/F concentrations and trends between 2004 and 2014 in whole fish (lake trout and walleye) from the Great Lakes. The authors used age-contaminant correction modelling to estimate a PCDD/F TEQ half-life, across all five lakes, of 7.3 years.

Application of a 7.3-year half-life to the Site 4 TEQ in 2005 yields an estimated TEQ of 1.04 pg/g in 2018, compared with the 0.452 pg/g observed. Likewise, the Site 19 TEQ in 2005 yields an estimated TEQ of 0.207 pg/g in 2018, compared with the 0.175 pg/g observed. Hence, the half-life results are both overestimates of the TEQ reductions observed in this study, however, they allow useful insight into the potential empirical reductions of PCDD/Fs in long-exposed biota in a site-specific setting, which are not inconsistent with the findings of Pagano et al. (2018).

5.3 Interpretation of PCDD/F results with respect to human health

Previous determinations of the concentrations of PCDD/Fs in Kopeopeo Canal eels (Park & Farrell, 2005, Park, 2005) resulted in concerns that consumption of eels taken from the Kopeopeo Canal might result in the exceedance of safe PCDD/F limits for human consumption.

Based on a maximum bound I-TEQ of 3.86 pg/g in eels from Site 4 it was calculated that, for a 70 kg person, consumption of 544 g of eel flesh per month would result in exceedance of the New Zealand Ministry of Health recommended Interim Maximum Monthly Intake guideline (30 pg TEQ/kg of body weight). If background dietary exposure values for New Zealand adult males were taken into account (estimated to be 11.1 pg TEQ/kg bw/month), then the estimate was 343 g of eel flesh per month (Park and Futter, 2005).

Ultimately, these concerns led to the Medical Officer of Health issuing a public health warning for the taking of eels from the most contaminated section Kopeopeo Canal (ESR, 2006).

Based on their analysis of eels in 2013, ToxConsult used the average TEQ of 0.55 pg/g eel, an eel consumption 70 to 100 g/day over a lifetime, and a combined PCDD/F intake from background exposures of 0.33 pg TEQ/kg/day to calculate that eating Kopeopeo Canal eels might slightly exceed the New Zealand PCDD/F tolerable daily intake (TDI) of 1 TEQ pg/kg/day (MfE, 2011b). ToxConsult concluded the potential health risk from consumption of Kopeopeo Canal eels was low.

This study has found that eels in the remediation zone have medium bound TEQs up to

0.856 pg/g and Kopeopeo Canal eels some distance upstream (Site 10) of the remediation zone have medium bound TEQs up to 0.538 pg/g. ESR (2006) has noted New Zealand estimates of eel consumption (2.3–7.3 kg/person/month are greater than the standard default exposure parameters (1.6–3.1 kg/person-month) often used in the determination of dietary PCDD/F exposures (USEPA, 1991).

Hence, a conservative application eel consumption rates (7.3 kg/person/month), added to background exposures of 0.33 pg TEQ/kg/day, yields a potential exposure in 70kg male consumers of Kopeopeo Canal eels from the remediation zone of up to 3.3 pg/g/day; the same calculation for Site 10 eels results in an exposure of 2.2 pg/g/day. Put another way, in order to stay below the New Zealand PCDD/F tolerable daily intake (TDI) of 1 TEQ pg/kg/day a 70kg male consumer should not consume more than 1.5 kg/month (49 g/day) of eels from the remediation zone or more than 2.4 kg/month (79 g/day) of eels from Site 10. It is noted that although the New Zealand PCDD/F TDI may be considered conservative (ToxConsult, 2013), the USEPA has recently established a non-cancer risk reference dose for PCDD/Fs at 0.7 pg/kg/day (USEPA, 2012).

It is also noted that the calculations of exposures in Kopeopeo Canal eel consumers do not apply to individuals who may have been subjected to high historic exposures of PCDD/Fs, such as sawmill workers exposed to PCP, farm workers exposed to 2,4,5-T, or war veterans exposed to Agent Orange. The New Zealand Ministry of Heath advice for people with elevated PCDD/F levels is to go to greater lengths than usual to limit future exposures (MfE, 2014).

6.0 Conclusion

Results from the analysis of PCDD/F in eels collected from the Kopeopeo Canal remediation zone showed elevated concentrations of PCDD/Fs, with a broad distribution of congeners observed. The averages of the medium bound total PCDD/F concentrations were 5.50 pg/g, 5.59 pg/g and 5.59 pg/g for Site 4, Site 5 and Site 6 composites, respectively; these concentrations are 6.5–8.1 times higher than the blank that was processed during the analysis. Eels collected from Site 10, upstream of the remediation zone, also showed elevated concentrations of PCDD/Fs with medium bound PCDD/F results 4.2 - 5.0 times higher than the blank.

In contrast, eels captured from the control sites on the Te Rahu Canal and the Orini Canal, contained low concentrations of PCDD/Fs. Te Rahu Canal medium bound results were lower than the blank result and Orini Canal medium bound results were either lower or slightly higher than the blank result. Eels collected from a new sampling site on the Upper Kopeopeo Canal had medium bound PCDD/F results 1.3–2.0 times higher than the blank, indicating a slight degree of contamination in eels distant from the remediation zone.

Comparison of PCDD/F concentrations in eels in this study with eels from the same sites in 2005 indicates a PCDD/F decrease not inconsistent with a half-life of 7.3 years, as estimated by Pagano et al. (2018).

With respect to human health concerns, this study has found that eels in the remediation zone have medium bound TEQs up to 0.856 pg/g, and that Kopeopeo Canal eels some distance upstream (Site 10) of the remediation zone have medium bound TEQs up to 0.538 pg/g. A conservative application of eel consumption rates (7.3 kg/person/month), in conjunction with a 0.33 pg TEQ/kg/day background exposure, would result in estimated

exposures in 70 kg male consumers of Kopeopeo Canal eels from the remediation zone of up to 3.3 pg/g/day, or 2.2 pg/g/day for consumers of eels taken from Site 10, upstream of the remediation zone. Both estimates are exceedances of the New Zealand PCDD/F TDI of 1 TEQ pg/kg/day.

7.0 References

Barnes et al., 1990. The international toxicity equivalency factor (I-TEF) method of risk assessment for complex mixtures of dioxins and related compounds. Washington DC: U.S. Environmental Protection Agency.

Bates et al., 1990. Organochlorine Residues in the Breast Milk of New Zealand Women: A report to the Department of Health. Petone: Department of Scientific and Industrial Research.

Bates et al., 2001. Investigation of Organochlorine Contaminants in the Milk of New Zealand Women. Porirua: ESR.

Buckland et al., 1998. Organochlorines in New Zealand: Ambient concentrations of selected organochlorines in soils. Wellington: Ministry for the Environment.

Buckland et al., 2000. New Zealand inventory of dioxin emissions to air, land and water, and reservoir sources. Wellington: Ministry for the Environment.

Buckland et al., 2001. Concentrations of Selected Organochlorines in the Serum of the Non-occupationally Exposed New Zealand Population. Wellington: Ministry for the Environment.

Chisnall, B. 1989: Age, growth, and condition of freshwater eels (*Anguilla* sp. in backwaters of the lower Waikato River, New Zealand. Journal of Marine and Freshwater Research, 23:4.

ESR, 2006. Abbreviated Assessment of Human Health Impact from Whakatane Old Sawmill Site. Wellington. Institute for Environment Science and Research Ltd.

Freshwater Solutions Ltd, 2017. Kopeopeo Canal Fish Monitoring and Removal Plan. Report prepared by Freshwater Solutions Ltd for Bay of Plenty Regional Council. December 2017.

Golder, 2017. Methodology for Eel Sampling. Golder Associates.

MfE, 2011a. New Zealand Inventory of Dioxin Emissions to Air, Land and Water, and Reservoir Sources. Wellington: Ministry for the Environment.

MfE, 2011b. Methodology for deriving standards for contaminants in soil to protect human health. Wellington: Ministry for the Environment.

MfE, 2014. Dioxins Questions and Answers. https://www.health.govt.nz/our-work/environmental-health/dioxins/dioxins-questions-and-answers. Accessed 1 August 2018.

Niimi and Oliver, 1986. Biological half-lives of chlorinated dibenzo-*p*-dioxins and dibenzofurans in rainbow trout (*Salmo gairdneri*). Environmental Toxicology and Chemistry, 5, 49-53.

Park, 2005. Investigation of Organic Contaminants in the Kopeopeo Canal. Environment Bay of Plenty.

Park and Futter, 2005. Whakatane Wood Waste Sites: Investigation of Contaminants in the Receiving Environment. Environment Bay of Plenty.

Pagano et al., 2018. Age-Corrected Trends and Toxic Equivalence of PCDD/F and CP-PCBs in Lake Trout and Walleye from the Great Lakes: 2004−2014. Environmental Science and Technology, 52, 712−721.

SKM, 2013. Kopeopeo Canal Removal, Remediation and Disposal of Canal Sediments: Bay of Plenty Reginal Council District and Regional Council Resource Consent Application and Assessment of Environmental Effects. Sinclair Knight Merz.

Smith and Lopipero, 2001. Evaluation of the Toxicity of Dioxins and Dioxin-like PCBs: a Health Risk Appraisal for the New Zealand Population. Wellington: Ministry for the Environment.

‘t Mannetje A. 2012. Addition to the report to the Ministry of Health. Concentrations of Persistent Organic Pollutants in the Milk of New Zealand Women. Wellington: Centre for Public Health Research.

‘t Mannetje A, Coakley J, Bates M, et al. 2013. Concentrations of Selected Persistent Organic Pollutants (POPs) in the Serum of New Zealanders. A report for the Ministry of Health, Wellington. Wellington: Centre for Public Health Research.

ToxConsult, 2013. Kopeopeo Canal dioxin survey. Toxicology Consulting Australasia.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. U.S. Environmental Protection Agency.

USEPA, 1996. Method 1613 Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS. U.S. Environmental Protection Agency Office of Water Engineering and Analysis Division.

USEPA, 2012. EPA’s Reanalysis of Key Issues Related to Dioxin Toxicity and Response to NAS Comments, Volume 1. Washington DC: United States Environmental Protection Agency.

Van den Berg et al., 2005. e 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds. *Toxicological Sciences*, 93 (2), 223-241.

APPENDIX A

Eel Length and Weight Data

AQ Prject number	Composite	Eel IDs	Length of Eel (mm)	Weight of Eel (g)	Weight of Skinless Fillet (g)	Weight of Eel used to form composite (g)
18-113518-1	Sample 1	Upper Kope - 1	405	110.7	23.2	20.613
		Upper Kope - 2	377	85.6	23.7	20.66
		Upper Kope - 3	412	145.2	44.9	20.465
		Upper Kope - 4	488	163.5	35.3	20.385
		Upper Kope - 5	582	310.9	73.3	20.418
18-113518-2	Sample 2	Upper Kope - 6	430	385.1	127	18.447
		Upper Kope - 7	531	285.5	52.4	18.023
		Upper Kope - 8	336	75.1	20.4	18.046
		Upper Kope - 9	473	173	54.3	18.257
		Upper Kope - 10	395	91.9	31.2	18.182
18-113518-3	Sample 3	Upper Kope - 11	460	163.4	47.1	13.969
		Upper Kope - 12	426	141.3	348	13.78
		Upper Kope - 13	393	113.5	32.4	13.689
		Upper Kope - 14	473	183.4	31.5	13.682
		Upper Kope - 15	336	70.9	15.7	13.978
18-113518-4	Sample 1	Site 6 - 1	410	131.7	35.3	15.471
		Site 6 - 2	320	73.7	17.2	15.778
		Site 6 - 3	435	210.5	52.5	15.69
		Site 6 - 4	370	108.2	27.9	15.199
		Site 6 - 5	445	173.6	41.3	15.581
18-113518-5	Sample 2	Site 6 - 6	381	146.9	35.9	16.219
		Site 6 - 7	336	72.6	17.5	16.047
		Site 6 - 8	390	132.1	38.6	16.283
		Site 6 - 9	335	90.6	25.4	16.095
		Site 6 - 10	385	125	33.6	16.146
18-113518-6	Sample 3	Site 6 - 11	346	73	17.9	17.193
		Site 6 - 12	386	123.4	33.1	17.192
		Site 6 - 13	527	321.6	96.3	17.283
		Site 6 - 14	456	176	54	17.172
		Site 6 - 15	364	89.2	25.2	17.105
18-113518-7	Sample 1	Site 4 - 1	403	121.3	32.3	12.385
		Site 4 - 2	322	50.4	12.8	12.207
		Site 4 - 3	379	111.5	29.6	12.404
		Site 4 - 4	420	158.4	47	12.266
		Site 4 - 5	356	93.8	26.2	12.442
18-113518-8	Sample 2	Site 4 - 6	393	134.4	34	19.421
		Site 4 - 7	384	108.4	26.5	19.469
		Site 4 - 8	356	89.6	22.6	19.374
		Site 4 - 9	414	144.3	41.7	19.391
		Site 4 - 10	450	176.7	51.3	19.219
18-113518-9	Sample 3	Site 4 - 11	375	100.7	29.5	20.362
		Site 4 - 12	444	174.2	52.5	20.311
		Site 4 - 13	490	218.9	59.7	20.224
		Site 4 - 14	476	232.4	60.9	20.217
		Site 4 - 15	485	239.4	67.6	20.337
18-113518-10	Sample 1	Site 10 - 1	504	245.9	71.4	20.208
		Site 10 - 2	477	194.9	58.7	20.382
		Site 10 - 3	431	164	43	20.251
		Site 10 - 4	454	165.2	46.1	20.256
		Site 10 - 5	410	114.7	28.2	20.137
18-113518-11	Sample 2	Site 10 - 6	374	99.3	28.3	19.575
		Site 10 - 7	365	89.6	29.3	19.708
		Site 10 - 8	422	134.6	38.6	19.32
		Site 10 - 9	403	131.3	46.4	19.576
		Site 10 - 10	369	87.6	24.9	19.546
18-113518-12	Sample 3	Site 10 - 11	395	111.4	32.7	15.159
		Site 10 - 12	349	76.1	23.8	15.552
		Site 10 - 13	376	109.8	29.3	15.541
		Site 10 - 14	353	74.9	21.3	15.16
		Site 10 - 15	328	59.2	16	15.275
18-113518-13	Sample 1	Site 5 - 1	390	117.3	29.8	17.815
		Site 5 - 2	445	184.7	50.6	17.991
		Site 5 - 3	432	176.9	42	18.058
		Site 5 - 4	343	82.7	18.4	17.616
		Site 5 - 5	427	169.4	47.6	17.832
18-113518-14	Sample 2	Site 5 - 6	292	40.4	11.8	10.248
		Site 5 - 7	280	40.2	11.2	10.043
		Site 5 - 8	440	219.1	50.4	10.499
		Site 5 - 9	464	214.6	48	10.379
		Site 5 - 10	428	152.1	45	10.451
18-113518-15	Sample 3	Site 5 - 11	392	107.4	26	11.219
		Site 5 - 12	379	99	26.2	11.101
		Site 5 - 13	484	255.1	68.3	11.291
		Site 5 - 14	303	51.5	12.1	11.17
		Site 5 - 15	395	113.5	31.4	11.702
18-113518-16	Sample 1	Te Rahu - 1	521	263.5	86.8	19.856
		Te Rahu - 2	510	256.8	70.8	19.667
		Te Rahu - 3	483	229.7	56.3	19.819
		Te Rahu - 4	422	134.2	25.4	19.999
		Te Rahu - 5	395	126.7	34	19.714
18-113518-17	Sample 2	Te Rahu - 6	472	225.3	48.7	20.873
		Te Rahu - 7	432	175.9	42.1	20.176
		Te Rahu - 8	539	341.2	66.5	20.552
		Te Rahu - 9	553	349.7	93	20.259
		Te Rahu - 10	531	302.8	75.6	20.859
18-113518-18	Sample 3	Te Rahu - 11	515	270.4	66.7	20.609
		Te Rahu - 12	505	274	75.1	20.168
		Te Rahu - 13	549	274.3	56.3	20.367
		Te Rahu - 14	615	470.9	133.2	20.358
		Te Rahu - 15	529	348.1	91.2	20.316
18-113518-19	Sample 1	Orini - 1	464	177.2	49.5	19.832
		Orini - 2	537	262.6	48.4	19.674
		Orini - 3	474	219.4	42.9	19.986
		Orini - 4	568	356.8	93.7	19.814
		Orini - 5	552	246.5	49.5	19.712
18-113518-20	Sample 2	Orini - 6	472	206.1	40.2	19.4
		Orini - 7	562	337.3	70	19.172
		Orini - 8	605	431.4	102.5	19.223
		Orini - 9	485	230.5	54.5	19.104
		Orini - 10	448	224.6	23.2	19.099
18-113518-21	Sample 3	Orini - 11	470	194.3	47.5	19.266
		Orini - 12	473	192.2	54.9	19.519
		Orini - 13	358	83.2	20.5	19.011
		Orini - 14	475	218.5	42.2	19.436
		Orini - 15	443	157.2	41.1	19.334

APPENDIX B

Assure Quality Laboratory Report

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Certificate of Analysis

Final Report

Brendon Love
Bay of Plenty Regional Council
PO Box 364
Whakatane 3158
New Zealand

PO Number: 99324

Report Issued: 06-Jul-2018 **AsureQuality Reference: 18-113518** **Sample(s) Received:** 20-Mar-2018 12:00

Sample 18-113518-1A tested as a composite of Upper Kope - 1, Upper Kope - 2, Upper Kope - 3, Upper Kope - 4, and Upper Kope - 5.
Sample 18-113518-2A tested as a composite of Upper Kope - 6, Upper Kope - 7, Upper Kope - 8, Upper Kope - 9, and Upper Kope - 10.
Sample 18-113518-3A tested as a composite of Upper Kope - 11, Upper Kope - 12, Upper Kope - 13, Upper Kope - 14, and Upper Kope - 15.
?Sample 18-113518-4A tested as a composite of Site 6 - 1, Site 6 - 2, Site 6 - 3, Site 6 - 4, and Site 6 - 5.
?Sample 18-113518-5A tested as a composite of Site 6 - 6, Site 6 - 7, Site 6 - 8, Site 6 - 9, and Site 6 - 10.
?Sample 18-113518-6A tested as a composite of Site 6 - 11, Site 6 - 12, Site 6 - 13, Site 6 - 14, and Site 6 - 15.
Sample 18-113518-7A tested as a composite of Site 4 - 1, Site 4 - 2, Site 4- 3, Site 4 - 4, and Site 4 - 5.
Sample 18-113518-8A tested as a composite of Site 4 - 6, Site 4 - 7, Site 4- 8, Site 4 - 9, and Site 4 - 10.
Sample 18-113518-9A tested as a composite of Site 4 - 11, Site 4 - 12, Site 4- 13, Site 4 - 14, and Site 4 - 15.
Sample 18-113518-10A tested as a composite of Site 10 - 1, Site 10 - 2, Site 10 - 3, Site 10 - 4, and Site 10 - 5.
Sample 18-113518-11A tested as a composite of Site 10 - 6, Site 10 - 7, Site 10 - 8, Site 10 - 9, and Site 10 - 10.
Sample 18-113518-12A tested as a composite of Site 10 - 11, Site 10 - 12, Site 10 - 13, Site 10 - 14, and Site 10 - 15.
Sample 18-113518-13A tested as a composite of Site 5 - 1, Site 5 - 2, Site 5- 3, Site 5 - 4, and Site 5 - 5.
Sample 18-113518-14A tested as a composite of Site 5 - 6, Site 5 - 7, Site 5- 8, Site 5 - 9, and Site 5 - 10.
Sample 18-113518-15A tested as a composite of Site 5 - 11, Site 5 - 12, Site 5 - 13, Site 5 - 14, and Site 5 - 15.
Sample 18-113518-16A tested as a composite of Te Rahu - 1, Te Rahu - 2, Te Rahu - 3, Te Rahu - 4, and Te Rahu - 5.
Sample 18-113518-17A tested as a composite of Te Rahu - 6, Te Rahu - 7, Te Rahu - 8, Te Rahu - 9, and Te Rahu - 10.
Sample 18-113518-18A tested as a composite of Te Rahu - 11, Te Rahu - 12, Te Rahu - 13, Te Rahu - 14, and Te Rahu - 15.
Sample 18-113518-19A tested as a composite of Orini - 1, Orini - 2, Orini - 3, Orini - 4, and Orini - 5.
Sample 18-113518-20A tested as a composite of Orini - 6, Orini - 7, Orini - 8, Orini - 9, and Orini - 10.
Sample 18-113518-21A tested as a composite of Orini - 11, Orini - 12, Orini - 13, Orini - 14, and Orini - 15.

Results

The tests were performed on the samples as received.

Customer Sample Name: Composite Sample 1 **AsureQuality ID:** 18-113518-1

Sample Description: Composite of sample Upper Kope -1,2,3,4,5

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	4.67	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0458	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0458	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.103	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
Total TCDD	<0.103	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0589	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0585	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0589	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.108	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.108	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.101	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.101	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.102	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.138	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.138	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.0885	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	0.255	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.0917	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	0.255	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.0870	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.116	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.116	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	0.254 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	0.254 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.187	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	0.496	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	1.00	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	1.38	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	1.76	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.0282	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.178	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.327	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.0285	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.158	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.287	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	73	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	89	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	77	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	112	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	79	%	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
E = Estimated result			

Customer Sample Name: Composite Sample 2 **AsureQuality ID:** 18-113518-2

Sample Description: Composite of sample Upper Kope -6,7,8,9,10

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	6.47	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0529	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0529	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.111	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.111	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0725	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0698	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0725	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.108	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.108	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.127	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.120	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.129	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.168	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.168	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.0903	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	0.113 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.0935	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	0.113 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.0947	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.126	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.126	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	0.155	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	0.155	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.117	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	0.263 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.531	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	0.909	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	1.29	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.0129	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.174	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.335	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.0131	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.155	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.297	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	79	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	90	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	76	%	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
$^{13}C_{12}$ 12378-PeCDF	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	94	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	91	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	92	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	92	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	85	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Composite Sample 3 **AsureQuality ID:** 18-113518-3

Sample Description: Composite of sample Upper Kope -11,12,13,14,15

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	3.99	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0605	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0605	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.120	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.120	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0759	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0694	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0759	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.0867	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.0867	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.0744	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.0722	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.0813	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.111	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.111	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.0930	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	0.114	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.0964	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	0.114	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.183	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.225	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.225	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	0.113 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	0.113 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.168	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	0.472	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.699	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
Sum of PCDD/Fs - Mediumbound	1.12	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	1.55	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.0127	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.159	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.305	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.0130	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.145	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.278	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	80	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	89	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	85	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	88	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	92	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	96	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	93	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	109	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	91	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	83	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Composite Sample 4 **AsureQuality ID:** 18-113518-4

Sample Description: Composite of sample Site 6 -1,2,3,4,5

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	1.22	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0763	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0763	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.100	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.100	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0757	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0746	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0757	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.107	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.107	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.0970	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.0903	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.0995	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.129	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
Total HxCDF	<0.129	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.0841	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	0.634	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.0871	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	0.634	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.127	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.161	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.161	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	0.585	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	0.585	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.152	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	2.08	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	3.30	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	3.70	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	4.10	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.0699	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.220	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.371	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.0713	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.203	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.335	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	82	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	96	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	85	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	114	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	116	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	111	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	109	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	86	%	USEPA Method 1613B (GC-HRMS)

Customer Sample Name: Composite Sample 5 **AsureQuality ID:** 18-113518-5

Sample Description: Composite of sample Site 6 -6,7,8,9,10

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	3.32	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0721	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
Total TCDF	<0.0721	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.158	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.158	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0711	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0723	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	0.118	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	0.264 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	0.264 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.142	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	0.209	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.140	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.196	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	0.209	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.159	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	2.19	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.165	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	2.19	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	0.223	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.155	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	0.223	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	1.40	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	1.96	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.212	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	2.69	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	7.65	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	7.88	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	8.10	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.521	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.656	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.792	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.391	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.534	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.678	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	78	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	80	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	122	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	122	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	115	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	108	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	94	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	111	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	115	%	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
$^{13}C_{12}$ 1234678-HpCDD	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	92	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Composite Sample 6 **AsureQuality ID:** 18-113518-6

Sample Description: Composite of sample Site 6 -11,12,13,14,15

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	1.18	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0815	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0815	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.121	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.121	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0601	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0578	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	0.0659	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	0.0927 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	0.0927 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.0624	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	0.110	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.0620	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.0835	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	0.110	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.105	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	0.895 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.109	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	0.895 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	0.122	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.147	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	0.649	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	0.745	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	0.745	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.165	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	2.46	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	5.02	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	5.20	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	5.39	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.203	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.299	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.395	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.158	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.260	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.363	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	85	%	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	90	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	123	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	130	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	124	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	108	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	108	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	109	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	114	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	88	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Composite Sample 7 **AsureQuality ID:** 18-113518-7

Sample Description: Composite of sample Site 4 -1,2,3,4,5

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	1.50	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0547	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0547	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.155	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.155	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0788	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0779	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0788	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	0.149 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	0.149 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.422	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.411	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.433	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.582	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.582	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.169	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	1.99	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.175	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	1.99	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.246	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.321	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.321	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	1.55	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	1.55	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
OCDF	<0.180	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	2.73	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	6.42	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	7.10	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	7.79	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.364	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.570	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.775	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.292	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.506	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.720	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	80	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	88	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	136	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	140	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	132	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	113	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	113	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	109	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	117	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	125	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	116	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	94	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Composite Sample 8 **AsureQuality ID:** 18-113518-8

Sample Description: Composite of sample Site 4 -6,7,8,9,10

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	1.07	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0668	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0668	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.0967	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.0967	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.115	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.120	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.120	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	0.129	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	0.129	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.115	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
123678-HxCDF	0.123	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.116	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.158	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	0.123	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.117	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	1.18	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.121	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	1.18	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	0.126	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.0908	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	0.126	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	0.868	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	0.868	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.201	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	2.17	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	4.60	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	4.84	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	5.08	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.270	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.373	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.476	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.207	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.323	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.440	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	85	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	87	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	128	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	128	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	125	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	108	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	96	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	117	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	108	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	90	%	USEPA Method 1613B (GC-HRMS)

Customer Sample Name: Composite Sample 9 **AsureQuality ID:** 18-113518-9

Sample Description: Composite of sample Site 4 -11,12,13,14,15

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	1.31	%	AsureQuality Method (Gravimetric)

Test	Result	Unit	Method Reference
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0585	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0585	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.107	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.107	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0724	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0680	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0724	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.326	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.326	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.113	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.109	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.117	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.167	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.167	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.166	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	1.26	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.172	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	1.26	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.382	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.444	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.444	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	0.986	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	0.986	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.223	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	1.63	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	3.88	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	4.57	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	5.27	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.136	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.413	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.690	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.137	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.341	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.544	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	89	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	92	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	121	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	125	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	120	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	121	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	122	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	114	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	108	%	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
$^{13}C_{12}$ 123478-HxCDD	123	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	108	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	115	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	127	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	114	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	83	%	USEPA Method 1613B (GC-HRMS)

Customer Sample Name: Composite Sample 10 **AsureQuality ID:** 18-113518-10

Sample Description: Composite of sample Site 10 -1,2,3,4,5

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	5.32	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0861	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0861	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.125	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.125	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0803	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0821	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0821	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	0.110 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	0.110 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.110	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.108	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.117	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.156	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.156	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.109	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	0.643 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.113	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	0.643 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.0935	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.123	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.123	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	0.562	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	0.562	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.156	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	1.24	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	2.56	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	2.92	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	3.28	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.180	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.297	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.414	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.126	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.252	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
Total PCDD/F I-TEQ - Upperbound	0.378	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	85	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	93	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	122	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	121	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	121	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	109	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	109	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	115	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	117	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	113	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	98	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Composite Sample 11 **AsureQuality ID:** 18-113518-11

Sample Description: Composite of sample Site 10 -6,7,8,9,10

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	7.72	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.110	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.110	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	0.0965 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	0.0965 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0849	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0851	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	0.103	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	0.250	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	0.250	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.112	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.107	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.115	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.152	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.152	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	0.127 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	1.17	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.0991	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	1.30 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.129	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.163	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
Total HpCDF	<0.163	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	1.08	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	1.08	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.106	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	1.21	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	4.04	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	4.30	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	4.57	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.487	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.538	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.588	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.363	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.423	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.483	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	94	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	83	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	93	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	94	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	95	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Composite Sample 12 **AsureQuality ID:** 18-113518-12

Sample Description: Composite of sample Site 10 -11,12,13,14,15

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	6.08	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.123	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.123	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	0.0795	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	0.0795	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.106	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.111	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.111	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
12378-PeCDD	0.180	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	0.180	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.237	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.230	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.235	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.313	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.313	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.117	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	0.991	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.121	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	0.991	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.139	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.175	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.175	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	0.765	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	0.765	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.181	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	1.12 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	3.14	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	3.59	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	4.04	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.367	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.455	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.544	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.277	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.378	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.479	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	88	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	80	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	96	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	89	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Composite Sample 13 **AsureQuality ID:** 18-113518-13

Sample Description: Composite of sample Site 5 -1,2,3,4,5

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	0.933	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0667	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0667	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.0960	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.0960	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0368	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0380	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0380	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.0971	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.0971	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.0978	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.0934	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.101	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.130	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.130	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.127	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	0.463 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.132	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	0.463 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.112	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.149	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.149	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	0.471	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	0.471	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.157	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	0.873	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	1.81	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	2.17	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	2.54	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.0513	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.193	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.334	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.0519	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.173	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.295	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	88	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	78	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	108	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	109	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	106	%	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
$^{13}C_{12}$ 234678-HxCDF	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	96	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	115	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	114	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	98	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Composite Sample 14 **AsureQuality ID:** 18-113518-14

Sample Description: Composite of sample Site 5 -6,7,8,9,10

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	4.32	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0771	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0771	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.110	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.110	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.124	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.124	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.124	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	0.374 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	0.374 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.186	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.175	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.179	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.253	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.253	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	0.236	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	3.07	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.137	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	3.31	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	0.226	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.178	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	0.226	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	2.12	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	2.12	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.165	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	3.07	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	9.10	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	9.46	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	9.83	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.729	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.856	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.982	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
Total PCDD/F I-TEQ - Lowerbound	0.544	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.685	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.825	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	95	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	82	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	108	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	109	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	112	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	94	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Composite Sample 15 **AsureQuality ID:** 18-113518-15

Sample Description: Composite of sample Site 5 -11,12,13,14,15

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	2.03	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0742	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0742	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.0936	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.0936	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0482	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0504	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0504	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.207	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.207	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.120	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	0.154	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.135	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.173	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	0.154	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.0996	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	1.60	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.103	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	1.60	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
1234678-HpCDF	0.134	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.167	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	0.134	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	1.08	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	1.08	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.156	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	1.88	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	4.85	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	5.14	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	5.43	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.188	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.383	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.577	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.189	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.338	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.486	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	95	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	90	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	112	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	109	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	108	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	112	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	99	%	USEPA Method 1613B (GC-HRMS)

Customer Sample Name: Composite Sample 16 **AsureQuality ID:** 18-113518-16

Sample Description: Composite of sample Te Rahu -1,2,3,4,5

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	0.872	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0715	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0715	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.0883	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.0883	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0533	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0562	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
Total PeCDF	<0.0562	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.102	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.102	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.0532	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.0503	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.0573	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.0730	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.0730	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.110	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	<0.118	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.114	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	<0.118	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.0845	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.118	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.118	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	<0.0752	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	<0.0752	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.115	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	<0.209	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.000	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	0.513	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	1.03	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.000	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.138	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.276	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.000	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.119	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.238	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	92	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	84	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	115	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	111	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	108	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	113	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	109	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	112	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	96	%	USEPA Method 1613B (GC-HRMS)

Customer Sample Name: Composite Sample 17 **AsureQuality ID:** 18-113518-17

Sample Description: Composite of sample Te Rahu -6,7,8,9,10

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	2.22	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0913	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0913	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.113	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.113	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0660	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0668	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0668	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.145	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.145	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.0857	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.0857	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.0881	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.115	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.115	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.101	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	<0.109	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.105	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	<0.109	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.0969	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.129	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.129	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	<0.0554	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	<0.0554	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.104	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	0.205	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.205	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	0.669	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	1.13	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.0000615	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.181	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.361	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.000205	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.152	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.303	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	85	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	81	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	109	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	98	%	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
$^{13}C_{12}$ 234678-HxCDF	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	108	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	101	%	USEPA Method 1613B (GC-HRMS)

Customer Sample Name: Composite Sample 18 **AsureQuality ID:** 18-113518-18

Sample Description: Composite of sample Te Rahu -11,12,13,14,15

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	1.42	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.102	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.102	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.0996	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.0996	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0663	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0672	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0672	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.0883	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.0883	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.0898	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.0843	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.0902	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.122	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.122	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.0985	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	<0.106	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.102	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	<0.106	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.101	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.134	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.134	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	<0.112	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	<0.112	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.0990	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	0.134 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.134	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	0.599	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	1.06	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.0000402	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.147	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.293	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
Total PCDD/F I-TEQ - Lowerbound	0.000134	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.132	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.264	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	90	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	89	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	108	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	108	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	93	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Composite Sample 19 **AsureQuality ID:** 18-113518-19

Sample Description: Composite of sample Orini -1,2,3,4,5

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	1.27	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0842	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0842	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.0832	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.0832	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0614	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0675	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0675	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.136	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.136	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.113	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.108	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.113	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.150	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.150	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.104	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	<0.108	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.108	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	<0.108	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
1234678-HpCDF	<0.127	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.164	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.164	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	<0.284	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	<0.284	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.101	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	0.181 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.181	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	0.770	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	1.36	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.0000543	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.168	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.336	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.000181	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.142	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.283	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	87	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	85	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	111	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	109	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	96	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	101	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Composite Sample 20 **AsureQuality ID:** 18-113518-20

Sample Description: Composite of sample Orini -6,7,8,9,10

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	4.04	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0740	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0740	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.0816	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.0816	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0903	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
23478-PeCDF	<0.0932	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0932	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.118	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.118	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.0832	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.0765	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.0831	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.114	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.114	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.112	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	0.193 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.116	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	0.193 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.0825	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.107	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.107	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	0.224	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	0.224	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.112	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	0.340 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.757	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	1.11	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	1.46	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.0216	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.171	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.320	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.0219	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.152	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.281	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	93	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	90	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	112	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	95	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Composite Sample 21 **AsureQuality ID:** 18-113518-21

Sample Description: Composite of sample Orini -11,12,13,14,15

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	1.42	%	AsureQuality Method (Gravimetric)
Environmental Tissue Sample Clean/Gut/Prep/Composite.			
status	Complete		AsureQuality Method
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0758	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0758	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.104	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.104	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.106	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.110	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.110	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.157	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.157	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.0692	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.0665	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.0717	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.0948	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.0948	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.0959	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	<0.103	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.0993	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	<0.103	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.190	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.249	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.249	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	<0.144	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	<0.144	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.182	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	0.196 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.196	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	0.806	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	1.42	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.0000588	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.185	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.371	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.000196	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.158	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.317	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	79	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	75	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	85	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	95	%	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
$^{13}C_{12}$ 12378-PeCDD	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	93	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	94	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	91	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	93	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	92	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	89	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	92	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	96	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	90	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: CARP-2 AQ#18-152372 **AsureQuality ID:** 18-113518-22

Sample Description: Certified Reference Material

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	6.66	%	AsureQuality Method (Gravimetric)
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	17.3	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	21.0	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	7.45	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	7.64	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	5.19	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	15.6	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	25.6	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	4.72	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	4.72	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	4.00	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	2.60	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	1.29	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.271	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	8.61	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	1.39	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	5.21	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	0.614	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	7.41	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	4.16	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.183	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	4.16	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	6.37	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	9.24	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	0.336	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	7.28	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	96.0	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	96.0	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	96.0	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	20.4	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	20.4	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
Total PCDD/F WHO-TEQ - Upperbound	20.4	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	21.2	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	21.2	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	21.3	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	82	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	82	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	88	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	116	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	118	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	117	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	116	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	113	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	97	%	USEPA Method 1613B (GC-HRMS)

Customer Sample Name: CARP-2 AQ#18-152372 **AsureQuality ID:** 18-113518-23

Sample Description: Certified Reference Material

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	7.27	%	AsureQuality Method (Gravimetric)
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	20.4	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	22.9	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	8.03	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	8.03	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<6.00	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	15.4	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	20.0	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	5.02	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	5.02	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	3.40	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	2.37	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	1.25	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.431	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	7.60	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	1.52	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	5.77	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	0.699 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	7.98 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	3.95	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.171	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
Total HpCDF	3.95	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	6.66	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	7.03	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	0.282	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	8.16	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	91.0	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	91.0	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	91.0	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	21.3	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	21.4	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	21.5	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	21.9	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	22.1	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	22.2	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	89	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	74	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	96	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	89	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	88	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	90	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Duplicate of 18-113518-1 **AsureQuality ID:** 18-113518-24

Sample Description: Duplicate of Composite of sample Upper Kope -1,2,3,4,5

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			
Lipid	4.41	%	AsureQuality Method (Gravimetric)
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0725	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0725	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.0975	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.0975	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0662	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0662	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0662	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.0819	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.0819	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
123478-HxCDF	<0.107	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.106	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.108	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.147	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.147	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.128	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	0.171	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.132	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	0.171	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.0940	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.120	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.120	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	0.206 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	0.206 (E)	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.160	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	0.503	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.880	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	1.25	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	1.63	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.0193	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.161	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.303	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.0197	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.148	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.277	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	90	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	96	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	94	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	116	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	118	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	115	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	111	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	106	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	109	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	117	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	114	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	97	%	USEPA Method 1613B (GC-HRMS)

E = Estimated result

Customer Sample Name: Duplicate of 18-113518-18 **AsureQuality ID:** 18-113518-25

Sample Description: Duplicate of Composite of sample Te Rahu -11,12,13,14,15

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
Lipid Determination			

Lipid	1.30	%	AsureQuality Method (Gravimetric)
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0800	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0800	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.104	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.104	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0604	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0651	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0651	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.122	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.122	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.0678	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.0643	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.0742	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.0883	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.0883	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.118	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	<0.127	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.122	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	<0.127	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.0877	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.102	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.102	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	<0.0754	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	<0.0754	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.103	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	0.255	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.255	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	0.688	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	1.12	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.0000765	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.162	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.324	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.000255	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.139	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.278	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	87	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	77	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	100	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	96	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	92	%	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
$^{13}C_{12}$ 1234678-HpCDF	92	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	89	%	USEPA Method 1613B (GC-HRMS)

QC Results

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Relates to sample(s) 18-113518-1, 18-113518-2, 18-113518-3, 18-113518-4, 18-113518-5, 18-113518-6, 18-113518-7, 18-113518-8, 18-113518-9, 18-113518-10, 18-113518-22, 18-113518-24

Test	Result	Unit	Method Reference
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0581	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0581	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.104	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.104	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.0503	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.0502	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.0503	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.110	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.110	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.0785	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.0753	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.0770	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.112	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.112	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.105	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	<0.112	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.109	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	<0.112	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.118	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.155	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.155	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	<0.189	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	<0.189	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.199	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	<0.290	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.000	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	0.690	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Upperbound	1.38	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.000	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.154	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.308	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.000	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.132	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.264	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	84	%	USEPA Method 1613B (GC-HRMS)

Internal Standards			
$^{13}C_{12}$ 2378-TCDF	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	93	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	103	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	105	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	99	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	111	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	86	%	USEPA Method 1613B (GC-HRMS)

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Relates to sample(s) 18-113518-11, 18-113518-12, 18-113518-13, 18-113518-14, 18-113518-15, 18-113518-16, 18-113518-17, 18-113518-18, 18-113518-19, 18-113518-20, 18-113518-21, 18-113518-23, 18-113518-25

Test	Result	Unit	Method Reference
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
2378-TCDF	<0.0573	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDF	<0.0573	pg/g	USEPA Method 1613B (GC-HRMS)
2378-TCDD	<0.100	pg/g	USEPA Method 1613B (GC-HRMS)
Total TCDD	<0.100	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDF	<0.209	pg/g	USEPA Method 1613B (GC-HRMS)
23478-PeCDF	<0.277	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDF	<0.486	pg/g	USEPA Method 1613B (GC-HRMS)
12378-PeCDD	<0.150	pg/g	USEPA Method 1613B (GC-HRMS)
Total PeCDD	<0.150	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDF	<0.0951	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDF	<0.0950	pg/g	USEPA Method 1613B (GC-HRMS)
234678-HxCDF	<0.0982	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDF	<0.133	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDF	<0.133	pg/g	USEPA Method 1613B (GC-HRMS)
123478-HxCDD	<0.0959	pg/g	USEPA Method 1613B (GC-HRMS)
123678-HxCDD	<0.103	pg/g	USEPA Method 1613B (GC-HRMS)
123789-HxCDD	<0.0994	pg/g	USEPA Method 1613B (GC-HRMS)
Total HxCDD	<0.103	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDF	<0.148	pg/g	USEPA Method 1613B (GC-HRMS)
1234789-HpCDF	<0.190	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDF	<0.190	pg/g	USEPA Method 1613B (GC-HRMS)
1234678-HpCDD	<0.0697	pg/g	USEPA Method 1613B (GC-HRMS)
Total HpCDD	<0.0697	pg/g	USEPA Method 1613B (GC-HRMS)
OCDF	<0.191	pg/g	USEPA Method 1613B (GC-HRMS)
OCDD	<0.239	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.000	pg/g	USEPA Method 1613B (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	0.860	pg/g	USEPA Method 1613B (GC-HRMS)

Test	Result	Unit	Method Reference
Sum of PCDD/Fs - Upperbound	1.72	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.000	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	0.211	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	0.421	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.000	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	0.203	pg/g	USEPA Method 1613B (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	0.406	pg/g	USEPA Method 1613B (GC-HRMS)
Clean-Up Standards			
$^{37}Cl_4$ 2378-TCDD	91	%	USEPA Method 1613B (GC-HRMS)
Internal Standards			
$^{13}C_{12}$ 2378-TCDF	80	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 2378-TCDD	101	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDF	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 23478-PeCDF	104	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 12378-PeCDD	114	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDF	95	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDF	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 234678-HxCDF	97	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123789-HxCDF	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123478-HxCDD	98	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 123678-HxCDD	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDF	102	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234789-HpCDF	110	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ 1234678-HpCDD	107	%	USEPA Method 1613B (GC-HRMS)
$^{13}C_{12}$ OCDD	97	%	USEPA Method 1613B (GC-HRMS)

Analysis Summary

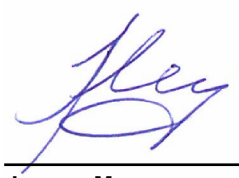
Wellington Laboratory

Analysis	Method	Authorised by
Lipid Determination		
DX-LIPD01, 01-DEFAULT	AsureQuality Method (Gravimetric)	Phil Bridgen
Environmental Tissue Sample Clean/Gut/Prep/Composite.		
DX-PREP01, 01-DEFAULT	AsureQuality Method	Jeremy May
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)		
DX-DIOX01, 05-TISSUE	USEPA Method 1613B (GC-HRMS)	Phil Bridgen

The total toxic equivalence (TEQ) is calculated for each sample using both WHO toxic equivalency factors (WHO-TEFs; Van den Berg et al., 2005) and international toxic equivalency factors (I-TEFs; Kutz et al., 1990).

Results that are prefixed with '<' indicate the lowest level at which the analyte can be reported, and that in this case the analyte was not observed above this limit.

Phil Bridgen
Senior Scientist



Jeremy May
Supervisor

Appendix

Analyte Definitions

Lipid Determination - AsureQuality Method (Gravimetric)

Analyte	Full Name
Lipid	Lipid content

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs) - USEPA Method 1613B (GC-HRMS)

Analyte	Full Name
2378-TCDF	2,3,7,8-Tetrachlorodibenzofuran
Total TCDF	Total tetrachlorodibenzofuran
2378-TCDD	2,3,7,8-Tetrachlorodibenzodioxin
Total TCDD	Total tetrachlorodibenzodioxin
12378-PeCDF	1,2,3,7,8-Pentachlorodibenzofuran
23478-PeCDF	2,3,4,7,8-Pentachlorodibenzofuran
Total PeCDF	Total pentachlorodibenzofuran
12378-PeCDD	1,2,3,7,8-Pentachlorodibenzodioxin
Total PeCDD	Total pentachlorodibenzodioxin
123478-HxCDF	1,2,3,4,7,8-Hexachlorodibenzofuran
123678-HxCDF	1,2,3,6,7,8-Hexachlorodibenzofuran
234678-HxCDF	2,3,4,6,7,8-Hexachlorodibenzofuran
123789-HxCDF	1,2,3,7,8,9-Hexachlorodibenzofuran
Total HxCDF	Total hexachlorodibenzofuran
123478-HxCDD	1,2,3,4,7,8-Hexachlorodibenzodioxin
123678-HxCDD	1,2,3,6,7,8-Hexachlorodibenzodioxin
123789-HxCDD	1,2,3,7,8,9-Hexachlorodibenzodioxin
Total HxCDD	Total hexachlorodibenzodioxin
1234678-HpCDF	1,2,3,4,6,7,8-Heptachlorodibenzofuran
1234789-HpCDF	1,2,3,4,7,8,9-Heptachlorodibenzofuran
Total HpCDF	Total heptachlorodibenzofuran
1234678-HpCDD	1,2,3,4,6,7,8-Heptachlorodibenzodioxin
Total HpCDD	Total heptachlorodibenzodioxin
OCDF	Octachlorodibenzofuran
OCDD	Octachlorodibenzodioxin

LOR = Limit of Reporting LOD = Limit of Detection NR = Not Reportable

APPENDIX C

Assure Quality CRM Report

CARP-2: REFERENCE FISH TISSUE for ORGANIC CONTAMINANT ANALYSIS

Catalogue Number	Product	Qty/Conc
CARP-2	Reference Fish Tissue, CARP-2	6 x 9 g

Polychlorinated Biphenyls (PCBs) Congener (IUPAC)	Certified Concentration µg/kg (wet weight basis)
18	27.3 ± 4.0
28	34.0 ± 7.2
44	86.6 ± 25.9
52	138 ± 43
118	148 ± 33
128	20.4 ± 4.4
153	105 ± 22
180	53.3 ± 13.0
194	10.9 ± 3.1
206	4.4 ± 1.1
Polychlorinated Biphenyls (PCBs) Congener (IUPAC)	**Reference Concentration* µg/kg (wet weight basis)**
8	4.8 ± 1.8
66/95	174 ± 52
101/90	145 ± 48
105	53.2 ± 15.6
138/163/164	103 ± 30
170/190	20.6 ± 2.9
187/182	37.1 ± 6.3
209	4.6 ± 2.0
Polychlorinated dibenzo-p-dioxins (PCDDs)	**ng/kg (wet weight basis)***
2,3,7,8-Tetrachlorodibenzo-p-dioxin	7.4 ± 0.7
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	5.3 ± 1.3
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.6 ± 0.3
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	5.8 ± 0.8
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.78 ± 0.12
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	6.4 ± 0.9
Octachlorodibenzo-p-dioxin	9.4 ± 1.7
Polychlorinated dibenzofurans (PCDFs)	**ng/kg (wet weight basis)***
2,3,7,8-Tetrachlorodibenzofuran	18.2 ± 1.6
1,2,3,7,8-Pentachlorodibenzofuran	5.6 ± 0.3
Pesticides	**µg/kg (wet weight basis)***
gamma-chlordane	4.5 ± 0.7
2,4'-DDE	2.9 ± 0.5
trans-nonachlor	11.0 ± 0.9
dieldrin	8.3 ± 0.8
4,4'-DDE	158 ± 14
2,4'-DDD	21.8 ± 0.7
4,4'-DDD	90.9 ± 8.5

* Not Certified

CARP-2 was prepared and certified by the National Research Council of Canada (NRCC), Institute for Environmental Research and Technology.