



## **Kopeopeo Remediation Project**

Bay of Plenty Regional Council

### **Baseline Ambient Air Monitoring Summary**

|Issue

23 September 2015



**Kopeopeo Remediation Project**

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## Appendix A. Dioxin Monitoring Report

## **1. Introduction**

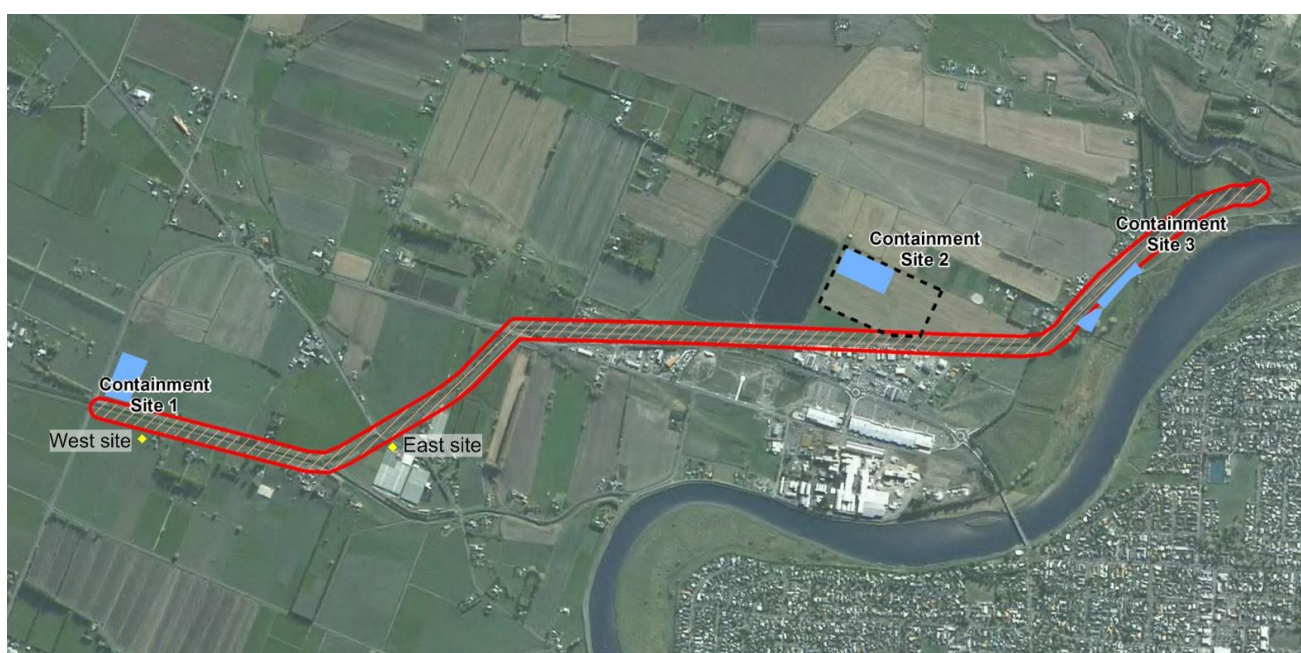
The Bay of Plenty Regional Council (BOPRC) is overseeing the remediation of the Kopeopeo Canal to remove dioxin-contaminated sediment from the canal and undertake remediation at sites near the canal. The project's Resource Consent 67173 requires monitoring of ambient air for both dust and dioxins during the remediation project. BOPRC has commissioned a baseline monitoring study to assess the existing levels of dust and dioxin in air, so that any perceived change in levels of these air contaminants resulting from the project can be assessed. The baseline monitoring was undertaken at two sites near the canal from 27 March to 3 June 2015. This report presents the findings of the baseline monitoring.

## 2. Study Design

### 2.1 Monitoring site locations

Baseline monitoring sites were selected based on recommendations made in the Kopeopeo Canal Remediation Baseline Air Monitoring Plan (Jacobs, February 2015). Two sites were selected for dust monitoring. One site was located at the western end of the Project, south of Containment Site 1 (the “West” site). The second monitoring site was located near the Whakatane Growers property (the “East” site). Monitoring for dioxins was also undertaken at this site. The two monitoring sites are indicated in Figure 1 below.

Figure 1 Kopeopeo Canal Remediation Project with locations of baseline ambient air monitoring sites



### 2.2 Sampling times and frequencies

Dust monitoring was undertaken by Airquality Ltd using a continuous optical particulate monitor (the Dustmote<sup>1</sup>). The monitors measured Total Suspended Particulate matter (TSP), and telemetered the data in 1-minute averages to a server. Airquality Ltd performed regular instrument checks and at the end of the project provided the data as 1-minute raw data as well as 1-hour and 24-hour averages.

Dioxin monitoring was undertaken by Source Testing New Zealand (STNZ) using hi-vol PUF samplers in general accordance with USEPA Method TO-9A<sup>2</sup>. Four 14-day samples were collected as per monitoring conditions in the remediation Project's resource consent.

Monitoring start and end dates for the two sites are provided in Table 1 below.

<sup>1</sup> [http://airqualityltd.com/wp-content/uploads/2014/03/Airquality-DUSTMOTE\\_brochure.pdf](http://airqualityltd.com/wp-content/uploads/2014/03/Airquality-DUSTMOTE_brochure.pdf)

<sup>2</sup> <http://www.epa.gov/ttnamti1/files/ambient/airtox/to-9arr.pdf>

Table 1 Kopeopeo Canal baseline monitoring start and end dates

Monitoring Type		West site	East site
TSP monitoring	Start	27 March, 13:00	8 April, 15:00
	End	27 May, 14:00	3 June, 15:00
Dioxin monitoring	Start	n/a	31 March, 12:00
	End		26 May, 12:00

Meteorological monitoring is undertaken at a monitoring site established by BOPRC near Containment Site 1, at the western end of the Project. The site was established in November 2014, and records wind speed and direction, atmospheric temperature and pressure, relative humidity, and precipitation.

## 2.3 Assessment criteria

Assessment criteria for TSP and dioxins in relation to the Project have been established as per the resource consent for the remediation Project. Condition 40.4 of the consent states a limit of for dioxins of 0.03 pg I-TEQ/m<sup>3</sup>, measured as a 14-day average. Condition 43.1(b) states a trigger level for TSP of 70 µg/m<sup>3</sup> as a 1-hour average.

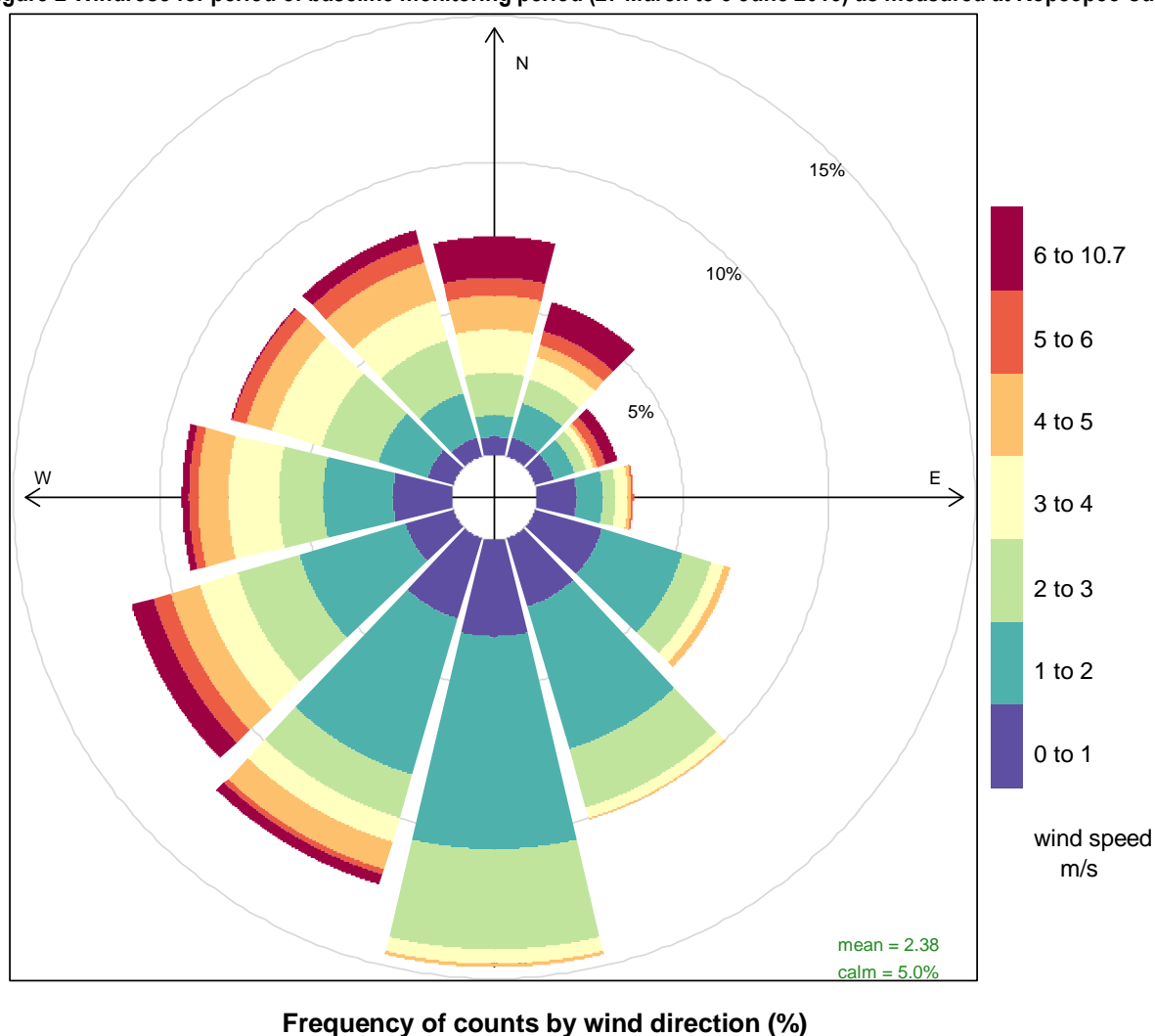
Any measurements above these trigger levels will require investigation into the causes of the exceedances, and if necessary additional mitigation measures to reduce the likelihood of exceedances in future.

### 3. Results

#### 3.1 Meteorology

Wind speed and direction as measured at the Kopeopeo meteorological monitoring site are presented in the windrose in Figure 2 below. Winds measured during the baseline monitoring period were variable, with predominant winds being from the south and southwest. Strong winds (greater than 5 m/s) occurred 8.6% of the time and calm winds (less than 0.5 m/s) occurred 5.0% of the time. Average wind speed was 2.4 m/s.

Figure 2 Windrose for period of baseline monitoring period (27 March to 3 June 2015) as measured at Kopeopeo Canal



Atmospheric temperature, pressure, and relative humidity as measured at the site are presented in Table 2 below.

Table 2 Temperature, Relative Humidity and Atmospheric Pressure as Measured at Kopeopeo Canal

Statistic	Temperature (°C)	Relative humidity (%)	Pressure (hPa)
Minimum	0.4	40.2	987
Maximum	23.6	94.3	1033
Mean	13.7	79.5	1017
Median	14.5	83.5	1018

### 3.2 Particulate Matter

TSP monitoring results for the two sites are shown in Figure 3 below. Summary results are presented in Table 3.

Concentrations greater than the trigger level of  $70 \mu\text{g}/\text{m}^3$  occurred primarily during early morning hours, and all exceedances occurred between 10:00 pm and 8:00 am. Figure 4 provides a plot showing average TSP concentrations by hour of day over the monitoring period, and shows the trend for increasing particulate matter during night-time and early morning. Possible reasons for this are the accumulation of wood smoke from residential heating during cooler night-time and early morning periods.

Another explanation is that increases in relative humidity that occur with cooling temperatures could result in condensation as fog, which optical particulate monitors read as particulate matter. Analysis of the 1-hour averages observed during the baseline monitoring show that almost all of the exceedances occurred when the relative humidity was greater than 90%.

Figure 3 Baseline TSP monitoring results(1-hour averages,  $\mu\text{g}/\text{m}^3$ )

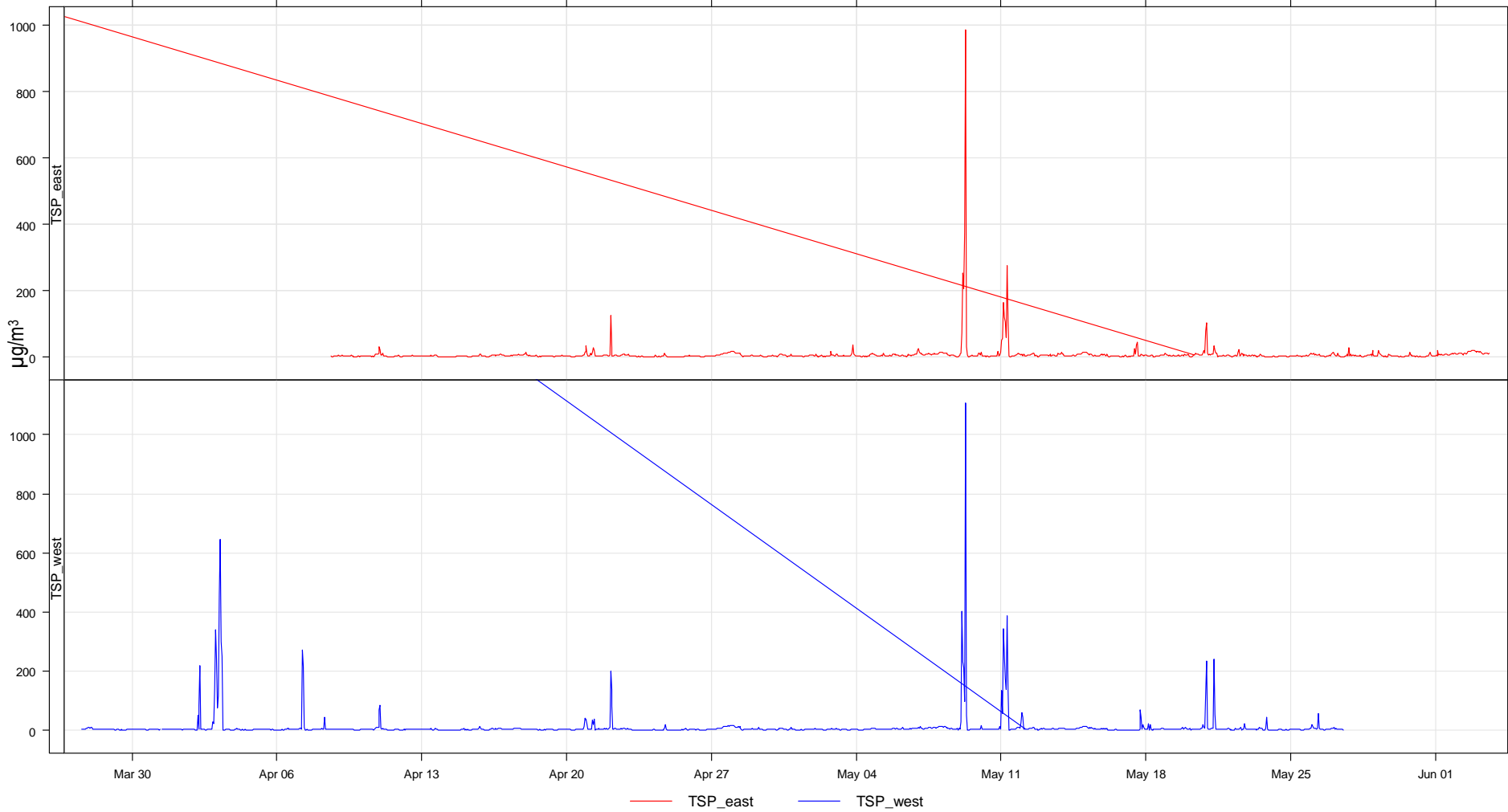
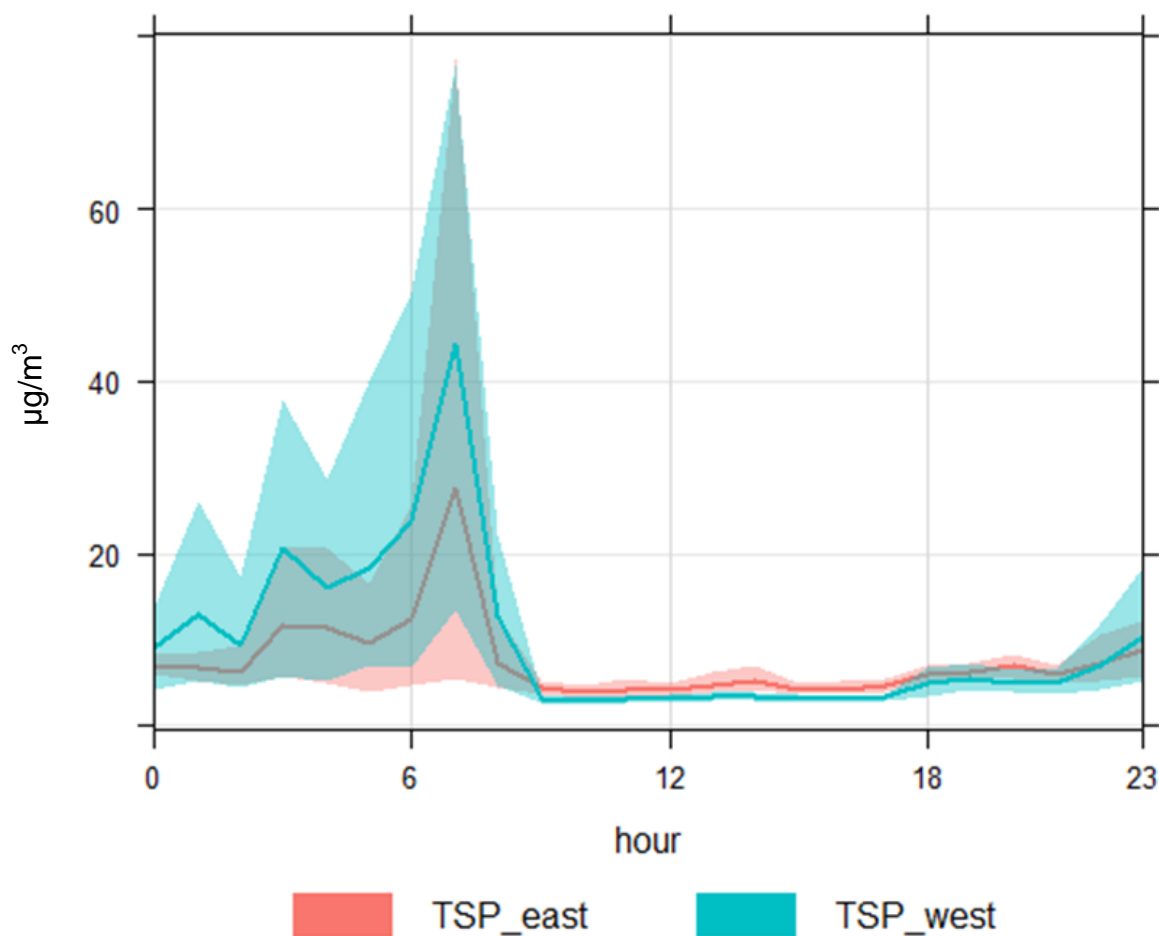


Table 3 TSP Monitoring Results (1-hour averages)

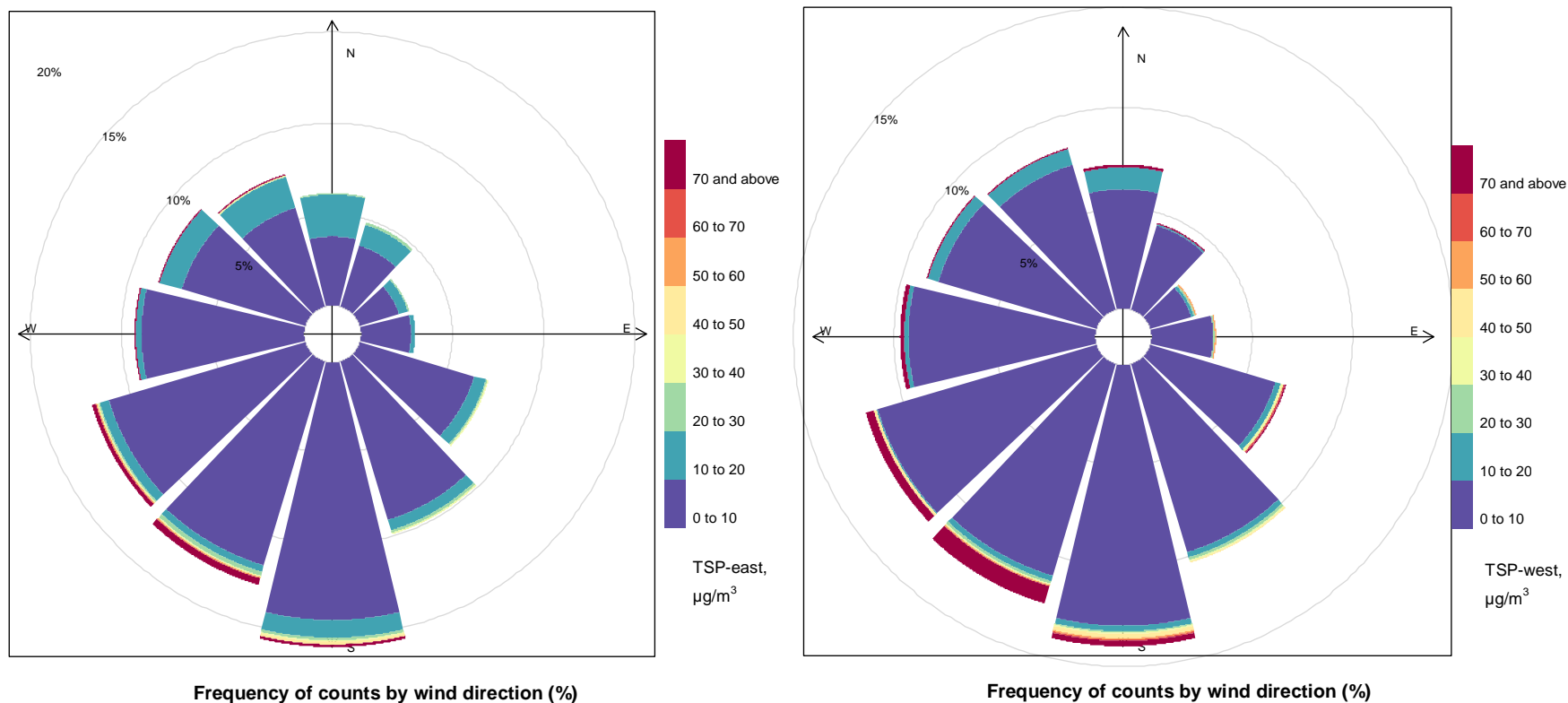
Statistic	TSP- West site ( $\mu\text{g}/\text{m}^3$ )	TSP - East site ( $\mu\text{g}/\text{m}^3$ )
Minimum	0	0
Maximum	1108	986
Mean	9.8	7.6
Median	3.1	4.0
95 <sup>th</sup> Percentile	14.0	15.3
Total number of exceedances	32	13
Total number of hours	1464	1345

Figure 4 Average TSP concentrations measured by hour of day (Mean and 95% confidence intervals per hour)



In terms of assessing possible sources of particulate matter in relation to wind direction, a pollution rose may be used to illustrate the frequency of wind directions correlated with TSP concentrations. Figure 5 provides pollution roses for the east and west TSP monitoring sites, with the red segments representing exceedances of the  $70 \mu\text{g}/\text{m}^3$  trigger level. The pollution roses show that the majority of exceedances occur when the winds are from the south and southwest, with a small number of exceedances measured during periods of northerly winds, indicating that the exceedances are generally not related to the Project area, including the unsealed road to the north of the monitoring sites.

Figure 5 Pollution roses for TSP monitoring at east (on left) and west (on right) sites. Red segments indicate exceedances of 70  $\mu\text{g}/\text{m}^3$  trigger level.



### 3.3 Dioxin Monitoring Results

Dioxin monitoring results are summarised in Table 4 below. A copy of the monitoring report from STNZ is provided as Appendix A. Four 14-day samples were collected during the baseline monitoring study. The sample results were relatively low, which is in agreement with concentrations seen in locations not impacted by industrial sources. The third sample, collected 28 April to 12 May, was significantly higher at 0.08 pg I-TEQ/m<sup>3</sup>. This exceeds the trigger level of pg I-TEQ/m<sup>3</sup>, although it is not inconsistent with measurements taken at other locations in New Zealand. Past measurements have indicated that dioxin concentrations (as 20-day averages) range from 0.001 to 0.01 pg I-TEQ/m<sup>3</sup> in rural sites, whereas concentrations for urban sites ranged from 0.007 to 0.04 pg I-TEQ/m<sup>3</sup>, and up to 1.2 pg I-TEQ/m<sup>3</sup> for an industrial site<sup>3</sup>.

**Table 4 Dioxin monitoring results**

	Sample 1	Sample 2	Sample 3	Sample 4
Start date/time	31/3/15 11:40	14/04/15 12:33	28/04/15 11:14	12/05/15 11:20
End date/time	14/04/15 10:55	28/04/15 11:10	12/05/15 11:15	26/05/15 11:10
Sample volume (Nm <sup>3</sup> )	20,112	20,077	20,161	20,109
Total I-TEQ (Medium Bound <sup>4</sup> ), pg/m <sup>3</sup>	0.004	0.018	0.082	0.011

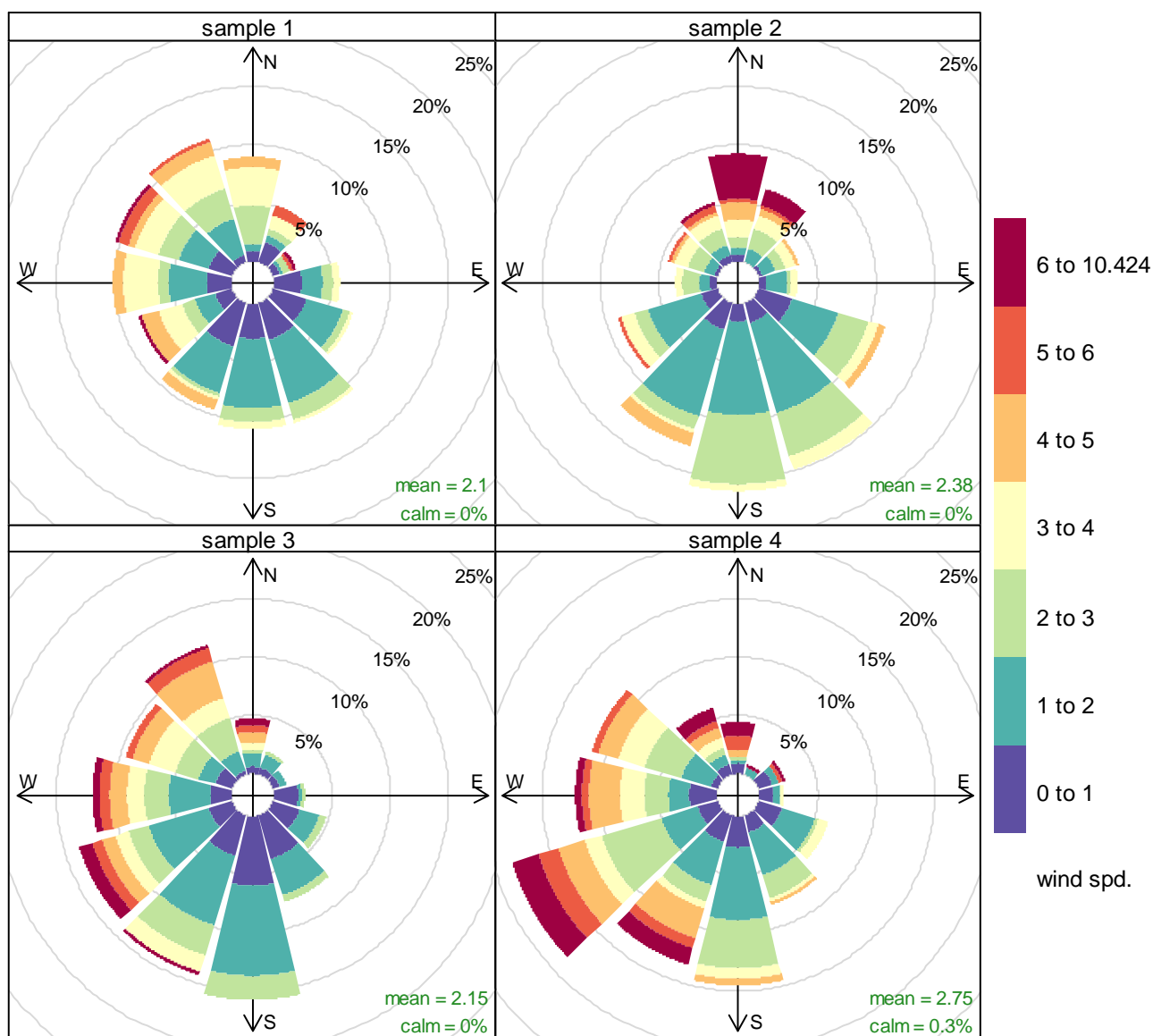
Although the higher dioxin concentration measured in Sample 3 is within the normal range for a rural area, it is likely that the sample was impacted by local combustion source(s) such as domestic heating appliances or open burning at nearby rural properties. Figure 6 presents windroses representing the winds observed during each of the four dioxin sample periods, and gives an indication of areas upwind of the ambient air monitoring sites that would potentially contribute to the dioxin measurements. Each of the four two-week sample periods show variable winds, with a general predominance from westerly and southerly directions. The Kopeopeo Canal is located to the north of the monitoring site, and so dioxins measured from this activity would be observed during periods of northerly winds.

The winds during the period of Sample 3 were variable, with predominant winds from the south and west. Upwind activities in these directions are largely rural. Comparison with the particulate monitoring data show that during this period there were two occasions where high particulate concentrations were observed: on Saturday 9<sup>th</sup> of May (between 3:00am and 7:00am), and again on Monday 11<sup>th</sup> of May (between 1:00am and 8:00am). Winds during these hour were also entirely from the southwestern quadrant, ruling out discharges from Whakatane residential area to the east and southeast. Wind speeds during these events were light (less than 2 m/s), which would tend to rule out windblown dust as a source. It is therefore likely that these spikes indicate a source of combustion (such as domestic or open burning to the south or west) that would influence the dioxin sample.

<sup>3</sup> MfE, *Organochlorines Programme, Ambient Concentrations of Selected Organochlorines in Air*, December 1999.

<sup>4</sup> The 'Medium Bound' concentration is derived by taking one-half the value of the level of detection

Figure 6 Windroses representing winds observed during each of the four dioxin sample periods



Frequency of counts by wind direction (%)

It should also be noted that the trigger level for dioxins is set at a low level, and exceedances of the trigger level do not necessarily indicate significant health risks. Table 5 provides a comparison of the Project trigger level for dioxins with ambient air guidelines, and indicates that the Project consent level is at the lower range of ambient air concentrations.

**Table 5 Ambient air trigger level and guidelines for dioxins**

Source	Averaging period	Evaluation Criterion (pg/m3)
Kopeopeo Canal Remediation Project – Consent Condition	14 days	0.03
Texas ESL <sup>5</sup>	Annual	0.03
California REL <sup>6</sup>	Annual	40
Ontario Ambient Air Guidelines <sup>7</sup>	24-hour	0.1

<sup>5</sup> <https://www.tceq.texas.gov/toxicology/esl>

<sup>6</sup> <http://oehha.ca.gov/air/allrels.html>

<sup>7</sup> <http://www.airqualityontario.com/downloads/AmbientAirQualityCriteria.pdf>

## 4. Discussion and Conclusions

Baseline monitoring for particulate matter (TSP) was carried out at two locations near the Kopeopeo Canal between 27 March and 3 June 2015. Dioxin monitoring was also carried out at one of the sites from 31 March to 26 May. The monitoring is intended to give an indication of existing levels of these contaminants in the vicinity of the canal prior to the commencement of remediation activities.

Although the baseline monitoring data for the area is relatively limited in terms of duration, the results of the monitoring indicate that exceedances of the trigger levels for particulate matter and dioxins, as specified in the resource consent for the remediation Project, will be exceeded at times. It is our understanding that due to the sensitive nature of the Project, these trigger levels have been set at a relatively low level and do not necessarily represent serious risks to human health or the surrounding environment. Rather, they are designed to indicate the need for further investigation as to the causes of the exceedances. In particular, whether they are a result of Project activities that can subsequently be mitigated, or are a result of existing activities in the area and so may be considered part of the existing environment.

In regard to the particulate monitoring, the trigger level of  $70 \mu\text{g}/\text{m}^3$  as a 1-hour average was exceeded on several occasions (approximately 1-2% of the time for both monitors). These exceedances tended to occur during night-time or early morning periods, and are likely explained by increases in part by relative humidity and subsequent formation of fog, which is read by the optical instruments as particulate matter. It is also possible that domestic burning during cooler night-time periods contributed to the readings of particulate matter.

Four 14-day average dioxin samples were collected during the monitoring period. Three of the samples were below the trigger level for dioxins of  $0.03 \text{ pg}/\text{m}^3$  I-TEQ. One sample exceeded the trigger level, at  $0.08 \text{ pg}/\text{m}^3$ . Analysis of the meteorology for the period of this exceedance indicates that the winds were predominantly from the west and south, which does not have any obvious combustion sources such as residential or industrial areas. However we note that this period also had high levels of particulate matter on two days, which could indicate a combustion source upwind of the area. It is possible that the 14-day sample could have been impacted by these events. We recommend that for future monitoring, any observation of combustion activities, especially open burning, be recorded so that they can be correlated with the monitoring results.

Given that the measured levels of dioxin are consistent with those measured in rural areas previously in New Zealand, and are below those measured in urban areas where the majority of the population reside, the levels of dioxin measured do not present a health risk above what is experienced by the majority of the population.

## **Appendix A. Dioxin Monitoring Report**



## **Jacobs New Zealand Limited**

BAY OF PLENTY REGIONAL COUNCIL  
KOPEOPEO CANAL REMEMDIATION  
BASELINE AMBIENT DIOXIN MONITORING, MARCH TO MAY 2015

Issue  
June 2015



# Jacobs New Zealand Limited

BAY OF PLENTY REGIONAL COUNCIL

KOPEOPEO CANAL REMEDIATION

BASELINE AMBIENT DIOXIN MONITORING,  
MARCH TO MAY 2015

Issue

June 2015

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# 1. Introduction

Source Testing New Zealand Limited (STNZ) was commissioned by Jacobs New Zealand Limited (Jacobs) on behalf of the Bay of Plenty Regional Council (BoPRC) to undertake Baseline Ambient Dioxin Monitoring as part of the Kopeopeo Canal Remediation. The Kopeopeo Canal is located to the west of Whakatane and is a critical component in the Rangitaiki Plains Draining Scheme. To maintain the canal, sediment is periodically removed and parts of the canal have been found to be contaminated with dioxins from historical storm water discharges from the Pinex Sawmill site.

BoPRC have obtained resource consent to remediate the contaminated portions of the canal. The Resource Consent stipulates air quality monitoring for both dust and dioxins for the duration of the project. In order to assess background dust and dioxin concentrations, Jacobs prepared the Baseline Air Monitoring Plan which detailed the ambient dust and dioxin monitoring programme to be completed prior to the commencement of the remediation.

Jacobs commissioned STNZ to undertake the ambient dioxin monitoring as detailed in the Baseline Air Monitoring Plan. Condition 40 of the resource consent relating to the ambient dioxin monitoring states:

*40.2 Air quality monitoring for dioxins shall be undertaken in accordance with AS3580 at or adjacent to 99 Paroa Road, Whakatane(Whakatane Growers Limited) and 34 Paroa Road, Whakatane (Paroa School) and conducted in accordance with USEPA Method TO-9A 'Determination of Polychlorinated, Polybrominated and Brominated/Chlorinated Dibenzo-p-Dioxins and Dibenzofurans in Ambient Air' except as modified for sampling over a 14-day period.*

While the resource consent identifies two sites for ambient dioxin monitoring, for the baseline monitoring only the Whakatane Growers Ltd site was recommended based on the sensitivity of the receptor and the availability of power for the sampler.

STNZ provided the sampling equipment for the baseline ambient dioxin monitoring and provided training to BoPRC staff on the operation, calibration and sample handling in accordance with USEPA Method TO-9a. Matthew Newby, Air Quality Scientist conducted the training on 30 March 2015 and commissioned the sampling equipment on 31 March 2015. BoPRC representatives exchanged the sampling components every 14-days until the site was decommissioned on 25 May 2015. Samples were registered at the BoPRC laboratory and forwarded to AsureQuality, Gracefield for analysis. Copies of all field sheets, calibration records, laboratory chain of custody forms and analytical reports were forwarded to STNZ for review and reporting. The following report outlines the baseline ambient dioxin sampling methodology, describes the monitoring site and presents the results of the monitoring.

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## 2. Sampling Methodologies

The BoPRC Kopeopeo Canal Remediation baseline ambient dioxin monitoring was conducted in accordance with USEPA Method TO-9A Determination of Polychlorinated, Polybrominated and Brominated/Chlorinated Dibenzo-p-Dioxins and Dibenzofurans in Ambient Air. STNZ are IANZ accredited for the sampling portion of this method and AsureQuality, Gracefield are IANZ accredited for the analysis.

STNZ employed an EcoTech HiVol 3000 PUF sampler for this work. The sampler consisted of a 100 mm quartz fibre filter holder which attaches directly to the PUF/XAD glass cartridge. The unit operated at a constant sampling rate of 12.5 m<sup>3</sup>/hr at actual conditions for a period of approximately 14 days. The sampler records a number of parameters including run time, sampling volume at actual conditions and standard sampling volume corrected to 0 °C, 101.3 kPa. The standardised sampling volume was used to calculate the ambient dioxin concentration.

USEPA Method TO- 9A specifies a 24 hour sampling period using a Poly Urethane Foam (PUF) cartridge. For the current project, the resource consent stipulated a 14-day sampling period. To prevent any potential loss of absorbed compounds due to the extended monitoring period, XAD resin was incorporated into the PUF cartridge. The sampling cartridges were spiked with isotopically labelled dioxin standards prior to sampling.

The HiVol PUF samples were exchanged by James Gladwin (Environmental Consultant with OPUS International Consultants) who was also responsible for calibrating the HiVol PUF samplers following the collection of each sample. James attended the training provided by Matthew Newby and was the key contact for the sampling portion of the project. James provided the collected samples to the BoPRC laboratory where samples were registered and forwarded to AsureQuality, Gracefield for analysis. As the sampling method requires the samples to be extracted within 7-days of sample collections, the samples were to be forwarded to AsureQuality on the day of collection. Appendix A presents the field sheets, calibration records, and laboratory chain of custody forms collected as part of the monitoring programme.

Included in the monitoring programme was a field blank collected on 28 April 2015 and a laboratory blank was conducted with each round of analysis.

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### 3. Sampling Locations

The Kopeopeo Canal Baseline Baseline Air Monitoring Plan identified a single monitoring site for ambient dioxin monitoring located at Whakatane Growers Ltd, 99 Paroa Rd Whakatane. The specific location was determined in accordance with AS/NZS 3580.1.1:2007 Method for sampling and analysis of ambient air – Guide to siting air monitoring equipment. The baseline ambient dioxin monitoring site is depicted in Figure 1 and an aerial map depicting the sampling location is presented in Figure 2.



■ **Figure 1: Baseline Monitoring Location**

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■ **Figure 2: Baseline Monitoring Location Aerial (data.linz.govt)**

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## 4. Ambient Dioxin Monitoring Results

### 4.1 Ambient Dioxin Monitoring Results

The following section presents the results of the BoPRC Kopeopeo Canal Remediation baseline ambient dioxin monitoring performed at Whakatane Growers Ltd. Table 1 presents the results of the ambient dioxin monitoring for the period 30 March 2015 to 26 May 2015. The results for each of the congeners along with the International Toxic Equivalency factors (I-TEQ) and World Health Organisation Toxic Equivalency factors (WHO-TEQ) have been presented. Appendix B presents the analytical reports from AsureQuality, Gracefield.

The results of the ambient dioxin monitoring show the concentration at the baseline monitoring location ranged from 4.49 to 81.9 fg/m<sup>3</sup> I-TEQ Upper Bound (corrected to 0 °C, 101.3kPa) with an average of 29.0 fg/m<sup>3</sup> I-TEQ Upper Bound (corrected to 0 °C, 101.3kPa). The WHO-TEQ Upper Bound ranged from 4.77 to 99.9 fg/m<sup>3</sup> (corrected to 0 °C, 101.3kPa) with an average of 33.3 fg/m<sup>3</sup> WHO-TEQ Upper Bound (corrected to 0 °C, 101.3kPa). The highest concentration of 81.9 fg/m<sup>3</sup> I-TEQ Upper Bound (corrected to 0 °C, 101.3kPa) occurring over the sampling period 28 April to 12 May 2015. It is worth noting that this sample was extracted 17 days after sample collection and hence did not meet the method specification of 7 days.

■ **Table 1: Ambient Dioxin Monitoring Results, 31 March to 26 May 2015**

Site	Baseline Monitoring Location							
Start Date/Time	31/03/15 11:40		14/04/15 12:33		28/04/15 11:14		12/05/15 11:20	
End Date/Time	14/04/15 10:55		28/04/15 11:10		12/05/15 11:15		26/05/15 11:10	
Run Time (minutes)	20,112		20,077		20,161		20,109	
Corrected Vol (m3) <sup>1</sup>	3,944		3,921		3,662		3,840	
Analyte	mass (pg)	Conc. (fg/m <sup>3</sup> ) <sup>1</sup>	mass (pg)	Conc. (fg/m <sup>3</sup> ) <sup>1</sup>	mass (pg)	Conc. (fg/m <sup>3</sup> ) <sup>1</sup>	mass (pg)	Conc. (fg/m <sup>3</sup> ) <sup>1</sup>
2378 TCDF	5.44	1.38	31.0	7.91	28.6	7.81	32.9	8.57
Total TCDF	174	44.1	924	236	878	240	759	198
2378 TCDD	<2.97	<0.753	3.80 <sup>E</sup>	0.969 <sup>E</sup>	47.8	13.1	<3.20	<0.833
Total TCDD	86.9	22.0	504 <sup>E</sup>	129 <sup>E</sup>	1,090	298	223	58.1
12378 PeCDF	5.45	1.38	28.6	7.29	21.4	5.84	16.4	4.27
23478 PeCDF	6.44	1.63	49.7	12.6	39.5	10.8	24.3	6.33
Total PeCDF	86.0	21.8	641	163	584	159	330	85.9
12378 PeCDD	<5.54	<1.40	14.1	3.60	159	43.4	11.5 <sup>E</sup>	2.99 <sup>E</sup>
Total PeCDD	44.8	11.4	354	90.3	2,060	563	126 <sup>E</sup>	32.8 <sup>E</sup>
123478 HxCDF	8.21 <sup>E</sup>	2.08 <sup>E</sup>	55.8	14.2	53.8	14.7	26.7	6.95
123678 HxCDF	6.08	1.54	51.9	13.2	41.9	11.4	18.4	4.79
234678 HxCDF	9.40	2.38	71.3	18.2	60.9	16.6	26.6	6.93
123789 HxCDF	<3.45	<0.875	<7.18	<1.83	<14.0	<3.82	<17.4	<4.53
Total HxCDF	64.0 <sup>E</sup>	16.2 <sup>E</sup>	474	121	688	188	181	47.1
123478 HxCDD	<4.30	<1.09	13.0 <sup>E</sup>	3.32 <sup>E</sup>	122	33.3	13.7 <sup>E</sup>	3.57 <sup>E</sup>
123678 HxCDD	9.41	2.39	26.4 <sup>E</sup>	6.73 <sup>E</sup>	324	88.5	24.1	6.28
123789 HxCDD	16.2	4.11	19.9	5.08	380	104	<19.9	<5.18
Total HxCDD	133	33.7	503 <sup>E</sup>	128 <sup>E</sup>	4,910	1,341	357 <sup>E</sup>	93.0 <sup>E</sup>
1234678 HpCDF	25.1	6.36	181	46.2	282	77.0	69.6	18.1
1234789 HpCDF	<4.36	<1.11	29.8	7.60	29.0	7.92	<23.8	<6.20
Total HpCDF	25.1	6.36	251	64.0	601	164	69.6	18.1
1234678 HpCDD	152	38.5	253	64.5	3,900	1,065	326	84.9
Total HpCDD	343	87.0	565	144	9,390	2,564	821	214
OCDF	14.0	3.55	81.5	20.8	270	73.7	34.0	8.85
OCDD	400	101	433	110	7,050	1,925	749	195
Total WHO -TEQ Lower Bound	9.46	2.40	65.4	16.7	365	99.7	37.7	9.82
Total WHO -TEQ Medium Bound	14.1	3.57	65.7	16.8	365	99.7	41.3	10.8
Total WHO -TEQ Upper Bound	18.8	4.77	66.1	16.9	366	99.9	44.9	11.7
Total I-TEQ Lower Bound	11.2	2.84	69.2	17.7	299	81.6	37.7	9.82
Total I -TEQ Medium Bound	14.4	3.65	69.6	17.8	299	81.6	41.3	10.8
Total I-TEQ Upper Bound	17.7	4.49	69.9	17.8	300	81.9	44.9	11.7

<sup>1</sup> Corrected to 0 °C, 101.3 kPa

E = Estimated result

#### SOURCE TESTING NZ

## **4.2 Quality Control Data**

The follow section outlines the quality control samples analysed as part of the BoPRC Kopeopeo Canal Remediation baseline ambient dioxin monitoring. All field sheets and calibration sheets were reviewed and found to be in order. Table 2 presents the results of the field blank and laboratory blanks. The ambient dioxin concentrations have been calculated based on the average sample volume for the field blank and the sample volume of the sample analysed with the laboratory blank.

USEPA Method TO- 9A specifies that the samples must be extracted within 7-days of collection. However, the sample collected over the period 28 April to 12 May 2015 was not extracted by AsureQuality until 29 May 2015, 17 days after sample collection and hence does not fully comply with the method. Otherwise, all quality control criteria were within the specified ranges.

■ **Table 2: Ambient Dioxin QC Sample Results, 31 March to 26 May 2015**

Description	Field Blank		Lab Blank 1		Lab Blank 2		Lab Blank 3	
Corrected Vol (m3) <sup>1</sup>	3,842		3944		3921		3,840	
Analyte	mass (pg)	Conc. (fg/m <sup>3</sup> ) <sup>1</sup>	mass (pg)	Conc. (fg/m <sup>3</sup> ) <sup>1</sup>	mass (pg)	Conc. (fg/m <sup>3</sup> ) <sup>1</sup>	mass (pg)	Conc. (fg/m <sup>3</sup> ) <sup>1</sup>
2378 TCDF	<2.20	<0.573	<2.43	<0.616	<2.23	<0.569	<4.30	<1.17
Total TCDF	<4.40	<1.15	<2.43	<0.616	<4.46	<1.14	<4.30	<1.17
2378 TCDD	<3.68	<0.958	<3.39	<0.859	<2.41	<0.615	<2.29	<0.625
Total TCDD	<3.68	<0.958	<3.39	<0.859	<4.81	<1.23	<4.58	<1.25
12378 PeCDF	<1.56	<0.406	<2.03	<0.515	<1.64	<0.418	<3.77	<1.03
23478 PeCDF	<1.64	<0.427	<2.02	<0.512	<1.84	<0.469	<3.80	<1.04
Total PeCDF	<1.64	<0.427	<2.03	<0.515	<1.84	<0.469	<3.80	<1.04
12378 PeCDD	<4.46	<1.16	<5.98	<1.52	<2.71	<0.691	<3.32	<0.91
Total PeCDD	<8.91	<2.32	<5.98	<1.52	<5.43	<1.38	<11.1	<3.03
123478 HxCDF	<4.10	<1.07	<2.10	<0.532	<4.86	<1.24	<4.74	<1.29
123678 HxCDF	<4.06	<1.06	<2.16	<0.548	<4.93	<1.26	<4.70	<1.28
234678 HxCDF	<4.86	<1.27	<2.35	<0.596	<5.40	<1.38	<5.21	<1.42
123789 HxCDF	<5.73	<1.49	<2.90	<0.735	<2.38	<0.607	<7.07	<1.93
Total HxCDF	<5.73	<1.49	<2.90	<0.735	<6.62	<1.69	<7.07	<1.93
123478 HxCDD	<5.99	<1.56	<4.31	<1.09	<5.36	<1.37	<5.65	<1.54
123678 HxCDD	<5.85	<1.52	<4.24	<1.07	<5.42	<1.38	<5.89	<1.61
123789 HxCDD	<6.06	<1.58	<4.36	<1.11	<5.42	<1.38	<5.71	<1.56
Total HxCDD	<6.06	<1.58	<4.36	<1.11	<5.42	<1.38	<5.89	<1.61
1234678 HpCDF	<5.15	<1.34	<3.05	<0.773	<2.51	<0.640	<4.45	<1.22
1234789 HpCDF	<7.04	<1.83	<4.25	<1.08	<3.39	<0.865	<6.68	<1.82
Total HpCDF	<7.04	<1.83	<4.25	<1.08	<3.39	<0.865	<6.68	<1.82
1234678 HpCDD	<5.64	<1.47	<4.92	<1.25	<5.15	<1.31	<7.19	<1.96
Total HpCDD	<5.64	<1.47	<4.92	<1.25	<5.15	<1.31	<7.19	<1.96
OCDF	<12.5	<3.25	<3.77	<0.956	<10.9	<2.78	<17.1	<4.67
OCDD	<4.05	<1.05	<2.67	<0.677	<8.88	<2.26	<13.3	<3.63
Total WHO -TEQ Lower Bound	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total WHO -TEQ Medium Bound	6.37	1.66	6.32	1.60	4.72	1.20	5.69	1.55
Total WHO -TEQ Upper Bound	12.7	3.31	12.6	3.19	9.44	2.41	11.4	3.11
Total I-TEQ Lower Bound	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total I -TEQ Medium Bound	5.44	1.42	5.05	1.28	4.25	1.08	5.29	1.44
Total I-TEQ Upper Bound	10.9	2.84	10.1	2.56	8.50	2.17	10.6	2.89

1. Corrected to 0 °C, 101.3 kPa

#### SOURCE TESTING NZ

## **Appendix A Field Sheets, Chain of Custody & Calibrations**

- This Appendix Contains 17 pages including the cover page.

Sampling Period 31 March to 14 April 2015

Ecotech HiVol 3000 Calibration Form

SF046  
Ecotech HiVol 3000 Calibration Form  
Issue Date: 30/12/10  
Version: 1.0

Unit Description:		Orifice Plate ID: PUF-014	
Sampler ID: 040884		Manometer ID: SKM150	
Date: 31/03/2015		Thermometer ID: ST53C	
P <sub>amb</sub> : 1022		Barometer ID: SKM141	
T <sub>amb</sub> : 22.6		Time: 11.20	
		Tech: RAY JG	

Flow Rate m <sup>3</sup> /hr STP	Target dp (mmH <sub>2</sub> O)	Pre Cal dp (mmH <sub>2</sub> O)	Volts	Post Cal dp (mmH <sub>2</sub> O)	Volts
10	32	0.4101	49	32	0.3320
15	42	0.6054	72	42	0.5273
20	128	1.40	0.6959	128	0.7812

Pass / Fail

Pass if the difference between the instrument and reference dp's are < ± 10 %

Comments:

I.U.T. Value (°C)	Ref. Value (°C)	I.U.T. Corr (°C)	X
Acceptance Criteria ± 3 °C			

I.U.T. Value (mmHg)	Ref. Value (mmHg)	I.U.T. Corr (mmHg)	Diff
Acceptance Criteria ± 3 mmHg			

Assign.....	...the value of....
Temp coeff 2	(TC2)/x <sup>2</sup>
Temp coeff 1	(TC2)/x
Temp coeff 0	DO NOT CHANGE

Comments:

I.U.T. Value (°C)	Ref. Value (°C)	I.U.T. Corr (°C)	X

I.U.T. Value (mmHg)	Ref. Value (mmHg)	I.U.T. Corr (mmHg)	Diff

I.U.T. = Instrument Under Test

Action:

If the instrument fails any of the calibration criteria a copy of the form must be forwarded by e-mail to the Project Manager

SOURCE TESTING NZ

**BoPRC - HiVol PUF/XAD Monitoring**

Site Description: Site 4 Whakatane Growers

PUF Sampling Details											
HiVol PUF ID <del>040834</del> 040834											
Initial Sampling Data					Final Sampling Data						
Date/Time Installed	PUF ID	Filter ID	Run Time	Flow Rate m <sup>3</sup> /hr	Tech Initials	Date/Time Removed	Flow Rate m <sup>3</sup> /hr	Sample Vol m <sup>3</sup> /hr Corr	Run Time	Tech Initials	
31/03 11:40	3021	1903155	0	12.54	JG.	14/04/15 10:55	12.43	<del>44.0</del> 3944.3	2012	JG.	
Spt Checks											
Date		Filter Exchanges		Technician		Date		Filter Exchanges		Technician	

SOURCE TESTING NZ

Bay of Plenty Regional Council Compliance Field Sheet					FIELD SHEET NO. 15/ 1618
WEATHER: TODAY <i>Five</i>			COLLECTION DATE: <i>14/04/15</i>		
WEATHER: YESTERDAY <i>Wet</i>			DATE REC'D BY LAB: <i>14/04/15</i>		
WIND SPEED/DIRECTION:			COLLECTED BY: <i>JG OPUS</i>		
COST CENTRE: RR-					
EBOP LAB ID NO.	15/ <i>2680</i>	15/	15/	15/	15/
Labstar Site No.					
Consent Number					
SAMPLE TYPE:					
Sample site location e.g name of dairy shed, stream, industrial site, etc	<i>Site 4 Whakatahane Growers</i>				
Map Reference					
Specific sampling site description e.g. 10m d/s of outfall					
NZDST Time - 24 Hour					
NZST Time - 24 hours					
SAMPLE COMMENTS	<i>Puf ID: 30221 JG.</i>				
Colour, Clarity etc. Any observations pertinent to the samples	<i>Filter ID: 190355</i>				
If any field measurements are taken, record here	<i>0.3655</i>				
Sample Containers					
Chemistry Bottle No's taken from this site					
Bacto Bottle No's taken from this site					
Any other bottles					
Analysis Required If different for each sample or refer to reverse of sheet If all samples require the same analysis	<i>Dioxins</i>				
Chain of Custody Record.					COC Number
Sample/s relinquished By	Sample/s Received By	Date	Time		
Name <i>JG.</i>	Name	<i>14/04/2015</i>	<i>12:30</i>		
Name	Name				
Name	Name				
Please print name under signature		If more than three sample transfers use separate COC form			

SOURCE TESTING NZ

Bay of Plenty Regional Council Laboratory  
SD074 / Sample Submission for External Analysis

To: Asure Quality

Analysis Request No: <u>2015/062</u>	Date: <u>14-04-15</u>
Submitters Signature: <u>[Signature]</u>	EBOP Order No: <u>72988</u>

BOPRC Sample ID	Analysis Requested	Comments (No of samples/type/Quote )
<u>15-2680</u>	<u>Dioxins</u>	<u>Filters</u>

SAMPLE RECEIPT ADVICE

Tick Box to indicate request to sub-contractor	Yes	No
High Priority Samples		
Return Field sheet		
Return samples after analysis		

SUB-CONTRACTING LAB

All samples received in good order and with appropriate documentation:	
Please quote security seal number and condition (where applicable):	
Laboratory Job Number:	
Results back to Laboratory Team Leader	<u>adrian.spence@boprc.govt.nz</u>
Comments:	
Name:	Date:
Signature:	

SOURCE TESTING NZ

Sampling Period 14 to 28 April 2015

SF046  
Ecotech HiVol 3000 Calibration Form  
Issue Date: 30/12/10  
Version: 1.0

Ecotech HiVol 3000 Calibration Form

Unit Description:		Orifice Plate ID: PUF-014			
Sampler ID: 04-0884		Manometer ID: SKM150			
		Thermometer ID: 13-0012			
		Barometer ID: MetService			
Date: 19/04/15		Time: 11:30			
P <sub>amb</sub> : 1000		Tech: M JG			
T <sub>amb</sub> : 13.8					
Flow Rate m <sup>3</sup> /hr STP	Target dp (mmH <sub>2</sub> O)	Pre Cal dp (mmH <sub>2</sub> O)	Volts	Post Cal dp (mmH <sub>2</sub> O)	Volts
10	32	0.6	0.248	32	0.3906
15	73	81	0.6836	73	0.6250
20	129	136	0.9375	129	0.8984
Pass / Fail					
Pass if the difference between the instrument and reference dp's are < ± 10 %					
Comments					

Ecotech HiVol 3000 Temp. Calibration

PreCal			
I.U.T. Value (°C)	Ref. Value (°C)	I.U.T. Corr (°C)	X
Acceptance Criteria ± 3 °C			

Ecotech HiVol 3000 Pressure Calibration

PreCal			
I.U.T. Value (mmHg)	Ref. Value (mmHg)	I.U.T. Corr (mmHg)	Diff
Acceptance Criteria ± 3 mmHg			

Assign....	...the value of....
Temp coeff 2	(TC2)/x <sup>2</sup>
Temp coeff 1	(TC2)/x
Temp coeff 0	DO NOT CHANGE

Comments:
-----------

Post Cal			
I.U.T. Value (°C)	Ref. Value (°C)	I.U.T. Corr (°C)	X

Post Cal			
I.U.T. Value (mmHg)	Ref. Value (mmHg)	I.U.T. Corr (mmHg)	Diff

I.U.T. = Instrument Under Test

Action:

If the instrument fails any of the calibration criteria a copy of the form must be forwarded by e-mail to the Project Manager

SOURCE TESTING NZ

**BoPRC - HiVol PUF/XAD Monitoring**

Site Description: Site 4 Whakatane Growers

PUF Sampling Details											
HiVol PUF ID 040884											
Initial Sampling Data				Final Sampling Data							
Date/Time Installed	PUF ID	Filter ID	Run Time	Flow Rate m <sup>3</sup> /hr	Tech Initials	Date/Time Removed	Flow Rate m <sup>3</sup> /hr	Sample Vol m <sup>3</sup> /hr Corr	Run Time	Tech Initials	
14/04/12.53	3020	19015A 03609	0	12.52	065	28/04/11.10	11.5	3920.6	20077	065	
Spt Checks											
Date		Filter Exchanges		Technician		Date		Filter Exchanges		Technician	

SOURCE TESTING NZ

Bay of Plenty Regional Council Field Sheet				FIELD SHEET NO. 15/ 1699	
WEATHER: TODAY Fine to showers				COLLECTION DATE: 28/04/15	
WEATHER: YESTERDAY Wet				COLLECTED BY: J&OPUS	
WIND SPEED/DIRECTION:				COST CENTRE:	
PROJECT CODE:					
EBOP LAB ID NO.	15/ 2983	15/ 2984	15/	15/	15/
Labstar Site No.					
Consent Number					
SAMPLE TYPE:	Air				
Lake/River/Location Description	Air Sample Site #4 - D Whakatare				
Map Reference	Gyrowens				
Site Description					
NZST Time - 24 Hour					
SAMPLE COMMENTS	PUF ID 3020 Filter ID 190315A	PUF ID 3022 JK. Filter ID 190315H			
Colour, Clarity etc.					
BOD Bottle No.					
Chemistry Bottle No.					
Bacto Bottle No.					
Other Bottle No.					
FIELD MEASUREMENTS (express all units)					
Temperature (°C)					
Dissolved Oxygen (g/m3)					
Conductivity - 3 (ms/cm)					
Conductivity (When 1 (us/cm))					
Only enter Conductivity-3 ms/cm, to convert us/cm to ms/cm + by 1000					
pH					
Salinity (0/00)					
Staff Gauge (M)					
	Temp	DO	Cond/Saln	VLEC	
Meter Type					
Meter No.					
ANALYSES REQUIRED:	Dioxins	Dioxins			
Black Disc (M) and Water Colour (Hue)					

FILL IN ALL SHADED AREAS

#### SOURCE TESTING NZ

**Bay of Plenty Regional Council Laboratory**  
**SD074 / Sample Submission for External Analysis**

To: *Assure Quality*

Analysis Request No: <i>2015/074</i>	Date: <i>28-04-15</i>
Submitters Signature: <i>D. Adkins</i>	EBOP Order No: <i>75175</i>

BOPRC Sample ID	Analysis Requested	Comments (No of samples/type/Quote )
<i>15/2983,2984</i>	<i>Dioxins - Brendon</i>	<i>Filters x2</i>

**SAMPLE RECEIPT ADVICE**

Tick Box to indicate request to sub-contractor	Yes	No
High Priority Samples		<input checked="" type="checkbox"/>
Return Field sheet		<input checked="" type="checkbox"/>
Return samples after analysis		<input checked="" type="checkbox"/>

**SUB-CONTRACTING LAB**

All samples received in good order and with appropriate documentation:	
Please quote security seal number and condition (where applicable):	
Laboratory Job Number:	
Results back to Laboratory Team Leader	<i>adrian.spence@boprc.govt.nz</i>
Comments:	
Name:	Date:
Signature:	

ISSUE No: 1

ISSUE DATE: 26/06/13

Page 1 of 1

**SOURCE TESTING NZ**

**Sampling Period 28/04/15 to 12/05/15**

SF046  
Ecotech HiVol 3000 Calibration Form  
Issue Date: 30/12/10  
Version: 1.0

**Ecotech HiVol 3000 Calibration Form**

Unit Description:		Orifice Plate ID: PUF-014	
Sampler ID: 04-4884		Manometer ID: SKM150	
		Thermometer ID: 13-0012	
		Barometer ID: MetService	
Date: 28/04/2015		Time: 10:50	
P <sub>amb</sub> : 1003		Tech: MNT JG	
T <sub>amb</sub> : 21.7			
Flow Rate m <sup>3</sup> /hr STP	Target dp (mmH <sub>2</sub> O)	Pre Cal dp (mmH <sub>2</sub> O)	Post Cal dp (mmH <sub>2</sub> O)
10	32	38	32
15	72	77	72
20	127	139	127
		Volts	Volts
		0.4296	0.3960
		0.6054	0.5859
		0.8594	0.8007
Pass / Fail			
Pass if the difference between the instrument and reference dp's are < ± 10 %			
Comments			

**Ecotech HiVol 3000 Temp. Calibration**

I.U.T. Value (°C)	Ref. Value (°C)	I.U.T. Corr (°C)	X
Acceptance Criteria ± 3 °C			

Assign.....	...the value of....
Temp coeff 2	(TC2)/x <sup>2</sup>
Temp coeff 1	(TC2)/x
Temp coeff 0	DO NOT CHANGE

I.U.T. Value (°C)	Ref. Value (°C)	I.U.T. Corr (°C)	X

I.U.T. = Instrument Under Test

**Ecotech HiVol 3000 Pressure Calibration**

I.U.T. Value (mmHg)	Ref. Value (mmHg)	I.U.T. Corr (mmHg)	Diff
Acceptance Criteria ± 3 mmHg			

Comments:

I.U.T. Value (mmHg)	Ref. Value (mmHg)	I.U.T. Corr (mmHg)	Diff

**Action:**

If the instrument fails any of the calibration criteria a copy of the form must be forwarded by e-mail to the Project Manager

**SOURCE TESTING NZ**

**BoPRC - HiVol PUF/XAD Monitoring**

Site Description: Site 4 Whakatane Growers

PUF Sampling Details										
Initial Sampling Data					Final Sampling Data					
Date/Time Installed	PUF ID	Filter ID	Run Time	Flow Rate m <sup>3</sup> /hr	Tech Initials	Date/Time Removed	Flow Rate m <sup>3</sup> /hr	Sample Vol m <sup>3</sup> /hr Corr	Run Time	Tech Initials
28/04	A210	19-3-15F	0	12.46	UG	11.15	10.43	3662.1	201/1	UG
	3025	0-3668	✓	12.46	UG	12/05/15				
Spt Checks										
Date	Filter Exchanges	Technician	Date	Filter Exchanges	Technician					

SOURCE TESTING NZ

Bay of Plenty Regional Council				FIELD SHEET NO. <del>15</del> 15/ 1754	
Field Sheet				COLLECTION DATE: 12/05/15	
WEATHER: TODAY Rain				COLLECTED BY: JG. O'Plas	
WEATHER: YESTERDAY Fine.				COST CENTRE:	
WIND SPEED/DIRECTION: 3176 JG. 19/06/15.				PROJECT CODE:	
EBOP LAB ID NO.	15/ 1754	15/	15/	15/	15/
Labstar Site No.					
Consent Number					
SAMPLE TYPE:					
Lake/River/Location Description	Site 4 Whakatawa Growers				
Map Reference					
Site Description	Airs sample				
NZST Time - 24 Hour					
SAMPLE COMMENTS	PWT ID 3025 Filter ID 19-3-15F				
Colour, Clarity etc.					
BOD Bottle No.					
Chemistry Bottle No.					
Bacto Bottle No.					
Other Bottle No.					
FIELD MEASUREMENTS (express all units)					
Temperature (°C)					
Dissolved Oxygen (g/m3)					
Conductivity - 3 (ms/cm)					
Conductivity (When i (us/cm)					
Only enter Conductivity-3 ms/cm, to convert us/cm to ms/cm + by 1000					
pH					
Salinity (0/00)					
Staff Gauge (M)					
	Temp	DO	Cond/Salm	VLEC	
Meter Type					
Meter No.					
ANALYSES REQUIRED:	Dioxins				
Black Disc (M) and Water Colour (Hue)					

FILL IN ALL SHADED AREAS

#### SOURCE TESTING NZ

Bay of Plenty Regional Council Laboratory  
SD074 / Sample Submission for External Analysis

To: Asure Quality

Analysis Request No: <u>2015/102</u>	Date: <u>26-05-15</u>
Submitters Signature: <u>[Signature]</u>	EBOP Order No: <u>72988</u>

BOPRC Sample ID	Analysis Requested	Comments (No of samples/type/Quote )
IS-3176	Dioxins	2 filters
3467	"	"

SAMPLE RECEIPT ADVICE

Tick Box to indicate request to sub-contractor	Yes	No
High Priority Samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Return Field sheet	<input type="checkbox"/>	<input type="checkbox"/>
Return samples after analysis	<input type="checkbox"/>	<input type="checkbox"/>

SUB-CONTRACTING LAB

All samples received in good order and with appropriate documentation:	
Please quote security seal number and condition (where applicable):	
Laboratory Job Number:	
Results back to Laboratory Team Leader	adrian.spence@boprc.govt.nz
Comments:	
Name:	Date:
Signature:	

ISSUE No: 1

ISSUE DATE: 26/06/13

Page 1 of 1

SOURCE TESTING NZ

Sampling Period 12 to 26 May 2015

SF046  
Ecotech HiVol 3000 Calibration Form  
Issue Date: 30/12/10  
Version: 1.0

Ecotech HiVol 3000 Calibration Form

Unit Description:		Orifice Plate ID: PUF-014			
Sampler ID: 04-4884		Manometer ID: SKM150			
		Thermometer ID: 130012			
		Barometer ID: Matservice			
Date: 12/15		Time: 11:30			
P <sub>amb</sub> : 1006		Tech: JG			
T <sub>amb</sub> : 17.5					
Flow Rate m <sup>3</sup> /hr STP	Target dp (mmH <sub>2</sub> O)	Pre Cal dp (mmH <sub>2</sub> O)	Volts	Post Cal dp (mmH <sub>2</sub> O)	Volts
10	32	42.5	0.4296	0.3714	0.32
15	32	35	0.6054	0.5859	0.72
20	12.7	12.3	0.8203	0.8339	12.7
(Pass) Fail					
Pass if the difference between the instrument and reference dp's are < ± 10 %					
Comments:					

Ecotech HiVol 3000 Temp. Calibration

I.U.T. Value (°C)	Ref. Value (°C)	I.U.T. Corr (°C)	X
Acceptance Criteria ± 3 °C			

Assign.....	...the value of.....
Temp coeff 2	(TC2)/x <sup>2</sup>
Temp coeff 1	(TC2)/x
Temp coeff 0	DO NOT CHANGE

I.U.T. Value (°C)	Ref. Value (°C)	I.U.T. Corr (°C)	X

I.U.T. = Instrument Under Test

Ecotech HiVol 3000 Pressure Calibration

I.U.T. Value (mmHg)	Ref. Value (mmHg)	I.U.T. Corr (mmHg)	Diff
Acceptance Criteria ± 3 mmHg			

Comments:

I.U.T. Value (mmHg)	Ref. Value (mmHg)	I.U.T. Corr (mmHg)	Diff

Action:

If the instrument fails any of the calibration criteria a copy of the form must be forwarded by e-mail to the Project Manager

**BoPRC - HiVol PUF/XAD Monitoring**

Site Description: Site 4 Whakatane Growers

PUF Sampling Details										
HiVol PUF ID 04 0884										
Initial Sampling Data					Final Sampling Data					
Date/Time Installed	PUF ID	Filter ID	Run Time	Flow Rate m <sup>3</sup> /hr	Tech Initials	Date/Time Removed	Flow Rate m <sup>3</sup> /hr	Sample Vol m <sup>3</sup> /hr Corr	Run Time	Tech Initials
12/05/15	AQID 3024	1514/115D 0-3708	0	12.45	OK	26/05/15 11.10	11.81	3840.2	20109	SG
Spt Checks										
Date	Filter Exchanges	Technician	Date	Filter Exchanges	Technician					

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Bay of Plenty Regional Council Field Sheet					
WEATHER: TODAY <i>Overcast</i>					FIELD SHEET NO. 15/ 835
WEATHER: YESTERDAY <i>Overcast to showers</i>					COLLECTION DATE: 26/05/15
WIND SPEED/DIRECTION: ~					COLLECTED BY: Orla JG.
PROJECT CODE:					
EBOP LAB ID NO.	15/ 3467	15/	15/	15/	15/
Labstar Site No.					
Consent Number					
SAMPLE TYPE:	AIR				
Lake/River/Location Description	Air Sample Site 4				
Map Reference					
Site Description	Whakatare Towers				
NZST Time - 24 Hour					
SAMPLE COMMENTS	POF ID: AQID 3024				
Colour, Clarity etc.	Filter ID: 15/4/150				
BOD Bottle No.					
Chemistry Bottle No.					
Bacto Bottle No.					
Other Bottle No.					
FIELD MEASUREMENTS (express all units)					
Temperature (°C)					
Dissolved Oxygen (g/m3)					
Conductivity - 3 (ms/cm)					
Conductivity (When 1 (us/cm)					
Only enter Conductivity-3 ms/cm, to convert us/cm to ms/cm + by 1000					
pH					
Salinity (0/00)					
Staff Gauge (M)					
	Temp	DO	Cond/Saln	VLEC	
Meter Type					
Meter No.					
ANALYSES REQUIRED:	Dioxins				
Black Disc (M) and Water Colour (Hue)					

FILL IN ALL SHADED AREAS

#### SOURCE TESTING NZ

Bay of Plenty Regional Council Laboratory  
SD074 / Sample Submission for External Analysis

To: Asure Quality

Analysis Request No: <u>2015/102</u>	Date: <u>26-05-15</u>
Submitters Signature: <u>[Signature]</u>	EBOP Order No: <u>72988</u>

BOPRC Sample ID	Analysis Requested	Comments (No of samples/type/Quote)
IS-3176	Dioxins	2 filters
3467	"	"

SAMPLE RECEIPT ADVICE

Tick Box to indicate request to sub-contractor	Yes	No
High Priority Samples	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Return Field sheet	<input type="checkbox"/>	<input type="checkbox"/>
Return samples after analysis	<input type="checkbox"/>	<input type="checkbox"/>

SUB-CONTRACTING LAB

All samples received in good order and with appropriate documentation:	
Please quote security seal number and condition (where applicable):	
Laboratory Job Number:	
Results back to Laboratory Team Leader	adrian.spence@boprc.govt.nz
Comments:	
Name:	Date:
Signature:	

ISSUE No: 1

ISSUE DATE: 26/06/13

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## Appendix B Laboratory Reports

This Appendix contains 18 pages including cover.

## Dioxin Laboratory Result for Period 31 March to 14 April 2015



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t. +64 4 570 8800 | e. cs@wellington.asurequality.com | w. www.asurequality.com  
*Global experts in food safety and quality*

### Certificate of Analysis

Submission Reference: 2015/062

Amended Report

Paul Futter  
Bay of Plenty Regional Council  
PO Box 364  
Whakatane 3158  
New Zealand

PO Number: 72988

Report Issued: 26-Jun-2015

AsureQuality Reference: 15-37889

Sample(s) Received: 15-Apr-2015 08:00

Sampled Date: 14 April 2015

Extraction Date: 15 April 2015

Analysis Date: 19 April 2015

### Results

The tests were performed on the samples as received.

Customer Sample Name: 15-2680 (Air) Lab ID: 15-37889-1

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
<b>Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)</b>			
2378-TCDF	5.44	pg	USEPA Method TO-9A (GC-HRMS)
Total TCDF	174	pg	USEPA Method TO-9A (GC-HRMS)
2378-TCDD	<2.97	pg	USEPA Method TO-9A (GC-HRMS)
Total TCDD	86.9	pg	USEPA Method TO-9A (GC-HRMS)
12378-PeCDF	5.45	pg	USEPA Method TO-9A (GC-HRMS)
23478-PeCDF	6.44	pg	USEPA Method TO-9A (GC-HRMS)
Total PeCDF	86.0	pg	USEPA Method TO-9A (GC-HRMS)
12378-PeCDD	<6.54	pg	USEPA Method TO-9A (GC-HRMS)
Total PeCDD	44.8	pg	USEPA Method TO-9A (GC-HRMS)
123478-HxCDF	8.21 (E)	pg	USEPA Method TO-9A (GC-HRMS)
123678-HxCDF	6.08	pg	USEPA Method TO-9A (GC-HRMS)
234678-HxCDF	9.40	pg	USEPA Method TO-9A (GC-HRMS)
123789-HxCDF	<3.54	pg	USEPA Method TO-9A (GC-HRMS)
Total HxCDF	64.0 (E)	pg	USEPA Method TO-9A (GC-HRMS)
123478-HxCDD	<4.30	pg	USEPA Method TO-9A (GC-HRMS)
123678-HxCDD	9.41	pg	USEPA Method TO-9A (GC-HRMS)
123789-HxCDD	16.2	pg	USEPA Method TO-9A (GC-HRMS)
Total HxCDD	133	pg	USEPA Method TO-9A (GC-HRMS)
1234678-HpCDF	25.1	pg	USEPA Method TO-9A (GC-HRMS)
1234789-HpCDF	<4.35	pg	USEPA Method TO-9A (GC-HRMS)
Total HpCDF	25.1	pg	USEPA Method TO-9A (GC-HRMS)
1234678-HpCDD	162	pg	USEPA Method TO-9A (GC-HRMS)
Total HpCDD	343	pg	USEPA Method TO-9A (GC-HRMS)
OCDF	14.0	pg	USEPA Method TO-9A (GC-HRMS)
OCDD	400	pg	USEPA Method TO-9A (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	1370	pg	USEPA Method TO-9A (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	1370	pg	USEPA Method TO-9A (GC-HRMS)

AsureQuality has used reasonable skill, care, and effort to provide an accurate analysis of the sample(s) which form(s) the subject of this report. However, the accuracy of this analysis is reliant on, and subject to, the sample(s) provided by you and your responsibility as to transportation of the sample(s). AsureQuality's standard terms of business apply to the analysis set out in this report.

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Report Number 127800 cancels Report Number 104138.

### SOURCE TESTING NZ

AsureQuality Reference: 15-37889

Report issued: 26-Jun-2015

Test	Result	Unit	Method Reference
Sum of PCDD/Fs - Upperbound	1370	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	9.46	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	14.1	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	18.8	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	11.2	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	14.4	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	17.7	pg	USEPA Method TO-9A (GC-HRMS)
<b>Surrogate Standards</b>			
<sup>12</sup> C <sub>12</sub> 2378-TCDD	94	%	USEPA Method TO-9A (GC-HRMS)
<b>Internal Standards</b>			
<sup>13</sup> C <sub>12</sub> 2378-TCDF	103	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 2378-TCDD	96	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 12378-PeCDF	102	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 23478-PeCDF	102	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 12378-PeCDD	118	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123478-HxCDF	86	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123678-HxCDF	76	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 234678-HxCDF	82	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123789-HxCDF	88	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123478-HxCDD	102	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123678-HxCDD	80	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234678-HpCDF	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234789-HpCDF	96	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234678-HpCDD	110	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> OCDD	78	%	USEPA Method TO-9A (GC-HRMS)

E = Estimated result

## QC Results

### Blank

Relates to sample(s) 15-37889-1

Test	Result	Unit	Method Reference
<b>Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)</b>			
2378-TCDF	<2.43	pg	USEPA Method TO-9A (GC-HRMS)
Total TCDF	<2.43	pg	USEPA Method TO-9A (GC-HRMS)
2378-TCDD	<3.39	pg	USEPA Method TO-9A (GC-HRMS)
Total TCDD	<3.39	pg	USEPA Method TO-9A (GC-HRMS)
12378-PeCDF	<2.03	pg	USEPA Method TO-9A (GC-HRMS)
23478-PeCDF	<2.02	pg	USEPA Method TO-9A (GC-HRMS)
Total PeCDF	<2.03	pg	USEPA Method TO-9A (GC-HRMS)
12378-PeCDD	<6.98	pg	USEPA Method TO-9A (GC-HRMS)
Total PeCDD	<6.98	pg	USEPA Method TO-9A (GC-HRMS)
123478-HxCDF	<2.10	pg	USEPA Method TO-9A (GC-HRMS)
123678-HxCDF	<2.16	pg	USEPA Method TO-9A (GC-HRMS)
234678-HxCDF	<2.36	pg	USEPA Method TO-9A (GC-HRMS)
123789-HxCDF	<2.90	pg	USEPA Method TO-9A (GC-HRMS)
Total HxCDF	<2.90	pg	USEPA Method TO-9A (GC-HRMS)
123478-HxCDD	<4.31	pg	USEPA Method TO-9A (GC-HRMS)
123678-HxCDD	<4.24	pg	USEPA Method TO-9A (GC-HRMS)
123789-HxCDD	<4.36	pg	USEPA Method TO-9A (GC-HRMS)

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AsureQuality Reference: 15-37889

Report issued: 26-Jun-2015

Test	Result	Unit	Method Reference
Total HxCDD	<4.36	pg	USEPA Method TO-9A (GC-HRMS)
1234678-HpCDF	<3.06	pg	USEPA Method TO-9A (GC-HRMS)
1234789-HpCDF	<4.26	pg	USEPA Method TO-9A (GC-HRMS)
Total HpCDF	<4.26	pg	USEPA Method TO-9A (GC-HRMS)
1234678-HxCDD	<4.92	pg	USEPA Method TO-9A (GC-HRMS)
Total HxCDD	<4.92	pg	USEPA Method TO-9A (GC-HRMS)
OCDF	<3.77	pg	USEPA Method TO-9A (GC-HRMS)
OCDD	<2.67	pg	USEPA Method TO-9A (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.000	pg	USEPA Method TO-9A (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	18.4	pg	USEPA Method TO-9A (GC-HRMS)
Sum of PCDD/Fs - Upperbound	36.7	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.000	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	6.32	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	12.6	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.000	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	6.06	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	10.1	pg	USEPA Method TO-9A (GC-HRMS)
<b>Surrogate Standards</b>			
<sup>21</sup> Cl <sub>4</sub> 2378-TCDD	100	%	USEPA Method TO-9A (GC-HRMS)
<b>Internal Standards</b>			
<sup>13</sup> C <sub>12</sub> 2378-TCDF	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 2378-TCDD	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 12378-PeCDF	108	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 23478-PeCDF	106	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 12378-PeCDD	122 (R)	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123478-HxCDF	88	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123678-HxCDF	76	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 234678-HxCDF	82	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123789-HxCDF	90	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123478-HxCDD	100	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123678-HxCDD	86	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234678-HpCDF	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234789-HpCDF	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234678-HpCDD	106	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> OCDD	80	%	USEPA Method TO-9A (GC-HRMS)

R = Recovered outside method limits

## Analysis Summary

### Wellington Laboratory

Analysis	Method	Accreditation	Authorised by
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs) DX-DIOX03, 01-DEFAULT	USEPA Method TO-9A (GC-HRMS)	IANZ	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).			
Lowerbound concept uses zero for the contribution of each non-quantified analyte. Mediumbound concept uses half of the reporting limit for the contribution of each non-quantified analyte. Upperbound concept uses the reporting limit for the contribution for each non-quantified analyte.			
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.			

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## SOURCE TESTING NZ



**Phil Bridgen**  
Senior Scientist

#### Accreditation

##### Wellington Laboratory



## Appendix Analyte Summary

### Analyte Definitions (Environmental Tests)

#### Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs) - USEPA Method TO-9A (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

**Dioxin Laboratory Results Period 14 April to 28 April 2015 & Field Blank.**



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## Certificate of Analysis

### Amended Report

Paul Futter  
Bay of Plenty Regional Council  
PO Box 364  
Whakatane 3158  
New Zealand

PO Number: 75175

Report issued: 26-Jun-2015

AsureQuality Reference: 15-44578

Sample(s) Received: 29-Apr-2015 08:00

Sampled Date: 15/2983 (15-44578-1) 28 April 2015

15/2984 (15-44578-2) 28 April 2015

Extraction Date: 1 May 2015

Analysed Date: 9 May 2015

### Results

The tests were performed on the samples as received.

Customer Sample Name: 16/2983 (Air) Lab ID: 15-44578-1

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
<b>Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)</b>			
2378-TCDF	31.0	pg	USEPA Method TO-8A (GC-HRMS)
Total TCDF	924	pg	USEPA Method TO-8A (GC-HRMS)
2378-TCDD	3.80 (E)	pg	USEPA Method TO-8A (GC-HRMS)
Total TCDD	504 (E)	pg	USEPA Method TO-8A (GC-HRMS)
12378-PeCDF	28.6	pg	USEPA Method TO-8A (GC-HRMS)
23478-PeCDF	49.7	pg	USEPA Method TO-8A (GC-HRMS)
Total PeCDF	641	pg	USEPA Method TO-8A (GC-HRMS)
12378-PeCDD	14.1	pg	USEPA Method TO-8A (GC-HRMS)
Total PeCDD	354	pg	USEPA Method TO-8A (GC-HRMS)
123478-HxCDF	55.9	pg	USEPA Method TO-8A (GC-HRMS)
123678-HxCDF	51.9	pg	USEPA Method TO-8A (GC-HRMS)
234678-HxCDF	71.3	pg	USEPA Method TO-8A (GC-HRMS)
123789-HxCDF	<7.18	pg	USEPA Method TO-8A (GC-HRMS)
Total HxCDF	474	pg	USEPA Method TO-8A (GC-HRMS)
123478-HxCDD	13.0 (E)	pg	USEPA Method TO-8A (GC-HRMS)
123678-HxCDD	26.4 (E)	pg	USEPA Method TO-8A (GC-HRMS)
123789-HxCDD	19.9	pg	USEPA Method TO-8A (GC-HRMS)
Total HxCDD	503 (E)	pg	USEPA Method TO-8A (GC-HRMS)
1234678-HpCDF	181	pg	USEPA Method TO-8A (GC-HRMS)
1234789-HpCDF	29.8	pg	USEPA Method TO-8A (GC-HRMS)
Total HpCDF	251	pg	USEPA Method TO-8A (GC-HRMS)
1234678-HpCDD	253	pg	USEPA Method TO-8A (GC-HRMS)
Total HpCDD	565	pg	USEPA Method TO-8A (GC-HRMS)
OCDF	81.5	pg	USEPA Method TO-8A (GC-HRMS)
OCDD	433	pg	USEPA Method TO-8A (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	4730	pg	USEPA Method TO-8A (GC-HRMS)

AsureQuality has used reasonable skill, care, and effort to provide an accurate analysis of the sample(s) which form(s) the subject of this report. However, the accuracy of this analysis is reliant on, and subject to, the sample(s) provided by you and your responsibility as to transportation of the sample(s). AsureQuality's standard terms of business apply to the analysis set out in this report.

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### SOURCE TESTING NZ

AzureQuality Reference: 15-44578

Report issued: 26-Jun-2015

Test	Result	Unit	Method Reference
Sum of PCDD/Fs - Mediumbound	4730	pg	USEPA Method TO-8A (GC-HRMS)
Sum of PCDD/Fs - Upperbound	4730	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	65.4	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	65.7	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	66.1	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	69.2	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	69.6	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	69.9	pg	USEPA Method TO-8A (GC-HRMS)
<b>Surrogate Standards</b>			
<sup>12</sup> C <sub>12</sub> 2378-TCDD	92	%	USEPA Method TO-8A (GC-HRMS)
<b>Internal Standards</b>			
<sup>12</sup> C <sub>12</sub> 2378-TCDF	82	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> 2378-TCDD	88	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> 12378-PeCDF	115	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> 23478-PeCDF	108	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> 12378-PeCDD	95	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> 123478-HxCDF	96	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> 123678-HxCDF	80	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> 234678-HxCDF	90	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> 123789-HxCDF	95	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> 123478-HxCDD	102	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> 123678-HxCDD	88	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> 1234678-HpCDF	78	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> 1234789-HpCDF	80	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> 1234678-HpCDD	90	%	USEPA Method TO-8A (GC-HRMS)
<sup>12</sup> C <sub>12</sub> OCDD	58	%	USEPA Method TO-8A (GC-HRMS)

E = Estimated result

Customer Sample Name: 16/2984 (Air) Lab ID: 15-44578-2

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
<b>Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)</b>			
2378-TCDF	<2.20	pg	USEPA Method TO-8A (GC-HRMS)
Total TCDF	<4.40	pg	USEPA Method TO-8A (GC-HRMS)
2378-TCDD	<3.68	pg	USEPA Method TO-8A (GC-HRMS)
Total TCDD	<3.68	pg	USEPA Method TO-8A (GC-HRMS)
12378-PeCDF	<1.56	pg	USEPA Method TO-8A (GC-HRMS)
23478-PeCDF	<1.64	pg	USEPA Method TO-8A (GC-HRMS)
Total PeCDF	<1.64	pg	USEPA Method TO-8A (GC-HRMS)
12378-PeCDD	<4.46	pg	USEPA Method TO-8A (GC-HRMS)
Total PeCDD	<8.91	pg	USEPA Method TO-8A (GC-HRMS)
123478-HxCDF	<4.10	pg	USEPA Method TO-8A (GC-HRMS)
123678-HxCDF	<4.06	pg	USEPA Method TO-8A (GC-HRMS)
234678-HxCDF	<4.86	pg	USEPA Method TO-8A (GC-HRMS)
123789-HxCDF	<5.73	pg	USEPA Method TO-8A (GC-HRMS)
Total HxCDF	<5.73	pg	USEPA Method TO-8A (GC-HRMS)
123478-HxCDD	<5.99	pg	USEPA Method TO-8A (GC-HRMS)
123678-HxCDD	<5.85	pg	USEPA Method TO-8A (GC-HRMS)
123789-HxCDD	<6.06	pg	USEPA Method TO-8A (GC-HRMS)
Total HxCDD	<6.06	pg	USEPA Method TO-8A (GC-HRMS)
1234678-HpCDF	<5.15	pg	USEPA Method TO-8A (GC-HRMS)

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Report Number 127822 equals Report Number 107148.

## SOURCE TESTING NZ

AsureQuality Reference: 15-44578

Report issued: 26-Jun-2015

Test	Result	Unit	Method Reference
1234789-HpCDF	<7.04	pg	USEPA Method TO-9A (GC-HRMS)
Total HpCDF	<7.04	pg	USEPA Method TO-9A (GC-HRMS)
1234678-HpCDD	<5.64	pg	USEPA Method TO-9A (GC-HRMS)
Total HpCDD	<5.64	pg	USEPA Method TO-9A (GC-HRMS)
OCDF	<12.5	pg	USEPA Method TO-9A (GC-HRMS)
OCDD	<4.05	pg	USEPA Method TO-9A (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.000	pg	USEPA Method TO-9A (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	29.8	pg	USEPA Method TO-9A (GC-HRMS)
Sum of PCDD/Fs - Upperbound	59.6	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.000	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	6.37	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	12.7	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.000	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	5.44	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	10.9	pg	USEPA Method TO-9A (GC-HRMS)
<b>Surrogate Standards</b>			
<sup>14</sup> C <sub>12</sub> 2378-TCDD	82	%	USEPA Method TO-9A (GC-HRMS)
<b>Internal Standards</b>			
<sup>13</sup> C <sub>12</sub> 2378-TCDF	78	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 2378-TCDD	85	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 12378-PeCDF	108	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 23478-PeCDF	102	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 12378-PeCDD	90	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123478-HxCDF	95	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123678-HxCDF	80	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 234678-HxCDF	85	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123789-HxCDF	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123478-HxCDD	102	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123678-HxCDD	85	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234678-HpCDF	75	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234789-HpCDF	78	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234678-HpCDD	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> OCDD	55	%	USEPA Method TO-9A (GC-HRMS)

## QC Results

### Blank

Relates to sample(s) 15-44578-1, 15-44578-2

Test	Result	Unit	Method Reference
<b>Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)</b>			
2378-TCDF	<2.23	pg	USEPA Method TO-9A (GC-HRMS)
Total TCDF	<4.46	pg	USEPA Method TO-9A (GC-HRMS)
2378-TCDD	<2.41	pg	USEPA Method TO-9A (GC-HRMS)
Total TCDD	<4.81	pg	USEPA Method TO-9A (GC-HRMS)
12378-PeCDF	<1.64	pg	USEPA Method TO-9A (GC-HRMS)
23478-PeCDF	<1.64	pg	USEPA Method TO-9A (GC-HRMS)
Total PeCDF	<1.64	pg	USEPA Method TO-9A (GC-HRMS)
12378-PeCDD	<2.71	pg	USEPA Method TO-9A (GC-HRMS)
Total PeCDD	<5.43	pg	USEPA Method TO-9A (GC-HRMS)
123478-HxCDF	<4.86	pg	USEPA Method TO-9A (GC-HRMS)

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## SOURCE TESTING NZ

Jacobs New Zealand Ltd.  
BoPRC Kopeopeo Canal Remediation  
Baseline Ambient Dioxin Monitoring  
March to May 2015

AssureQuality Reference: 15-44578

Report Issued: 26-Jun-2015

Test	Result	Unit	Method Reference
123678-HxCDF	<4.93	pg	USEPA Method TO-8A (GC-HRMS)
234678-HxCDF	<5.40	pg	USEPA Method TO-8A (GC-HRMS)
123789-HxCDF	<2.38	pg	USEPA Method TO-8A (GC-HRMS)
Total HxCDF	<8.62	pg	USEPA Method TO-8A (GC-HRMS)
123478-HxCDD	<5.36	pg	USEPA Method TO-8A (GC-HRMS)
123678-HxCDD	<5.42	pg	USEPA Method TO-8A (GC-HRMS)
123789-HxCDD	<5.42	pg	USEPA Method TO-8A (GC-HRMS)
Total HxCDD	<5.42	pg	USEPA Method TO-8A (GC-HRMS)
1234678-HpCDF	<2.51	pg	USEPA Method TO-8A (GC-HRMS)
1234789-HpCDF	<3.39	pg	USEPA Method TO-8A (GC-HRMS)
Total HpCDF	<3.39	pg	USEPA Method TO-8A (GC-HRMS)
1234678-HpCDD	<5.15	pg	USEPA Method TO-8A (GC-HRMS)
Total HpCDD	<5.15	pg	USEPA Method TO-8A (GC-HRMS)
OCDF	<10.9	pg	USEPA Method TO-8A (GC-HRMS)
OCDD	<8.88	pg	USEPA Method TO-8A (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.000	pg	USEPA Method TO-8A (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	28.4	pg	USEPA Method TO-8A (GC-HRMS)
Sum of PCDD/Fs - Upperbound	56.9	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.000	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	4.72	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	9.44	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.000	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	4.25	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	8.50	pg	USEPA Method TO-8A (GC-HRMS)
<b>Surrogate Standards</b>			
<sup>237</sup> Cl <sub>4</sub> 2378-TCDD	98	%	USEPA Method TO-8A (GC-HRMS)
<b>Internal Standards</b>			
<sup>13</sup> C <sub>12</sub> 2378-TCDF	82	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 2378-TCDD	85	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 12378-PeCDF	112	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 23478-PeCDF	102	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 12378-PeCDD	92	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123478-HxCDF	92	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123678-HxCDF	78	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 234678-HxCDF	85	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123789-HxCDF	103	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123478-HxCDD	102	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123678-HxCDD	85	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234678-HpCDF	80	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234789-HpCDF	82	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234678-HpCDD	95	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> OCDD	58	%	USEPA Method TO-8A (GC-HRMS)

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## SOURCE TESTING NZ

AssureQuality Reference: 15-44578

Report issued: 26-Jun-2015

### Analysis Summary

#### Wellington Laboratory

Analysis	Method	Accreditation	Authorised by
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)			
DX-DIOX03_01-DEFAULT	USEPA Method TO-9A (GC-HRMS)	IANZ	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).

Lowerbound concept uses zero for the contribution of each non-quantified analyte. Mediumbound concept uses half of the reporting limit for the contribution of each non-quantified analyte. Upperbound concept uses the reporting limit for the contribution for each non-quantified analyte.

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

### Accreditation

#### Wellington Laboratory



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### SOURCE TESTING NZ

AsureQuality Reference: 15-44578

Report Issued: 26-Jun-2015

## Appendix

### Analyte Summary

#### Analyte Definitions (Environmental Tests)

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs) - USEPA Method TO-9A (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

**Dioxin Lab Results Periods 28 April to 12 May & 12 May to 26 May 2015**



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**Amended Report**

Paul Futter  
Bay of Plenty Regional Council  
PO Box 364  
Whakatane 3158  
New Zealand

PO Number: 72988

Report issued: 26-Jun-2015

AsureQuality Reference: 15-58934

Sample(s) Received: 27-May-2015 08:00

Sampled Date: 15/3176 (15-58934-1) 12 May 2015

15/3467 (15-58934-2) 26 May 2015

Extraction Date: 29 May 2015

Analysed Date: 2 June 2015

**Results**

The tests were performed on the samples as received.

Customer Sample Name: 15-3176 (Air) Lab ID: 15-58934-1

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
<b>Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)</b>			
2378-TCDF	28.6	pg	USEPA Method TO-9A (GC-HRMS)
Total TCDF	878	pg	USEPA Method TO-9A (GC-HRMS)
2378-TCDD	47.8	pg	USEPA Method TO-9A (GC-HRMS)
Total TCDD	1090	pg	USEPA Method TO-9A (GC-HRMS)
12378-PeCDF	21.4	pg	USEPA Method TO-9A (GC-HRMS)
23478-PeCDF	39.5	pg	USEPA Method TO-9A (GC-HRMS)
Total PeCDF	584	pg	USEPA Method TO-9A (GC-HRMS)
12378-PeCDD	159	pg	USEPA Method TO-9A (GC-HRMS)
Total PeCDD	2060	pg	USEPA Method TO-9A (GC-HRMS)
123478-HxCDF	53.8	pg	USEPA Method TO-9A (GC-HRMS)
123678-HxCDF	41.9	pg	USEPA Method TO-9A (GC-HRMS)
234678-HxCDF	60.9	pg	USEPA Method TO-9A (GC-HRMS)
123789-HxCDF	<14.0	pg	USEPA Method TO-9A (GC-HRMS)
Total HxCDF	688	pg	USEPA Method TO-9A (GC-HRMS)
123478-HxCDD	122	pg	USEPA Method TO-9A (GC-HRMS)
123678-HxCDD	324	pg	USEPA Method TO-9A (GC-HRMS)
123789-HxCDD	380	pg	USEPA Method TO-9A (GC-HRMS)
Total HxCDD	4910	pg	USEPA Method TO-9A (GC-HRMS)
1234678-HpCDF	262	pg	USEPA Method TO-9A (GC-HRMS)
1234789-HpCDF	29.0	pg	USEPA Method TO-9A (GC-HRMS)
Total HpCDF	601	pg	USEPA Method TO-9A (GC-HRMS)
1234678-HpCDD	3900	pg	USEPA Method TO-9A (GC-HRMS)
Total HpCDD	9390	pg	USEPA Method TO-9A (GC-HRMS)
OCDF	270	pg	USEPA Method TO-9A (GC-HRMS)
OCDD	7050	pg	USEPA Method TO-9A (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	27500	pg	USEPA Method TO-9A (GC-HRMS)

AsureQuality has used reasonable skill, care, and effort to provide an accurate analysis of the sample(s) which form(s) the subject of this report. However, the accuracy of this analysis is reliant on, and subject to, the sample(s) provided by you and your responsibility as to transportation of the sample(s). AsureQuality's standard terms of business apply to the analysis set out in this report.

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**SOURCE TESTING NZ**

AssureQuality Reference: 15-58934

Report issued: 26-Jun-2015

Test	Result	Unit	Method Reference
Sum of PCDD/Fs - Mediumbound	27500	pg	USEPA Method TO-9A (GC-HRMS)
Sum of PCDD/Fs - Upperbound	27500	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	365	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	365	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	366	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	299	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	299	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	300	pg	USEPA Method TO-9A (GC-HRMS)
<b>Surrogate Standards</b>			
<sup>14</sup> C <sub>12</sub> 2378-TCDD	100	%	USEPA Method TO-9A (GC-HRMS)
<b>Internal Standards</b>			
<sup>14</sup> C <sub>12</sub> 2378-TCDF	100	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> 2378-TCDD	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> 12378-PeCDF	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> 23478-PeCDF	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> 12378-PeCDD	102	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> 123478-HxCDF	98	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> 123678-HxCDF	85	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> 234678-HxCDF	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> 123789-HxCDF	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> 123478-HxCDD	110	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> 123678-HxCDD	85	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> 1234678-HpCDF	82	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> 1234789-HpCDF	90	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> 1234678-HpCDD	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>14</sup> C <sub>12</sub> OCDD	52	%	USEPA Method TO-9A (GC-HRMS)

Customer Sample Name: 15-3467 (Air) Lab ID: 15-58934-2

Sample Condition: Acceptable

Test	Result	Unit	Method Reference
<b>Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)</b>			
2378-TCDF	32.9	pg	USEPA Method TO-9A (GC-HRMS)
Total TCDF	759	pg	USEPA Method TO-9A (GC-HRMS)
2378-TCDD	<3.20	pg	USEPA Method TO-9A (GC-HRMS)
Total TCDD	223	pg	USEPA Method TO-9A (GC-HRMS)
12378-PeCDF	16.4	pg	USEPA Method TO-9A (GC-HRMS)
23478-PeCDF	24.3	pg	USEPA Method TO-9A (GC-HRMS)
Total PeCDF	330	pg	USEPA Method TO-9A (GC-HRMS)
12378-PeCDD	11.5 (E)	pg	USEPA Method TO-9A (GC-HRMS)
Total PeCDD	126 (E)	pg	USEPA Method TO-9A (GC-HRMS)
123478-HxCDF	26.7	pg	USEPA Method TO-9A (GC-HRMS)
123678-HxCDF	18.4	pg	USEPA Method TO-9A (GC-HRMS)
234678-HxCDF	26.6	pg	USEPA Method TO-9A (GC-HRMS)
123789-HxCDF	<17.4	pg	USEPA Method TO-9A (GC-HRMS)
Total HxCDF	181	pg	USEPA Method TO-9A (GC-HRMS)
123478-HxCDD	13.7 (E)	pg	USEPA Method TO-9A (GC-HRMS)
123678-HxCDD	24.1	pg	USEPA Method TO-9A (GC-HRMS)
123789-HxCDD	<19.9	pg	USEPA Method TO-9A (GC-HRMS)
Total HxCDD	357 (E)	pg	USEPA Method TO-9A (GC-HRMS)
1234678-HpCDF	89.6	pg	USEPA Method TO-9A (GC-HRMS)
1234789-HpCDF	<23.8	pg	USEPA Method TO-9A (GC-HRMS)

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Jacobs New Zealand Ltd.  
BoPRC Kopepeo Canal Remediation  
Baseline Ambient Dioxin Monitoring  
March to May 2015

AsureQuality Reference: 15-58934

Report issued: 26-Jun-2015

Test	Result	Unit	Method Reference
Total HpCDF	69.6	pg	USEPA Method TO-9A (GC-HRMS)
1234678-HpCDD	326	pg	USEPA Method TO-9A (GC-HRMS)
Total HpCDD	821	pg	USEPA Method TO-9A (GC-HRMS)
OCDF	34.0	pg	USEPA Method TO-9A (GC-HRMS)
OCDD	749	pg	USEPA Method TO-9A (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	3650	pg	USEPA Method TO-9A (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	3650	pg	USEPA Method TO-9A (GC-HRMS)
Sum of PCDD/Fs - Upperbound	3650	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	37.7	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	41.3	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	44.9	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	37.7	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	41.3	pg	USEPA Method TO-9A (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	44.9	pg	USEPA Method TO-9A (GC-HRMS)
<b>Surrogate Standards</b>			
<sup>14</sup> C <sub>12</sub> 2378-TCDD	105	%	USEPA Method TO-9A (GC-HRMS)
<b>Internal Standards</b>			
<sup>13</sup> C <sub>12</sub> 2378-TCDF	108	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 2378-TCDD	98	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 12378-PeCDF	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 23478-PeCDF	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 12378-PeCDD	105	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123478-HxCDF	99	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123678-HxCDF	82	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 234678-HxCDF	90	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123789-HxCDF	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123478-HxCDD	110	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123678-HxCDD	90	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234678-HpCDF	78	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234789-HpCDF	85	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234678-HpCDD	92	%	USEPA Method TO-9A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> OCDD	50	%	USEPA Method TO-9A (GC-HRMS)

E = Estimated result

## QC Results

### Blank

Relates to sample(s) 15-58934-1, 15-58934-2

Test	Result	Unit	Method Reference
<b>Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs)</b>			
2378-TCDF	<4.30	pg	USEPA Method TO-9A (GC-HRMS)
Total TCDF	<4.30	pg	USEPA Method TO-9A (GC-HRMS)
2378-TCDD	<2.29	pg	USEPA Method TO-9A (GC-HRMS)
Total TCDD	<4.58	pg	USEPA Method TO-9A (GC-HRMS)
12378-PeCDF	<3.77	pg	USEPA Method TO-9A (GC-HRMS)
23478-PeCDF	<3.80	pg	USEPA Method TO-9A (GC-HRMS)
Total PeCDF	<3.80	pg	USEPA Method TO-9A (GC-HRMS)
12378-PeCDD	<3.32	pg	USEPA Method TO-9A (GC-HRMS)
Total PeCDD	<11.1	pg	USEPA Method TO-9A (GC-HRMS)
123478-HxCDF	<4.74	pg	USEPA Method TO-9A (GC-HRMS)

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Baseline Ambient Dioxin Monitoring  
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AsureQuality Reference: 15-58934

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Test	Result	Unit	Method Reference
123878-HxCDF	<4.70	pg	USEPA Method TO-8A (GC-HRMS)
234678-HxCDF	<5.21	pg	USEPA Method TO-8A (GC-HRMS)
123789-HxCDF	<7.07	pg	USEPA Method TO-8A (GC-HRMS)
Total HxCDF	<7.07	pg	USEPA Method TO-8A (GC-HRMS)
123478-HxCDD	<5.85	pg	USEPA Method TO-8A (GC-HRMS)
123678-HxCDD	<5.89	pg	USEPA Method TO-8A (GC-HRMS)
123789-HxCDD	<5.71	pg	USEPA Method TO-8A (GC-HRMS)
Total HxCDD	<5.89	pg	USEPA Method TO-8A (GC-HRMS)
1234678-HpCDF	<4.45	pg	USEPA Method TO-8A (GC-HRMS)
1234789-HpCDF	<6.68	pg	USEPA Method TO-8A (GC-HRMS)
Total HpCDF	<6.68	pg	USEPA Method TO-8A (GC-HRMS)
1234678-HpCDD	<7.19	pg	USEPA Method TO-8A (GC-HRMS)
Total HpCDD	<7.19	pg	USEPA Method TO-8A (GC-HRMS)
OCDF	<17.1	pg	USEPA Method TO-8A (GC-HRMS)
OCDD	<13.3	pg	USEPA Method TO-8A (GC-HRMS)
Sum of PCDD/Fs - Lowerbound	0.000	pg	USEPA Method TO-8A (GC-HRMS)
Sum of PCDD/Fs - Mediumbound	40.5	pg	USEPA Method TO-8A (GC-HRMS)
Sum of PCDD/Fs - Upperbound	81.0	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F WHO-TEQ - Lowerbound	0.000	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F WHO-TEQ - Mediumbound	5.89	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F WHO-TEQ - Upperbound	11.4	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F I-TEQ - Lowerbound	0.000	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F I-TEQ - Mediumbound	5.29	pg	USEPA Method TO-8A (GC-HRMS)
Total PCDD/F I-TEQ - Upperbound	10.6	pg	USEPA Method TO-8A (GC-HRMS)
<b>Surrogate Standards</b>			
<sup>13</sup> C <sub>12</sub> 2378-TCDD	100	%	USEPA Method TO-8A (GC-HRMS)
<b>Internal Standards</b>			
<sup>13</sup> C <sub>12</sub> 2378-TCDF	95	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 2378-TCDD	95	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 12378-PeCDF	95	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 23478-PeCDF	92	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 12378-PeCDD	105	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123478-HxCDF	92	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123678-HxCDF	80	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 234678-HxCDF	90	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123789-HxCDF	88	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123478-HxCDD	110	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 123678-HxCDD	90	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234678-HpCDF	75	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234789-HpCDF	78	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> 1234678-HpCDD	82	%	USEPA Method TO-8A (GC-HRMS)
<sup>13</sup> C <sub>12</sub> OCDD	48	%	USEPA Method TO-8A (GC-HRMS)

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### Analysis Summary

#### Wellington Laboratory

Analysis	Method	Accreditation	Authorised by
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs) DX-DIOX03, 01-DEFAULT	USEPA Method TO-9A (GC-HRMS)	IANZ	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).

Lowerbound concept uses zero for the contribution of each non-quantified analyte. Mediumbound concept uses half of the reporting limit for the contribution of each non-quantified analyte. Upperbound concept uses the reporting limit for the contribution for each non-quantified analyte.

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

### Accreditation

#### Wellington Laboratory



## Appendix

### Analyte Summary

#### Analyte Definitions (Environmental Tests)

#### Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs) - USEPA Method TO-9A (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