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8 September 2022

Danielle Petricevich
Bay of Plenty Regional Council
PO Box 364
WHAKATANE 3158

Dear Danielle

RM20-0190-AP: RESPONSE TO SECTION 92(1) INFORMATION REQUEST – AIR DISCHARGE

1.0 Introduction

On 26 March 2020, Higgins Contractors Limited (HCL) applied to Bay of Plenty Regional Council (BOPRC) to replace Discharge Permit 63317 to discharge Combustion Gases, Bitumen, Sulphur Dioxide, Volatile Organic Compounds, Water Vapour and Particulate Matter from an Asphalt Plant to Air. On 2 October 2020, BOPRC sought additional information pursuant to Section 92(1) of the Resource Management Act 1991 (RMA). This letter provides a response to the matters raised in S92(1) request for further information.

We also attach at Appendix A an updated consent condition, which reflects a change to the proposal. Changes include a proposed reduction in emission rates for total particulate matter from the asphalt plant from 2.5 kg/hr as currently consented, to 1.5 kg/hr. HCL is volunteering this reduction in emission rates in recognition of the status of the Mt Maunganui airshed as a 'polluted' airshed under the NESAQ. Based on emissions testing data provided by HCL, this is a realistic emission rate limit for the plant, that will also continue to allow room for fluctuations in emissions during normal plant operations.

2.0 S92(1) Responses

1. Stack Emission Reports

Please provide all of the stack emission reports for the duration of the consent (63317) and a summary of the emission trends and effects on air quality.

Please see the requested stack emission testing reports attached as Appendix B. HCL has thoroughly checked their records and confirms that four stack emission reports have been undertaken since the asphalt plant was commissioned. Table 1 summarises the test data from all the available reports. Except for the tests undertaken on 9 February 2012, the test results for Total Suspended Particulate Matter (TSP) indicate that the discharge complied with the consented limits for TSP on both a concentration and mass emission basis.

The 9 February 2012 test was undertaken during a period when lime was added to the hot mix asphalt. We understand that lime addition resulted in elevated particulate matter discharges, which exceeded the TSP limits on both a concentration and mass emission rate basis. HCL does not currently add lime to the

hot mix and does not intend to do so in future at this site. The test results from 9 February 2012 are therefore not representative of current operations.

From the test data, we can assume that under normal operations the plant discharges on average around 1 kg/hr of TSP, which is lower than the 2.1 kg/hr (as TSP) that has been conservatively assessed using air emission factors as described in the AEE. As a result, HCL is voluntarily proposing to set the TSP emission limit at 1.5 kg/hr to essentially cap the emissions at historic production rates (see question 2).

As a result of this proposed reduction, this will reduce the modelling predictions provided in the remainder of this letter by nearly a third. Accordingly, the policy assessment within the AEE largely stands.

Table 1: Summary of Emissions Test Results

Date of test	Production rate (tonne/hr)	TSP Concentration (mg/Nm^3)	TSP Emission Rate (kg/hr)	Efflux velocity (m/s)	Temperature (°C)
7/03/2003	40	84	0.5	9-12.9	61-66
9/02/2012	52	392*	4.2*	10.2-10.4	59
24/05/2012	40	103	0.9	8.1-8.4	55-56
30/04/2015	50	142	1.2	8.9-9.2	58-65
19/12/2017	n/a	113	1	8 to 9	55-58
1/03/2022	n/a	73	0.66	8.5-9.0	54-56
Consent limit	***n/a***	***250***	***2.5***	***n/a***	***n/a***

**Test undertaken during addition of lime to hot mix*

2. Stack Emission Monitoring

Please carry out additional stack emission monitoring when the plant is running at maximum load. Please test for TSP, PM_{10}, $PM_{2.5}$ and sulphur dioxide.

The maximum rate of asphalt production for the plant is 60 tonnes per hour (tph). The rate of production during the historic emissions testing has been in the range of 40 to 52 tph. This is the normal range of operation at which the plant operates most efficiently. Testing at the higher rate of 60 tph is not representative of normal operations. Maintaining production at 60 tph over the testing period would also produce surplus asphalt that would require disposal.

We understand that testing for PM_{10} and $PM_{2.5}$ cannot be undertaken using accepted standard methods for HCL's Mt Maunganui plant due to the high moisture content of the stack gas. We have therefore relied on published emission factors to estimate the PM_{10} and $PM_{2.5}$ as a proportion of TSP. We consider the assessments of these contaminants was conservative and that actual emissions data would not change the conclusions reached in the assessment.

We consider that HCL's use of low sulphur diesel at 0.001% means that SO_2 discharges will be negligible as calculated by mass balance. We have requested emissions testing data for SO_2 at other diesel-fired asphalt plants in New Zealand from Source Testing New Zealand Ltd (STNZ) and were informed that SO_2

readings are generally below the instrument level of detection at these plants[1]. We are therefore of the view that SO_2 testing is not necessary to inform decision making beyond the information already supplied nor is it warranted.

SO_2 emissions can be managed sufficiently for consenting purposes by specifying a limit on the sulphur content of the fuel.

3. Annual Asphalt Production Rates

Please provide annual asphalt production rates from 2005 to 2020 or relevant information to estimate the change in production over the duration of the current consent (63317).

HCL has historically produced between 9,000 and 40,000 tonnes per year (tpy) of asphalt over its time of operation at the Mt Maunganui site as per Figure 1.

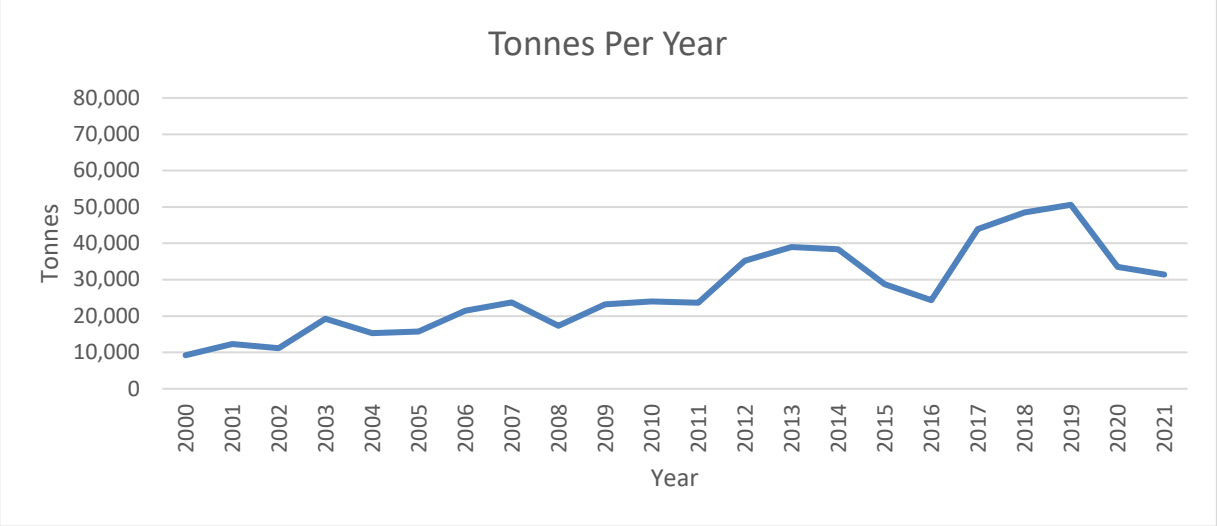

Figure 1: Historic Annual Production Rate

4. Dispersion Modelling

Please carryout dispersion modelling using parameters from the stack emission testing results i.e. stack gas velocity, stack gas temperature, pollutant concentrations. Dispersion modelling must be carried out over 3 years (2014, 2015, 2016) to be consistent with other applications in the Mt Maunganui airshed and to take into account various weather patterns (e.g. El Nino).

We consider the modelling undertaken as part of the assessment to be fit for purpose, consistent with generally accepted good practice elsewhere and is considered a sufficient basis for decision making. The modelling is conservative in that it assumes continuous emissions of contaminants at a rate higher than is typical (i.e. emissions were modelled at more than twice the rate of what is typically discharged from the stack).

Modelling for three years will not, in our experience, result in significantly different predictions. We note that the main factor in the highest predicted concentrations are as a result of building downwash, and so are principally influenced by wind speed and wind direction. Two years of meteorological data will include the full range of wind conditions that occur at the site as likely to impact on building downwash. While El Nino has implications for the general climate, the effects in regard to dispersion of the HCL plant are not expected to be substantially impacted. We would not in most cases expect any significant differences in

[1] STNZ, personal communication 17 November 2020.

predictions in modelling 2014-2016 as compared to the modelling already undertaken for 2010-2011 and consider the additional cost to HCL of remodelling three years is not warranted.

5. Dispersion Modelling for Night Shifts

Operating hours are stated as 6 am-4 pm (day shift) and 6 pm-6 am (night shift). Modelling has been carried out from 7 am-7 pm. It is noted in the application that asphalt is manufactured overnight when there are certain projects that require the product outside of normal working hours. Modelling should be carried out to reflect this scenario. Where continuous operating hours are not used, ensure that the operating hours are consistent with actual hours or predicted hours for future production (Consent Conditions may be based around this restricting operating hours).

Note: the application states annual production for the proposed plant is to rise from 40,000T to 75,000T and Higgins is proposing to manufacture asphalt during both day and night shifts.

HCL is proposing to operate within a maximum 12-hour period on any given day, though operating hours will generally be less than this. The initial modelling of a 12-hour daytime shift was chosen to represent a likely worst-case scenario. We note that assuming a production rate of 50 tph, the production of asphalt at 75,000 tpy equates to around 1,500 hours operation per year, whereas a modelling scenario of 12 hours per day every day equates to 4,380 hour of operation per year. Accordingly, a 12-hour operating scenario is more than sufficient to meet the production needs of the plant over the course of a year (and any particular day). The re-modelling has also been undertaken to reflect the lower emission rate for TSP of 1.5 kg/hr rather than the 2.1 kg/hr as assumed in the original AEE. The lower emission rate has been volunteered by HCL as condition of consent in order to reflect the better performance of the scrubber compared to what has been assumed previously.

As indicated, there are periods when asphalt production is needed for projects undertaken at night. PDP has subsequently modelled emissions from the HCL plant to assess the effects of a night-time operation with the results presented below. The additional modelling assumed operation over the two-year modelling period from 6 pm to 6 am each day, and the lower emission rate of 1.5 kg/hr for TSP. Table 2 presents the highest predicted maximum ground level concentrations (MGLCs) for night-time operations. As provided by BOPRC[2], a background concentration for PM_{10} of 30.2 $\mu g/m^3$ has been used to assess the cumulative impact.

Table 2: Highest Predicted offsite MGLCs of Contaminants from the HCL Asphalt Plant (Night-time 6 pm to 6 am, 1.5 kg/hour PM_{10})

Contaminant	Highest Predicted MGLCs ($\mu g/m^3$)		Averaging Period	Assessment Criteria ($\mu g/m^3$)	Source
	Excluding Background	Including Background			
PM_{10}	12.4	42.6	24-hour	50	NESAQ
	1.0	15.6	Annual	20	MfE
$PM_{2.5}$	3.1	17.1	24-hour	25	NESAQ (proposed)
	0.3	7.8	Annual	10	NESAQ (proposed)

[2] Email from Mary Pappon dated 13 October 2020.

Table 2: Highest Predicted offsite MGLCs of Contaminants from the HCL Asphalt Plant (Night-time 6 pm to 6 am, 1.5 kg/hour PM_{10})

Contaminant	Highest Predicted MGLCs (µg/m³)		Averaging Period	Assessment Criteria (µg/m³)	Source
	Excluding Background	Including Background			
NO_2	37	102	1-hour	200	NESAQ
	17	60	24-hour	100	MfE
	1.4	17.4	Annual	30	MfE
CO	37	5,037	1-hour	30,000	MfE
	0.07	24	8-hour	10,000	NESAQ
SO_2	0.03	16	1-hour	350	NESAQ
	17.5	48	Annual	120	MfE

For consistency, PDP repeated the modelling for a daytime scenario of 6 am to 6 pm. The additional modelling was run with the typical stack gas conditions based on the data in Table 1, using an efflux velocity of 9 m/s and a stack gas temperature of 60°C.

Table 3 presents the highest predicted MGLCs of the daytime operation. In both cases, the locations of the highest predicted MGLCs occur within 100 to 150 m of HCL's site and are predicted to decrease rapidly with distance from the site.

On this basis, the effects remain the same (and slightly lower for PM_{10}) than the existing assessment.

Table 3: Highest Predicted offsite MGLCs of Contaminants from the HCL Asphalt Plant (Daytime 6 am to 6 pm 1.5 kg/hour PM_{10})

Contaminant	Highest Predicted MGLCs (µg/m³)		Averaging Period	Assessment Criteria (µg/m³)	Source
	Excluding Background	Including Background			
PM_{10}	9.1	39.4	24-hour	50	NESAQ
	1.3	15.9	Annual	20	MfE
$PM_{2.5}$	2.4	16.4	24-hour	25	NESAQ (proposed)
	0.4	7.9	Annual	10	NESAQ (proposed)
NO_2	35.8	100.8	1-hour	200	NESAQ
	12.6	55.6	24-hour	100	MfE
	1.7	17.7	Annual	30	MfE
CO	82	5082	1-hour	30,000	MfE

Table 3: Highest Predicted offsite MGLCs of Contaminants from the HCL Asphalt Plant (Daytime 6 am to 6 pm 1.5 kg/hour PM_{10})					
Contaminant	Highest Predicted MGLCs (µg/m³)		Averaging Period	Assessment Criteria (µg/m³)	Source
	Excluding Background	Including Background			
	70	2070	8-hour	10,000	NESAQ
SO_2	0.07	24.1	1-hour	350	NESAQ
	0.02	16.0	Annual	120	MfE

6. Night time operations

Please provide the number of nights and the number of hours per night that the asphalt plant has operated between 6 pm-6 am (nightshift) annually for the last 5 years.

Approximate nightshifts and hours are recorded below:

- Jul 2017 - Jun18 – 59 nightshifts, approximately. 590 hours.
- Jul 2018 – Jun19 – 77 nightshifts, approximately 770 hours
- Jul 2019 – Jun20 – 64 nightshifts, approximately 640 hours
- Jul 2020-Jun21 – 44 nightshifts, approximately 440 hours
- Jul 2021 – Jun22 – 47 nightshifts, approximately 470 hours

For the majority of the year nightshifts are infrequent, and the majority of nightwork is around peak summer months for NOC and Port works. Moving forward nightshifts will be tracked in Surfacing programme.

7. Individual Contribution and Cumulative Contribution to Airshed

Background air quality data that is added to modelled ground level concentrations are inconsistent with other applications in the Mount Maunganui Industrial Airshed. Due to the discharge being in a gazetted airshed, a detailed investigation into appropriate background ambient air concentrations has been commissioned by BOPRC.

Please use the background data provided by the BOPRC for PM_{10} and SO_2 and updated modelling to assess this activity's individual contribution to the airshed and cumulative contribution taking into account the activity Allied is undertaking (application RM20-0301).

Bay of Plenty Regional Council recommends that Allied and Higgins work together to undertake the cumulative modelling, or at least provide each other their updated stack test data. It is acknowledged that this information may be commercially sensitive and therefore BOPRC could undertake the cumulative assessment on behalf of both parties, if requested by the applicants.

We have requested and obtained recommended concentrations of contaminants to be used as background from BOPRC. Background concentrations of PM_{10} as a 24-hour average is 30.2 µg/m³, which is lower than the 32.8 µg/m³ that we used in the AEE. The recommended background as an annual average for PM_{10} is 14.6 µg/m³ compared to 10 µg/m³ used in the original assessment.

The main contaminant of concern from the operation of the asphalt plant is PM_{10} as a 24-hour average. The reduction in assumed 24-hour average background concentrations does not affect the conclusion in

the original assessment, that the effects of the discharge with respect to PM_{10} are at a level that may be considered less than minor. The highest predicted concentration of particulate matter as an annual average is relatively low compared to the assessment criteria (i.e. 1.3 µg/m^3 compared to the NES of 20 µg/m^3), and so the increase in assumed background concentrations on an annual average basis also does not change the conclusions of the original assessment in the AEE.

BOPRC has provided recommended background concentrations for SO_2 derived from monitoring data collected near the Port of Tauranga. The recommended values are 25 µg/m^3 as a 1-hour average and 16 µg/m^3 as a 24-hour average. While these are higher than the MfE recommended values for a main urban area of 20 µg/m^3 as a 1-hour average and 8 µg/m^3 as a 24-hour average, the peak modelled concentrations of SO_2 are less than 0.1 µg/m^3 for all averaging periods, and so will result in negligible incremental increases in ambient SO_2 concentrations.

The Allied asphalt plant is around 450 m to the southeast of the HCL plant, and well outside the range where the highest predicted MGLCs of contaminants from the HCL plant are predicted to occur. The highest predicted concentrations from the HCL plant occur between 100 and 150 m from the stack and decrease quickly with distance thereafter. The isopleths also indicate that the highest predicted concentrations occur when winds are from the north or from the southeast, during which periods the plumes from the two asphalt plant stacks would not overlap to any significant degree. Furthermore, incorporating values for background air quality already takes into account other sources of air contaminants in the airshed, of which there are several besides the two asphalt plants.

Given the above, in our view, cumulative modelling of the two plants would not change any of the conclusions made in the original AEE and in our view is not needed to better understand the effects of HCL's discharges on air quality.

8. PM_{10} and SO_2 Contribution to Airshed

Please provide an assessment of the contribution that Higgins is making for PM_{10} and SO_2 to the airshed (e.g. kg/yr). Compare this data to an emission inventory for the Mount Maunganui Airshed.

Assuming HCL manufactures asphalt at 75,000 tpy at an average production rate of 50 tph, the plant will be in operation for 1,500 hours per year. Based on stack test data as summarised in Table 1 of this letter, the HCL plant is typically contributing TSP at a rate 1 kg/hr of operation or an estimated 0.83 kg of PM_{10}. This would generate around 1.5 tonnes of TSP discharged to the atmosphere per year if production reached the maximum level.

BOPRC has commissioned an emissions inventory for various air contaminants in Tauranga[3] which includes the Mount Maunganui Airshed as well as the wider Tauranga City. The emissions inventory has estimated the total TSP emitted to atmosphere on an annual basis to be 443 tpy, with 84 tpy being from industry. Domestic solid fuel burning generates most of the PM_{10} on an annual basis and is estimated to be around 39% of total PM_{10} emissions on an annual basis.

Conservatively assuming all TSP discharged from the HCL plant is PM_{10}, this would be less than 0.3% of total PM_{10} emitted in Tauranga, and 1.8% of total industrial emissions. We consider this contribution of PM_{10} to be relatively minor in the context of other sources that are accounted for in the inventory, which contribute to the overall concentrations of particulate matter in the airshed.

The BOPRC emissions inventory for Tauranga estimates that 986 tonnes of SO_2 are released to the atmosphere per year, with 232 tpy being from industrial sources. The predominant source of SO_2 is from shipping activities in the Port of Tauranga, which discharge an estimated 745 tpy of SO_2 to atmosphere.

[3] Environet, *Tauranga Air Emission Inventory 2018*,

As discussed previously, SO_2 emissions from asphalt plants fired on low sulphur diesel are negligible. We have estimated that the discharge of SO_2 from the HCL asphalt plant to be 0.0033 kg/hr, or around 5 kg on an annual basis. This is less than 0.0001% of total SO_2 discharged on an annual basis within the Mount Maunganui airshed. Consequently, we consider emissions of SO_2 from the operation to be negligible in the context of the Mount Maunganui airshed.

9. Recycled Asphalt Pavement Assessment

Please provide an assessment on Recycled Asphalt Pavement (RAP) used in the asphalt manufacturing process and how this may affect discharges to air.

There is very little difference in contaminant emissions when using RAP in the manufacture of asphalt, although there may be an increased risk of odour effects. In any case, HCL has confirmed that the Mt Maunganui site will not be using RAP in asphalt manufacturing.

10. $PM_{2.5}$ Assessment

An assessment of $PM_{2.5}$ should be made. There are no specific requirements in the Bay of Plenty at this point, however it is expected to be incorporated in the future. Consideration should include but not be limited to:

a. What are the emission levels of $PM_{2.5}$

b. What are the offsite concentrations of $PM_{2.5}$

c. How does that compare to any relevant Ambient Air Quality Guidelines for $PM_{2.5}$

a. Emission levels of $PM_{2.5}$ from asphalt production will be less than PM_{10}. While it is not practicable to directly measure $PM_{2.5}$ emissions from a wet scrubber, there are published emission factors. USEPA AP-42 emission factors for hot mix asphalt plants have particle size distributions for uncontrolled asphalt plants and for asphalt plants fitted with bag filters. The particle size distribution factors state that $PM_{2.5}$ makes up 5.5% of TSP discharged from uncontrolled asphalt plants, and 21% of baghouse-controlled asphalt plants. While there are no particle size distribution data for wet scrubbers, presumably due to the difficulty of measuring speciated particulate matter from wet sources, using the emission factor for baghouse-controlled sources will provide a conservative estimate of the emissions of $PM_{2.5}$ from the HCL asphalt plant. Assuming a total emission rate for TSP of 1.5 kg/hr (which is the proposed new consent limit for TSP emission rates), this equates to an emission factor for $PM_{2.5}$ of 0.31 kg/hr. However, we note that the more typical emission rate for TSP is 1 kg per hour, which would equate to an emission rate of 0.21 kg/hr for $PM_{2.5}$.

b. The offsite concentrations of $PM_{2.5}$ are provided for night-time and day-time operations in Table 2 and Table 3 of this letter respectively.

c. Table 2 and Table 3 above provide a comparison of the highest predicted $PM_{2.5}$ concentrations, including background concentrations. The highest predicted concentrations of $PM_{2.5}$ including background are 17.1 $\mu g/m^3$ as a 24-hour average and 7.8 $\mu g/m^3$ as an annual average. These are both below the proposed NESAQ for $PM_{2.5}$ of 20 $\mu g/m^3$ as a 24-hour average and 10 $\mu g/m^3$ as an annual average. Accordingly, based on a conservative estimate of the likely $PM_{2.5}$ fraction, the discharges are not predicted to exceed the proposed NESAQ for $PM_{2.5}$.

11. Diesel Fuel Sulphur Content

Confirm that the diesel fuel used to fire the plant has a sulphur content of 10ppm (0.001% w/w). The current consent (63317) permits a fuel with a sulphur content up to 2% w/w.

HCL confirms that the diesel fuel used at the plant is low-sulphur diesel with a sulphur content of 10 ppm or less.

12. Odour Assessment

12. Provide an assessment of odour at and beyond the site boundary, from on-site operations. This should include an assessment of complaints received.

Hot-mix asphalt production has a characteristic odour that is present during the manufacture and loading of the product. The main source of odour from the proposed plant is the hot-mix drum, with emissions of odorous compounds being discharged through the stack together with products of combustion and from load-out.

Odour may also be discharged from the bitumen storage tank during refilling when the headspace in the tank is displaced by fresh bitumen, and during truck loadout operations. These events are either infrequent or of short duration and are not expected to contribute significantly to odour effects beyond the site boundaries.

Odour Complaints

Section 6.5.1 of the AEE states that HCL has successfully operated the asphalt plant at the site without any odour issues or complaints for over 20 years, as confirmed through the complaints record sent to HCL by BOPRC. Since the AEE was submitted, HCL has received an odour complaint from a neighbouring property which was verified by a BOPRC enforcement officer on 2 February 2022 as being offensive and objectionable in nature. BOPRC issued an abatement notice requiring HCL to comply with Condition 5.7 of the existing air discharge consent, which states that *the permit holder shall control the operations on site so there is not an odour nuisance beyond the boundary of the site.* PDP understands that there have been no other verified complaints resulting from HCL operations since February 2022.

Since receiving notification of an odour complaint and associated abatement notice, HCL has undertaken a programme of daily odour monitoring within the site and at the site boundary using HCL staff. HCL has further committed to undertaking odour monitoring using an independent third party to identify potential issues with site operations that may result in offsite odour effects. The independent odour monitoring study is in progress at the time of writing.

Given the low frequency of odour complaints over the long duration of HCL's operations at the stie, it is likely that the conditions leading to the odour complaint occur infrequently, and do not reflect normal operating conditions. Should the odour surveys indicate a higher frequency of offsite odour effects, HCL will investigate options for reducing the odour emissions from the site.

Odour Dispersion Modelling

PDP has undertaken air dispersion modelling of estimated odour emissions to assess the potential odour effects from the proposed asphalt plant. PDP's assessment approach included:

- Reviewing available odour emission rate data as measured from the HCL plant;
- Dispersion modelling of the odour emissions to predict the highest ground level concentrations of odour beyond the site boundary and at the nearest sensitive receptors;
- Evaluation using odour modelling assessment criteria recommended in the MfE *Good Practice Guide Assessing and Managing Odour* (2016); and,

- Undertaking a qualitative assessment of odour using the FIDOL factors.

Odour Emission Rates

The concentration of odour can be measured in odour units (OU), where 1 OU/m^3 is the concentration where 50% of a panel in a laboratory situation can just detected the odour[4]. In an environmental setting, 1 OU/m^3 would be barely perceptible to most people. An odour concentration of 5 to 10 OU/m^3 would be described as faint odour by most people[5].

In March 2022, HCL commissioned stack emissions testing to measure odour concentrations emitted from the asphalt plant stack. The emissions testing measured an average emission rate for odour of 58,025 OU/s. PDP considers the measured emission rate to be within the range of odour emission rates for plants in New Zealand and representative of normal plant operations. The odour emissions test report is included as Attachment B.

Odour Assessment Criteria

The Ministry for the Environment's *Good Practice Guide for Assessing and Managing Odour (*MfE 2016) includes odour dispersion modelling guideline values that are designed to avoid adverse effects from offensive or objectionable odour. Table 4 below sets out the MfE recommended odour guideline values to use for odour dispersion modelling assessments depending on the receiving environment sensitivity.

The industrial nature of the receiving environment around the HCL site is generally considered to have low sensitivity for odour effects, while the residential dwellings are considered to have a moderate to high sensitivity to odour depending on the character and nature of the odour. The modelling guidelines include percentile values that are statistical parameters used in modelling to filter outlying values, which are excluded for odour effects assessments. The 0.5th percentile value generated by the model is the 44th highest hour in one year. The 0.5th percentile is recommended for assessing the potential "chronic effects" of odour, which can occur from frequently exposure to low levels of odour. The 0.1th percentile value is recommended for assessing potential "acute effects", which can occur due to high intensity odour that is infrequent. The rationale for these percentiles is described in "*Review of Odour Management in New Zealand*" Ministry for the Environment, Air Quality Technical Report (2002).

For this assessment, PDP considers the appropriate assessment criterion to be 1 to 2 OU/m^3 at the nearest sensitive receptors, and 5 - 10 OU/m^3 at locations near the plant.

Table 4: Odour Modelling Guideline Values

Sensitivity of the Receiving Environment	Concentration	Percentile
High (worst-case impacts during unstable to semi-unstable conditions)	1 OU/m^3	0.1% and 0.5%
High (worst-case impacts during neutral to stable conditions)	2 OU/m^3	0.1% and 0.5%
Moderate (all conditions)	5 OU/m^3	0.1% and 0.5%
Low (all conditions)	5-10 OU/m^3	0.5%

[4] MfE, *Good Practice Guide for Assessing and Managing Odour,* November 2016 (p.44).
[5] Institute of Air Quality Management, *Guidance on the assessment of odour for planning version 1.1,* July 2018

Odour Modelling Predictions

Dispersion model outputs for odour as OU/m^3 are compared to odour modelling guideline values to estimate whether, and where, adverse effects of odour might occur. PDP has undertaken dispersion modelling of the emissions from HCL's plant assuming odour emission rates as measured in the March 2022 emissions testing.

Table 5 presents the highest predicted MGLCs of odour as 1-hour average values at the 99.9th and 99.5th percentiles. The 99.5th percentile is the recommended odour modelling guideline value for a low sensitivity receiving environment and is considered applicable to the Industrial Zone around the plant. The highest predicted offsite concentrations of odour from the modelling occur to the south of HCL's site.

Table 5: 1-hour Average (99.9th percentile) Predicted Odour MGLCs

Location	Highest Predicted MGLC (OU/m^3)	Evaluation Criteria
Highest MGLC beyond site boundary	4.2	5 to 10 OU/m^3 (unstable conditions)
Nearest sensitive receptor	1.5	1 OU/m^3 (unstable conditions) 2 OU/m^3 (Stable and neutral conditions)

Figure 2 presents an isopleth diagram of the predicted 1-hour average odour concentrations from the asphalt plant stack at the 99.9th percentile. Odour concentrations of up to 4 OU/m^3 occur within a small area near the asphalt plant within the industrial area, and would likely be discernible, though at a low level of intensity and on this basis not at a level likely to result in nuisance. The highest predicted odour concentrations at the nearest sensitive receptors are between 1 and 2 OU/m^3. At these concentrations an odour may or may not be discernible depending on the sensitivity of the individual, and in any case, any odour will expected to be very weak to weak in intensity[6].

[6] As defined by the German standard method of olfactometry VDI 3882.

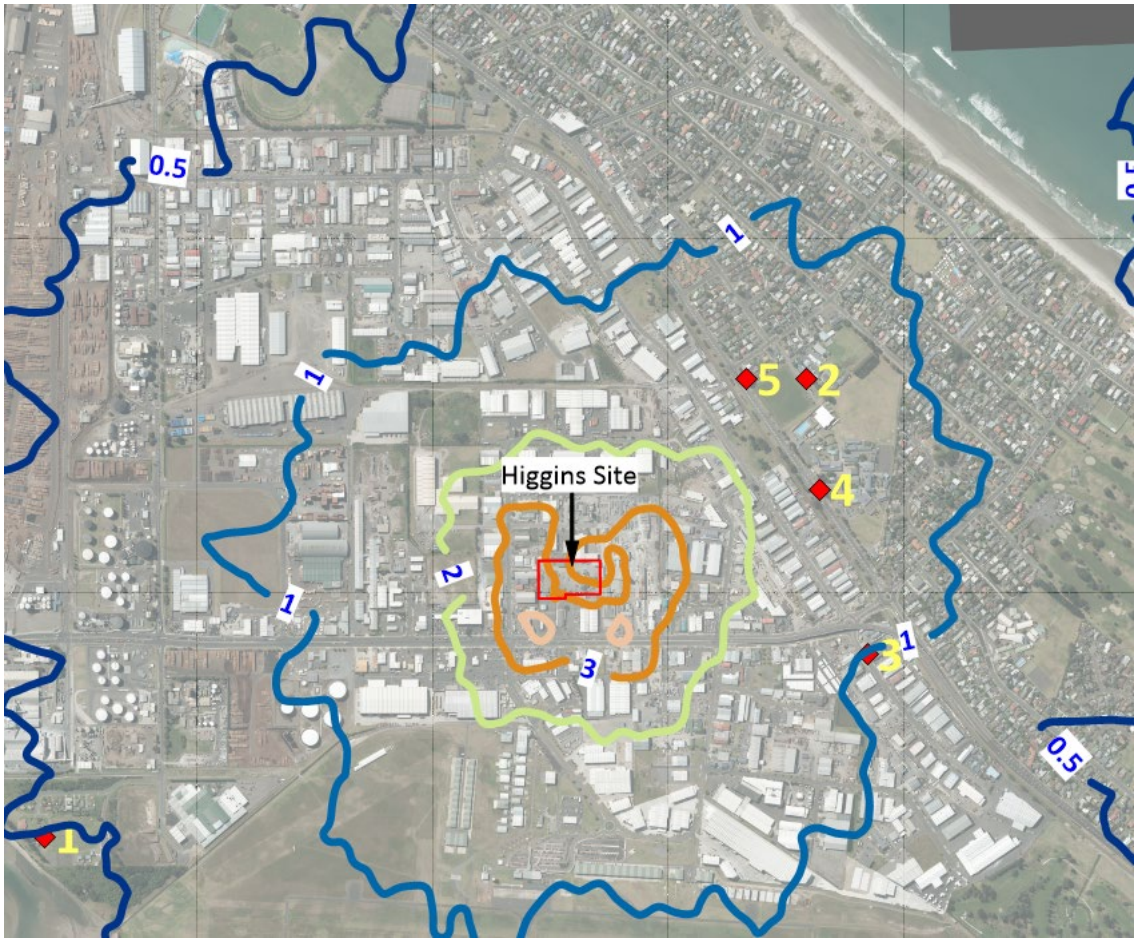

Figure 2 Predicted MGLCs of Odour from the HCL Asphalt Plant (OU/m^3), 1-hour averages (99.9th percentile)

FIDOL Assessment

Fugitive odours from the site will be discharged from the site during loadout periods and from general storage and handling of asphalt. As these discharges are intermittent and of short duration (generally less than a few minutes at any time), they are difficult quantitatively assess using dispersion modelling. The Ministry for the Environment recommends an assessment of fugitive discharges by considering the FIDOL factors to evaluate the actual and potential effects due to discharges to air. The FIDOL factors are:

- **frequency –** how often an individual is exposed;
- **intensity -** strength of odour;
- **duration** – length of exposure;
- **offensiveness** – character/hedonic tone, which may be pleasant/neutral/unpleasant; and,
- **location** of land use and sensitivity of the receiving environment.

Table 6 below provides an assessment of the potential odour effects of fugitive discharges from the HCL asphalt plant using the FIDOL factors.

Table 6: FIDOL Assessment of Potential Odour Discharges from HCL Asphalt Plant

Factor	Assessment
Frequency	The frequency of potential odour emissions is for the most part directly related to the frequency of the operation of the asphalt plant. The maximum number of hours on an annual basis are estimated to be around 1,500 hours, or 17% of the time for the maximum asphalt production scenario of 75,000 tpy. The frequency of fugitive discharges from loadout activities is determined by the number of trucks being loaded at any one time, and can be up to several per day.
Intensity	Certain activities have potential for higher intensity odour, such as transferring hot-mix from the hot storage bins into trucks. Odour from the manufacturing process will have moderate intensity.
Duration	As with frequency, the duration of potential odour emissions is principally linked to periods of plant operation. The duration of events with a higher potential for odour, such as truck loadouts, occurs during a limited timeframe of less than five minutes, though could occur at any time of day or night.
Offensiveness	Odour associated with asphalt manufacture is characteristic of bitumen, which has a mildly unpleasant character. The odour could be considered as offensive if it were to occur in sufficient concentrations in sensitive locations.
Location	The plant is appropriately located within an established industrial area, well separated from the closest living zones. No sensitive land uses are located in the immediate vicinity. The location is assessed as low sensitivity to bitumen type odours.

Based on consideration of the FIDOL factors, the frequency, intensity and duration of the odour from asphalt manufacturing is considered as likely to be acceptable in the industrial location. PDP considers that the normal operations are unlikely to result in odour that is offensive of objectionable to the extent that there is an adverse effect beyond the site.

As noted previously, complaints of odour relating to the site have been infrequent, with only one complaint being received in the past twenty years of operation. This supports the FIDOL assessment that adverse odour effects are unlikely to occur from the operation of the asphalt plant at the site. HCL is, however, currently undertaking a programme of field odour surveys downwind of the plant to further assess the frequency, intensity, duration and offensiveness of odour from the plant to assess if the odour at an acceptable level.

13. Assessment of Effects on Sensitive Receptors

Provide an assessment of effects on sensitive receptors including childcare centres and schools within the vicinity (in regard to all contaminants, including odour). A consideration of separation distances should be discussed.

The HCL site is located in an industrial area which is zoned to allow for adequate separation distance from sensitive land uses. Table 7 provides a selection of the nearest sensitive receptor locations, and Figure 2 shows these locations on a map. Note that only a selection of receptors situated closest to the site boundary have been selected. These residences are the closest sensitive properties to the site boundary and are, therefore, considered to be representative of 'worst-case' sensitive receptor locations for the purposes of this assessment.

Table 7: Sensitive Receptor Locations					
Ref.	Description	Address	Distance to HCL Stack (m)	UTM Zone 60 South	
				Easting (m)	Northing (m)
1	Whareroa Marae	25 Taiaho Place	1,500	428014	5830480
2	Gwen Rogers Kindergarten	22 Tui St	780	429951	5831641
3	Montessori School	1 MacDonald St	780	430107	5830942
4	Mount Maunganui College	565 Maunganui Rd	660	429985	5831362
5	Nearest residence	564 Maunganui Rd	660	429799	5831641

Figure 3: Map of Selected Sensitive Receptors

The main contaminant of concern from the HCL site is particulate matter. The maximum 24-hour PM_{10} and $PM_{2.5}$ concentrations (with and without background) for the receptor locations are presented in Table 8 below. The values presented are the highest of the daytime and night-time operating scenarios and are modelled using actual stack parameters. In all cases the predicted concentrations at the sensitive receptors are well below the maximum predicted concentrations and are below the relevant assessment

criteria. The highest predicted odour concentrations at the nearest sensitive receptors are predicted to be between 1 and 2 OU/m^3, and are within the recommended MfE odour modelling guidelines which are designed to protect highly sensitive areas from nuisance levels of odour. The concentrations of other contaminants, including NO_2, SO_2, and other contaminants, will be similarly well below the highest level of effects and will have levels of effects that are less than minor.

Table 8: Predicted MGLCs of 24-hour average PM_{10} at Sensitive Receptors, 1.5 kg/hour PM_{10}

Receptor ID	Modelling Scenario - PM_{10} 24-hour concentration (µg/m^3)		Modelling Scenario - $PM_{2.5}$ 24-hour concentration (µg/m^3)	
	Without background	With background	Without background	With background
1	1.8	32.0	0.4	14.4
2	4.4	34.6	0.9	14.9
3	3.9	34.1	0.8	14.8
4	3.4	33.6	0.7	14.7
5	2.1	32.3	0.4	14.4

14. Assessment of Effects on Neighbours and Consultation

Please supply an updated assessment of effects on neighbours taking into account updated modelling and any consultation undertaken.

The conclusions of the original assessment have not changed as a result of the updated modelling presented in this letter. The effects of air discharges from the site are highest near the site boundary and are not predicted to result in any exceedances of the relevant air quality standards and guidelines. Given that the site is within the industrial zoned area, we consider these effects to be at an acceptable level. Based on a conservative modelling scenario of PM_{10} discharge at 1.5 kg/hour, the nearest sensitive receptors including residences, childcare centres, schools, and marae, the effects are predicted to be at a level for likely to be less that minor for typical emissions and at acceptable levels within the industrial area. The odour modelling assessment provided in the response to Question 12 above similarly indicates that odour concentrations at the nearest sensitive receptors will be below the relevant odour modelling guidelines, and nuisance odour form the plant is unlikely to be observed at those locations.

Consultation undertaken by HCL is further discussed in the response to Question 16 below.

15. BPO and Mitigation Measures

Please provide a further assessment of BPO and mitigation measures. The site is in a gazetted airshed and the current abatement technology used is not what would be fitted to a modern asphalt plant. Plans to upgrade the current abatement system to a more efficient system should be considered if a 10 year consent is requested.

Best practicable option (BPO) is defined in s.2(1) of the Resource Management Act 1991 (RMA) as:

> *".. meaning the best method for preventing or minimising the adverse effects on the environment having regard, amongst other things, to*

a) The nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and
b) The financial implications, and the effects on the environment, of that option when compared with other options; and
c) *The current state of technical knowledge and the likelihood that the option can be successfully applied."*

PDP has considered points a-c of the s.2(1) of the RMA. The 'nature' of the discharge is well known and the effects of the discharges have been conservatively assessed in the AEE and through this s.92 response. These effects have been put in the context of the immediate receiving environment being of low sensitivity, although it is recognised the wider airshed is polluted.

The discharge could be moved out of the airshed, however this would require HCL to cease making asphalt until a new site is found, purchased, authorised (through building/resource consents), designed, constructed and commissioned. HCL is investigating moving the operations to a new site, but estimate that a 10-year period is needed to enable this to happen.

The plant could be fired on natural gas rather than low sulphur diesel, which would potentially reduce the emissions of particulate matter formed as products of combustion, although the impact would be minimal as the emissions are dominated by process drum emissions. Furthermore, this would be an expensive option, and would not significantly reduce the emissions of SO_2, NO_X and other contaminants. The use of low sulphur diesel is currently the most practicable fuel for the HCL site to remain a commercially viable operation.

Using a high efficiency venturi wet scrubber to minimise particulate matter generated from the process is standard technology in New Zealand. While a baghouse filter could be used to provide greater control of particulate matter, the associated capital and operational costs of a baghouse not considered practicable for HCL's current operations.

16. Iwi/Hapū Consultation Update

16. Please provide an updated assessment of effects on cultural values. I note that the consent application stated that:

- *engagement with Ngati Kuku, Ngai Tukairangi is on-going but to date no specific cultural concerns have been raised;*
- *a meeting with Waitaha was held on 11 November 2019 and Vivienne Robinson indicated that they would defer to Ngai Te Rangi*
- *an updated AEE will be provided to Ngai te Rangi upon lodgement of consent but to date no specific cultural concerns have been raised*
- *Ngāti Pūkenga did not raised specific cultural concerns but were interested in compliance with BOPRC standards*

a) It is not clear whether engagement with Whareroa Marae has taken place. However, given the issues being experienced within the Mount Airshed, it is important that engagement with Whareroa Marae (in addition to engagement with their iwi and hapu – Ngai te Rangi and Ngati Kuku) takes place. Contact details for the marae are as follows: Joel Ngatuere whareroacollective@gmail.com.

b) It is important that the groups identified above understand that the existing plant will continue to operate at this location for the foreseeable future (at least 10 years given the requested consent term). Please confirm that the groups identified above are aware that the plant will continue to operate in this location for that duration.

c) The application document states that Ngāi Tukairangi and Ngāti Kuku were going to review and respond to the air quality report provided by Higgins to these parties. Can you please confirm the outcome of this and provide the response where it has been received?

In response to this question, HCL provides a response as follows:

a) As well as those parties consulted as part of the application preparation, HCL has consulted with representatives from Ngai Tukairangi and Ngati Kuku, who represent Whareroa marae. Accordingly, the following consultation has taken place since March 2020:

   - Ngāi Te Rangi – Was emailed on 16/11/2021, texted on 18/1/22, and emailed on 10/2/22. No response was received from Ngāi Te Rangi as a result of this contact. See response under b) below. See Appendix C for the further written consultation record with Ngāi Te Rangi.
   - Ngati Kuku – Two hui has been held with Ngati Kuku. Further detail of this hui is provided in b) and c) below.

b) All iwi and hapu have now been fully informed that a 10 year consent is being sought. Specifically, the following is reported:

   Waitaha

   No further action as Waitaha deferred their response to *Ngai Te Rangi and* HCL updated Waitaha of change in plans to only re-consent the existing asphalt plant on 25/03/2020.

   Ngai Te Rangi

   In an email sent 16/11/2021, HCL informed Ngāi Te Rangi of the proposal for a 10 year duration. No feedback has been received from Ngāi Te Rangi. See Appendix C for the further written consultation record with Ngāi Te Rangi.

   Ngāti Pūkenga

   In an email sent 16/11/2021, HCL informed Ngāti Pūkenga of the proposal for a 10 year duration. Ngāti Pūkenga acknowledged this approach and commended HCL for lowering the consented discharge limit. See Appendix C for the further written consultation record with Ngāti Pūkenga.

   Ngai Tukairangi Hapū, Ngāti Kuku Hapū Trust and Whareroa Marae

   Two hui has been held with these hapu. Further detail of this hui is provided in c) below. See Appendix C for the further written consultation record with Ngai Tukairangi Hapū, Ngāti Kuku Hapū Trust and Whareroa Marae.

c) As outlined above, HCL has been consulting with Ngāi Tukairangi and Ngāti Kuku, who represent Whareroa Marae. One element of this consultation has been to respond to recommendations made in a report provided by HCL, that was prepared by a consultant who is trusted to Ngāi Tukairangi and Ngāti Kuku. Higgins has been able to positively respond to many of these recommendations raised within this report and has presented this response to both Ngāi Tukairangi and Ngāti Kuku.

	Ecocific Recommendations	**HCL Response**
1	*To investigate and implement new alternatives to assess scrubber performance which can complement the 3 years emission report (e.g. ambient air testing, pressure differential, scrubber liquid solids content and scrubber liquid flow rate monitoring).*	The short-term duration is intended to provide HCL time to consider long-term options for the site. HCL propose to involve Ngāi Tukairangi and Ngāti Kuku on an ongoing basis. HCL will be resourcing data to support sufficient changes that are short term and long term.
2	*To add conditions in the proposed resource consent that will address new requirements from the Mount Maunganui airshed. These new requirements (e.g. amended emission rate and/or maximum production rate) should take in consideration business, cultural and environmental sustainability.*	HCL is proposing to lower the consented rate from 2.5kg/hr to 1.5kg/hr. HCL's goal is to mana enhance the taiao by reducing the consented rate and to engage with mana whenua.
3	*To list and provide guidelines in various management plans on the PPE available, when for example responding to environmental incidents.*	This has been implemented within HCL and the wider business.
4	*To undertake an air emission report on all volatile compounds and implement measures as required by the finding (e.g. SO_2, NOx, CO, CO_2, PAH, VOC).*	PDP has prepared this information and shared it with Ngāi Tukairangi and Ngāti Kuku. This demonstrates all trace contaminants are significantly less than relevant assessment criteria.
5	*To undertake air emission testing (e.g. particulate matter and gases) when the mixture for asphalt production is significantly modified.*	It is recommended that the annual testing occurs while batches of asphalt represent worst case emissions.
6	*To implement ambient air quality program to assess the efficacy of remediation measures, fugitive emissions, compliance, health and safety, and support environmental sustainability.*	HCL will undertake some ambient monitoring on-site to capture variability in operating and meteorological conditions. For HCL this will be valuable information to contribute towards the understanding of air quality in the Mount Airshed and can share this information with mana whenua.
7	*To record odour daily at the site boundary and directly downwind –*	HCL undertake daily odour observations and has installed a weather station to monitor and record weather conditions. Third party odour observations are being undertaken to validate findings and will be made available upon request by local key stakeholders i.e.: Mana whenua.
8	*To investigate the benefits to correlate control measures to weather conditions; for example increasing the use of water cart during strong wind -*	
9	*To notify any environmental and human health incidents within 7 days of the discovery and supported by a report including the following information in this written description:* o *the cause of the deviation;*	Higgins has implemented a SOP process that supports notifying and reporting any environmental and human health incidents within 7 days of the discovery.

	Ecocific Recommendations	**HCL Response**
	o *the exact dates of the period of the deviation, if the deviation has been corrected;*	
	o *whether or not the deviation has been corrected;*	
	o *the anticipated time by which the deviation is expected to be corrected, if not yet corrected; and*	
	o *steps taken or planned to reduce, eliminate, and prevent reoccurrence of the deviation -*	

Further to these recommendations, HCL has considered more broadly how relationships can be prioritised and mana enhanced for the hapu. Ngai Tukairangi has responded that the relationship is of utmost importance to them, and that engagement must be genuine, and must be heartfelt. HCL has committed to furthering this relationship.

During the hui with Ngati Kuku, they have expressed concern regarding air quality within the Mount airshed in general. There is acknowledgement that air quality effects are a cumulative issue and shared across many industrial stakeholders. However, Ngati Kuku seek air quality improvements with all stakeholders. HCL has previously demonstrated intent to improve through the upgrade of their asphalt plant and will continue to investigate options that improve their business in the near future. As such, consultation with Ngati Kuku is ongoing.

HCL will again be meeting with Ngai Tukairangi and Ngati Kuku at the Whareroa Marae to further this kōrero. Any feedback from that hui will be presented to BOPRC.

3.0 Limitations

This report has been prepared by PDP on the basis of information provided by HCL. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared by PDP on the specific instructions of HCL for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

Prepared by

Chris Bender

Service Leader – Air Quality

Simon Greening

Service Leader – Environmental Planning

Reviewed by

Deborah Ryan

Technical Director – Air Quality

Approved by

David Whitty

Technical Director – Environmental Management

Appendix A: Proposed Amended Consent Conditions

The mass discharge of particulate matter from the asphalt plant shall not exceed 1.5 ~~2.5~~ kg/hr.

Appendix B.1: Stack Emission Reports

CRL Ref: 03-31052-1

Date of Test: 7 March 2003

Company: Higgins Contractor BOP Ltd
P.O. Box 4473
Mt. Maunganui

Description of Plant Tested:

Asphalt Plant		
Firing System:	n/a	
Fuel:	Natural Gas	
Emission Control:	Bag House Filter	
Sampling Start Time:	11:27am	
Total Sampling Time	30	min
Productivity:	40	t/hr

Measurement standard:

American Standard ASTM D 3685-78 (Method A)

Conditions at Sample Plane:

Sample Point Location:	Stack	
Stack Diameter:	0.535	m
Sampling Points:	6	

Conditions of Gas at Sample Point:

Oxygen content (dry, vol):	10.7	%
Carbon dioxide content (dry, vol):	9.7	%
Carbon monoxide content (dry, vol):	172	ppm
Nitrogen content (dry, vol, by difference):	79.5	%
Gas moisture content (vol):	27.9	%
Oxygen content (wet, mass):	9.3	%
Carbon dioxide content (wet, mass):	11.6	%
Carbon monoxide content (wet, mass):	0	%
Nitrogen Content (wet, mass):	60.3	%
Gas Moisture Content (wet, mass):	18.8	%
Stack Gas Pressure:	102.6	kPa
Average Temperature:	65.8	°C
Stack Gas Density:	0.97	kg/m^3
Average gas velocity:	12.9	m/s
Dry gas volumetric flow rate:	6123.0	dsm^3/hr

Conditions of Sampling:

Sampling Method:	Cumulative Sampling	
Suction nozzle type:	Sharp-edged stainless steel nozzle	
Equipment Arrangement:	Water Removal Upstream of the Gas Meter	
Particulate Drying:	Washing with Acetone, drying in oven at 105°C	
Particulate Seperator:	Glass microfibre thimble filter with size 30mmX80mm	
Nozzle internal diameter:	4.97	mm
Leakage Tests:	Performed by R. Ermens	
Variation from isokinetic:	113.6	%
Sample time at each point:	5.0	min
Total sample time:	30	min
Gas meter reading start:	464.408	cu.m
Gas meter reading stop:	464.727	cu.m
Gas meter inlet temperature:	18.7	°C
Dry gas volume sampled:	0.30	dsm^3
Particulate matter collected:	27.8	mg

Results:

Actual Concentration of particulates:	**93**	**mg/dsm^3**
Concentration of particulates at 8%O2	**118**	**mg/cu.m**
Particulate matter emission rate:	**0.6**	**kg/hr**

Notes:

dsm^3 = dry standard cubic metre (273 K, 101.325 kPa)
All gas volumes are expressed at 273 K and 101.325 kPa.
Allowable variation from isokinetic conditions is 90 to 110%

CRL Ref: 03-31052-2

Date of Test: 7 March 2003

Company: Higgins Contractor BOP Ltd
P.O. Box 4473
Mt. Maunganui

Description of Plant Tested:

Asphalt Plant		
Firing System:	n/a	
Fuel:	Natural Gas	
Emission Control:	Bag House Filter	
Sampling Start Time:	12:13pm	
Total Sampling Time	20	min
Productivity:	40	t/hr

Measurement standard:

American Standard ASTM D 3685-78 (Method A)

Conditions at Sample Plane:

Sample Point Location:	Stack	
Stack Diameter:	0.535	m
Sampling Points:	4	

Conditions of Gas at Sample Point:

Oxygen content (dry, vol):	14.1	%
Carbon dioxide content (dry, vol):	6.5	%
Carbon monoxide content (dry, vol):	145	ppm
Nitrogen content (dry, vol, by difference):	79.4	%
Gas moisture content (vol):	6.7	%
Oxygen content (wet, mass):	14.6	%
Carbon dioxide content (wet, mass):	9.3	%
Carbon monoxide content (wet, mass):	0	%
Nitrogen Content (wet, mass):	71.9	%
Gas Moisture Content (wet, mass):	4.2	%
Stack Gas Pressure:	102.6	kPa
Average Temperature:	60.5	°C
Stack Gas Density:	1.07	kg/m^3
Average gas velocity:	9.0	m/s
Dry gas volumetric flow rate:	5646.6	dsm^3/hr

Conditions of Sampling:

Sampling Method:	Cumulative Sampling	
Suction nozzle type:	Sharp-edged stainless steel nozzle	
Equipment Arrangement:	Water Removal Upstream of the Gas Meter	
Particulate Drying:	Washing with Acetone, drying in oven at 105°C	
Particulate Seperator:	Glass microfibre thimble filter with size 30mmX80mm	
Nozzle internal diameter:	6.12	mm
Leakage Tests:	Performed by R. Ermens	
Variation from isokinetic:	91.2	%
Sample time at each point:	5.0	min
Total sample time:	20	min
Gas meter reading start:	464.727	cu.m
Gas meter reading stop:	464.968	cu.m
Gas meter inlet temperature:	21.0	°C
Dry gas volume sampled:	0.22	dsm^3
Particulate matter collected:	16.6	mg

Results:

Actual Concentration of particulates:	**74**	**mg/dsm^3**
Concentration of particulates at 8%O2	**139**	**mg/cu.m**
Particulate matter emission rate:	**0.4**	**kg/hr**

Notes:

dsm^3 = dry standard cubic metre (273 K, 101.325 kPa)
All gas volumes are expressed at 273 K and 101.325 kPa.
Allowable variation from isokinetic conditions is 90 to 110%

CRL Ref: 03-31052

Date of Test: 7-Mar-03

Company: Higgins Contractor BOP Ltd
P.O. Box 4473
Mt. Maunganui

Description of Plant Tested:

Asphalt Plant

Firing system:	n/a
Fuel:	Natural Gas
Sample point location:	Stack

Measurement standard:

American Standard ASTM D 3685-78 (Method A)

Conditions at Sample Point:

CRL Ref:	03-31052-1	03-31052-2	Average	
Average gas velocity:	12.9	9.0	**10.9**	m/s
Dry gas volumetric flow rate:	6123.0	5646.6	**5884.8**	dsm^3/hr
Variation from isokinetic:	113.6	91.2	**102.4**	%

Results:

Sample time minutes:	30	20	**25**	min
Dry gas volume sampled:	0.30	0.22	**0.26**	m^3
Particulate matter collected:	27.8	16.6	**22.2**	mg
Concentration of particulate matter:	93	74	**84**	**mg/dsm^3**
Corrected to 8% O2:	118	139	**128**	**mg/dsm^3**
Particulate matter emission rate:	0.6	0.4	**0.5**	**kg/hr**

Notes:

dsm3 = dry standard cubic metre (273 K, 101.325 kPa)
All gas volumes are expressed at 273 K and 101.325 kPa.
Allowable variation from isokinetic conditions is 90 to 110%

Appendix B.2: Stack Emission Reports

Tests indicated as not accredited are outside the scope of the laboratory's accreditation

PARTICULATE EMISSION REPORT: TOTAL SUSPENDED PARTICULATES (TSP)

Author(s):	**M Arnott**
CRL Ref:	**11-31508**
Consent Number:	**03 0087**
Client Name:	**Higgins And Sons Asphalt Plant**
Client Address:	**Higgins Contactors 92 Hewletts Road Mount Maunganui**
Date of Issue:	**9th February 2012**
Signature:	_____
Name & Designation:	**Maurice Arnott (NZCE) Environmental Scientist**
Approved:	_____
Name & Designation	**Steven Gale BSc (Hons) Environmental Officer**
Distribution: (other than client)	**Nil**

Contents:

Appendix

Introduction:

CRL Energy Ltd was commissioned by Higgins & Sons to perform particulate testing on the asphalt plant stack located at Tauranga. The purpose of the monitoring was to undertake the annual compliance testing as per discharge permit No. 03 0087

The asphalt plant has one emission source which is equipped with a wet scrubber for particulate emission control.

Maurice Arnott and Dylan Vernall of CRL Energy carried out three consecutive particulate tests on the 31st of January 2012.

Test Method:

The method employed was USEPA Method 5 – Determination of Particulate Matter Emissions From Stationary Sources.

The principal behind USEPA Method 5 involves positioning a sharp-edged nozzle into a duct ensuring that the nozzle orifice faces the moving gas stream. A sample of the gas flow is thus extracted isokinetically for a measured period of time. In order to obtain a representative measurement of the flue gas, samples are taken over a number of pre-selected positions in the stack cross-section. Particulate matter present in the sampled gas flow is then separated by a pre-weighed glass fibre filter, which, following the completion of sampling is dried and weighed. The concentration of particulate is then determined using the weighed particulate mass and the gas sample volume.

An S Type pitot tube connected to a digital manometer was employed to measure the stack gas velocity. At each traverse point the differential pressure was noted down along with the stack temperature and dry gas meter temperature. These measurements were used to determine sample rate at each traverse point (along with moisture), and the stack gas velocity.

Moisture was condensed and collected into Greenburg-Smith impingers. The impingers were weighed before and after each test to determine the percentage moisture in the stack.

The Particulate result is expressed as mg/m^3 on a dry gas basis and at STP (STP being 1 atm and 0 ºC). The result can be corrected for oxygen depending on air discharge resource consent requirements.

Factors That May Influence The Test:

In accordance with USEPA Method 5 an ideal particulate sampling location should be in a straight piece of duct with a constant shape and cross-sectional area. The sampling plane should also be located downstream and upstream from any obstruction that may cause a flow disturbance (minimum 2 diameters downstream and 0.5 diameter upstream). The point of sampling was >8 diameters downstream from an interference and >6 diameters upstream of the stack exit. It is also important to note that despite 2 sampling ports being present, only one sampling port was accessible and as a result only one sampling traverse was performed.

Plant Operating Conditions:

The Asphalt Plant is fired by diesel and was operating at normal operating conditions. A production load of 52 t/hr was maintained during all three tests. The mixture being produced during testing was 'AC 28' which included the addition of lime.

Discussion and Conclusion:

On the 31st January 2012 the concentration of particulate matter from the asphalt plant was above the Air Discharge Consent limit.

Higgins and Son's Air Discharge Consent states under Emission Limits and Controls that the total emissions of particulate matter from the stack of asphalt plant shall not exceed 250 mg/m^3 corrected to dry gas basis and STP (0^oC , one atmospheric pressure). Also the mass emission of particulate matter, from the asphalt plants stack shall not exceed 4.2 kg/hr.

Three consecutive particulate tests were carried out on the asphalt plant stack.

The particulate concentration for Test 1 was 386 mg/m^3 at STP (0 ^oC and 1 atm). The particulate emission rate was 4.2 kg/hr. Which is above the 250 mg/m3 consent limit but is within the mass emission limit of 4.2 kg/hr.

The particulate concentration for Test 2 was 360 mg/m^3 at STP (0 ^oC and 1 atm). The particulate emission rate was 4.0 kg/hr. Which is above the 250 mg/m3 consent limit but is within the mass emission limit of 4.2 kg/hr.

The particulate concentration for Test 3 was 431 mg/m^3 at STP (0 ^oC and 1 atm). The particulate emission rate was 4.6 kg/hr. Which is above the 250 mg/m3 consent limit and above the mass emission limit of 4.2 kg/hr.

The average particulate concentration for the three tests was 392 mg/m^3 and the average emission rate was 4.2 kg/hr. Which is above the 250 mg/m3 consent limit but is within the mass emission limit of 4.2 kg/hr.

CRL Reference:	11-31508	**Date of Test:**	31/01/2011	**Company:**	Higgins & Sons Tauranga
Description of Plant Tested:		**Test:**	1	**Fuel analysis:**	(as received basis)
Boiler:	Asphalt Plant			Moisture	N/A %
Product:	AC28			Ash	N/A %
Emission control:	Wet Scrubber			Calorific Value	N/A MJ/kg
Production Rate:	52 Ton/Hr			Type	Diesel

Measurement Standard:
USEPA Method 1 – Sample and velocity traverses for stationary sources.
USEPA Method 2 – Determination of stack gas velocity and volumetric flow rate (type S Pitot tube)
USEPA Method 3 – Gas Analysis for the determination of dry molecular weight
USEPA Method 4 – Determination of moisture content in stack gases
USEPA Method 5 – Determination of Particulate Matter Emissions From Stationary Sources.

Conditions at Sampling Plane:	See figures 1 & 2			Stack diameter/Duct dimensions:	0.720 m
Conditions of Gas at Sample Point:	% Dry (vol.)	% Wet (mass)		Sampling start time:	11:42
Oxygen content:	13.8	13.5	%	Stack gas pressure:	102.64 kPa
Carbon dioxide content *:	6.5	8.8	%	Average temperature:	59 °C
Carbon monoxide content *(ppm dry)* :	17	0.00	%	Stack gas density:	1.040 kg/m^3
Nitrogen content #:	79.7	68.6	%	Average gas velocity:	10.390 m/s
Gas moisture content:	14.1	9.1	%	Dry gas volumetric flow rate:	10,865 dsm^3/hr

Conditions of Sampling:				
Nozzle internal diameter:	6.19	mm	Sampling Method:	Cumulative sampling
Variation from isokinetic:	100.8	%	Suction nozzle type:	Sharp-edged stainless steel nozzle
Sample time at each point:	10	min	Equipment arrangement:	Water removal upstream of the gas meter
Total sample time:	60	min	Particulate drying :	Washing with Water, evaporating at clean ambient
Gas meter reading start:	1965.538	m^3		condition, drying in oven 105°C.
Gas meter reading stop:	1966.399	m^3	Particulate separator:	Circular 90mm glass microfibre filter
Gas meter static-pressure:	0	kpa	Leakage tests performed by:	DV MA
Gas meter inlet temperature:	26	°C		
Dry gas volume sampled:	0.810	dsm^3		
Particulate matter collected:	312	mg		

Results:

Actual concentration of particulate:	**386**	**mg/dsm^3**
Particulate matter emission rate:	**4.2**	**kg/hr**

Notes:
* CO_2 is calculated in accordance with $M(1-O_2/20.9)$ where M is the theoretical maximum CO_2 content for a given fuel when combusted with no excess air.
# dry N volume by difference
Allowable variation from isokinetic conditions is 90 to 110%
All gas volumes are expressed at 273 K and 101.325 kPa.
dsm^3 = dry standard cubic metre (273 K, 101.325 kPa)

CRL Energy Ltd

CRL Reference:	11-31508	**Date of Test:**	31/01/2012	**Company:**	Higgins & Sons Tauranga
Description of Plant Tested:		**Test:**	2	**Fuel analysis:**	(as received basis)
Boiler:	Asphalt Plant			Moisture	N/A %
Product:	AC28			Ash	N/A %
Emission control:	Wet Scrubber			Calorific Value	N/A MJ/kg
Production Rate:	52 Ton/Hr			Type	Diesel

Measurement Standard:
USEPA Method 1 – Sample and velocity traverses for stationary sources.
USEPA Method 2 – Determination of stack gas velocity and volumetric flow rate (type S Pitot tube)
USEPA Method 3 – Gas Analysis for the determination of dry molecular weight
USEPA Method 4 – Determination of moisture content in stack gases
USEPA Method 5 – Determination of Particulate Matter Emissions From Stationary Sources.

Conditions at Sampling Plane:	See figures 1 & 2			Stack diameter/Duct dimensions:	0.720 m
Conditions of Gas at Sample Point:	% Dry (vol.)	% Wet (mass)		Sampling start time:	12:53
Oxygen content:	13.6	13.3	%	Stack gas pressure:	102.64 kPa
Carbon dioxide content *:	6.7	9.0	%	Average temperature:	59 °C
Carbon monoxide content *(ppm dry)* :	*14*	0.00	%	Stack gas density:	1.039 kg/m^3
Nitrogen content #:	79.8	68.5	%	Average gas velocity:	10.542 m/s
Gas moisture content:	14.2	9.2	%	Dry gas volumetric flow rate:	11,001 dsm^3/hr

Conditions of Sampling:				
Nozzle internal diameter:	6.19	mm	Sampling Method:	Cumulative sampling
Variation from isokinetic:	101.7	%	Suction nozzle type:	Sharp-edged stainless steel nozzle
Sample time at each point:	10	min	Equipment arrangement:	Water removal upstream of the gas meter
Total sample time:	60	min	Particulate drying :	Washing with Water, evaporating at clean ambient condition, drying in oven 105°C.
Gas meter reading start:	1966.403	m^3		
Gas meter reading stop:	1967.292	m^3	Particulate separator:	Circular 90mm glass microfibre filter
Gas meter static-pressure:	0	kpa	Leakage tests performed by:	DV MA
Gas meter inlet temperature:	29	°C	**Results:**	
Dry gas volume sampled:	0.828	dsm^3	**Actual concentration of particulate:**	**360 mg/dsm^3**
Particulate matter collected:	297.4	mg	**Particulate matter emission rate:**	**4.0 kg/hr**

Notes:
* CO_2 is calculated in accordance with $M(1-O_2/20.9)$ where M is the theoretical maximum CO_2 content for a given fuel when combusted with no excess air.
# dry N volume by difference
Allowable variation from isokinetic conditions is 90 to 110%
All gas volumes are expressed at 273 K and 101.325 kPa.
dsm^3 = dry standard cubic metre (273 K, 101.325 kPa)

CRL Energy Ltd

CRL Reference:	11-31508	**Date of Test:**	31/01/2011	**Company:**	Higgins & Sons Tauranga
Description of Plant Tested:		**Test:**	3	**Fuel analysis:**	(as received basis)
Boiler:	Asphalt Plant			Moisture	N/A %
Product:	AC28			Ash	N/A %
Emission control:	Wet Scrubber			Calorific Value	N/A MJ/kg
Production Rate:	52 Ton/Hr			Type	Diesel

Measurement Standard:
USEPA Method 1 – Sample and velocity traverses for stationary sources.
USEPA Method 2 – Determination of stack gas velocity and volumetric flow rate (type S Pitot tube)
USEPA Method 3 – Gas Analysis for the determination of dry molecular weight
USEPA Method 4 – Determination of moisture content in stack gases
USEPA Method 5 – Determination of Particulate Matter Emissions From Stationary Sources.

Conditions at Sampling Plane:	See figures 1 & 2			Stack diameter/Duct dimensions:	0.720 m
Conditions of Gas at Sample Point:	% Dry (vol.)	% Wet (mass)		Sampling start time:	14:20
Oxygen content:	13.6	13.4	%	Stack gas pressure:	102.64 kPa
Carbon dioxide content *:	6.6	8.9	%	Average temperature:	59 °C
Carbon monoxide content *(ppm dry)* :	*13*	0.00	%	Stack gas density:	1.039 kg/m^3
Nitrogen content #:	79.8	68.5	%	Average gas velocity:	10.203 m/s
Gas moisture content:	14.4	9.2	%	Dry gas volumetric flow rate:	10,634 dsm^3/hr

Conditions of Sampling:				
Nozzle internal diameter:	6.19	mm	Sampling Method:	Cumulative sampling
Variation from isokinetic:	101.3	%	Suction nozzle type:	Sharp-edged stainless steel nozzle
Sample time at each point:	10	min	Equipment arrangement:	Water removal upstream of the gas meter
Total sample time:	60	min	Particulate drying :	Washing with Water, evaporating at clean ambient condition, drying in oven 105°C.
Gas meter reading start:	1967.295	m^3		
Gas meter reading stop:	1968.161	m^3	Particulate separator:	Circular 90mm glass microfibre filter
Gas meter static-pressure:	0	kpa	Leakage tests performed by:	DV MA
Gas meter inlet temperature:	32	°C	**Results:**	
Dry gas volume sampled:	0.797	dsm^3	**Actual concentration of particulate:**	**431 mg/dsm^3**
Particulate matter collected:	342	mg	**Particulate matter emission rate:**	**4.6 kg/hr**

Notes:
* CO_2 is calculated in accordance with $M(1-O_2/20.9)$ where M is the theoretical maximum CO_2 content for a given fuel when combusted with no excess air.
# dry N volume by difference
Allowable variation from isokinetic conditions is 90 to 110%
All gas volumes are expressed at 273 K and 101.325 kPa.
dsm^3 = dry standard cubic metre (273 K, 101.325 kPa)

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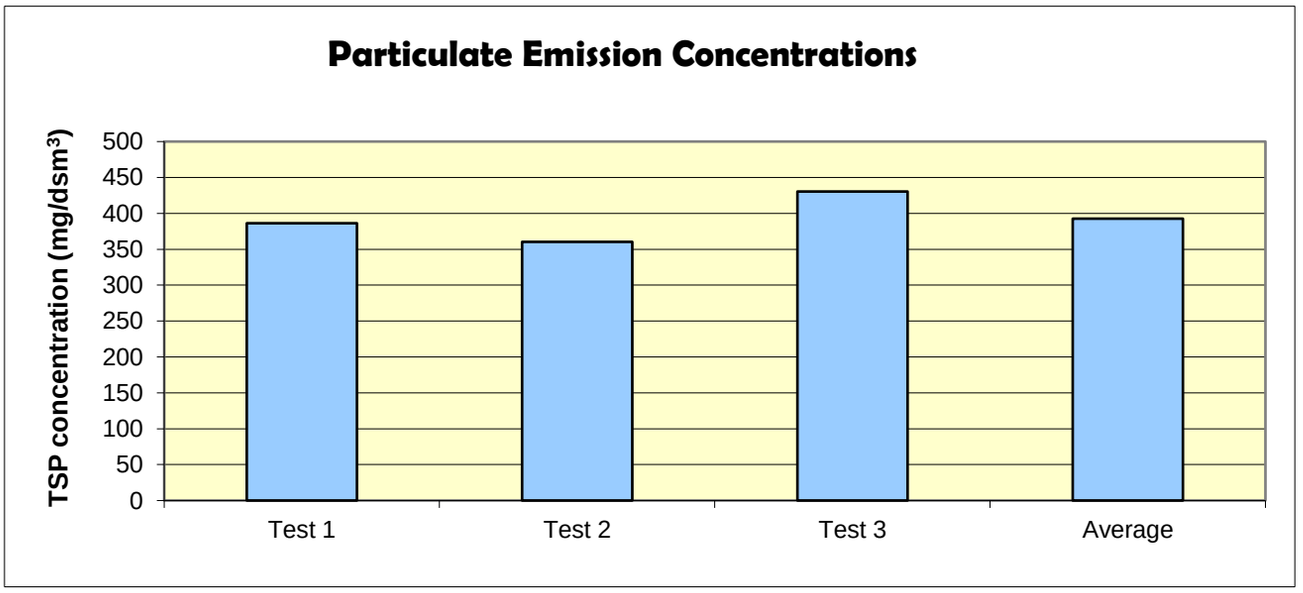
Summary Table

Higgins And Sons

	Test 1	Test 2	Test 3	Average	Units
Actual concentration of particulate:	386	360	431	392	mg/dsm^3
Particulate matter emission rate:	4.2	4.0	4.6	4.2	kg/hr



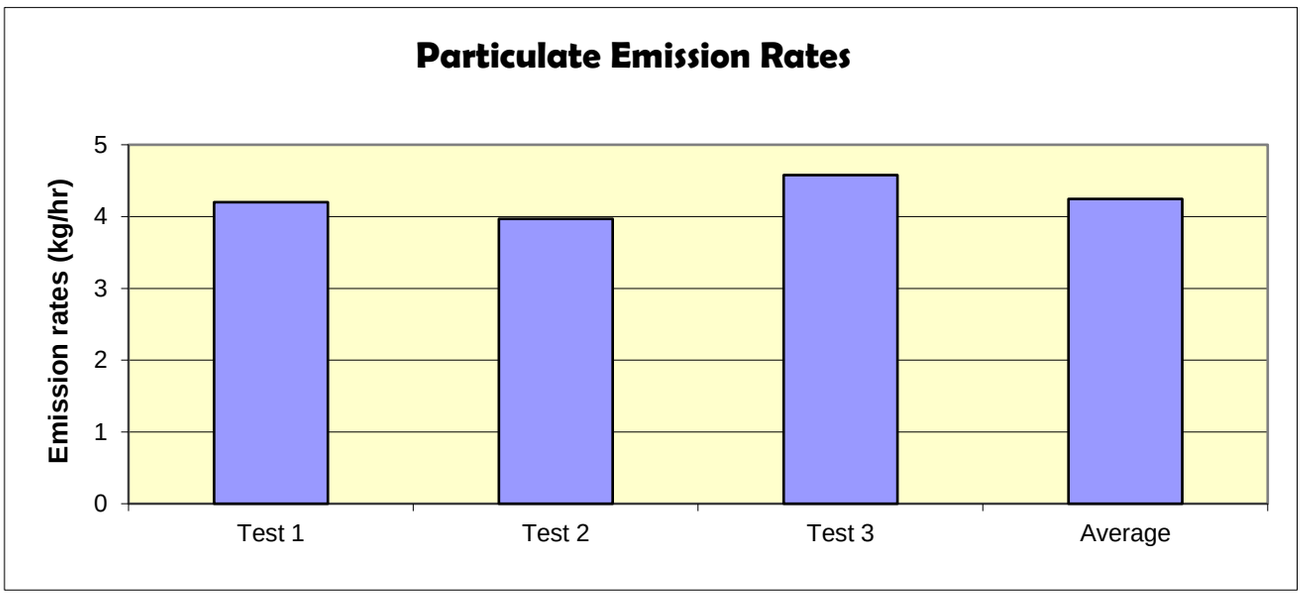


Figure 1: Sampling Location

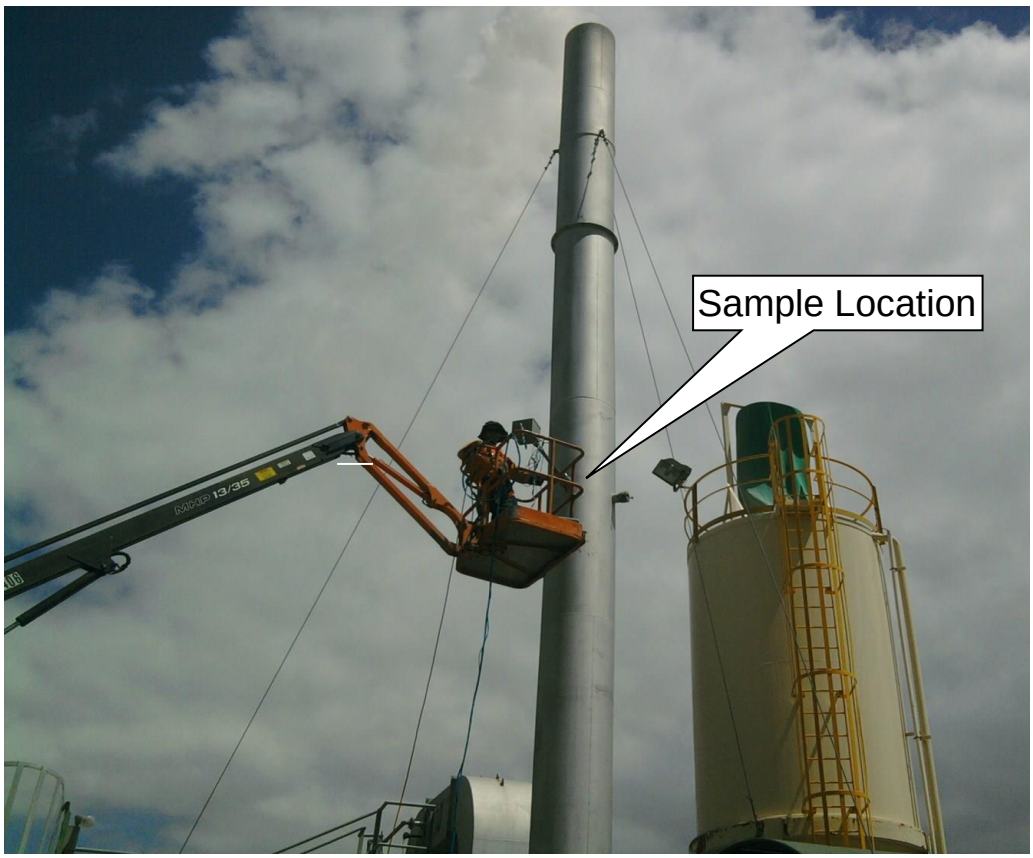


Figure 2: Sampling Plane.

Shape: Circular

Approximate diameters upstream from Interferences (after sampling point) >8

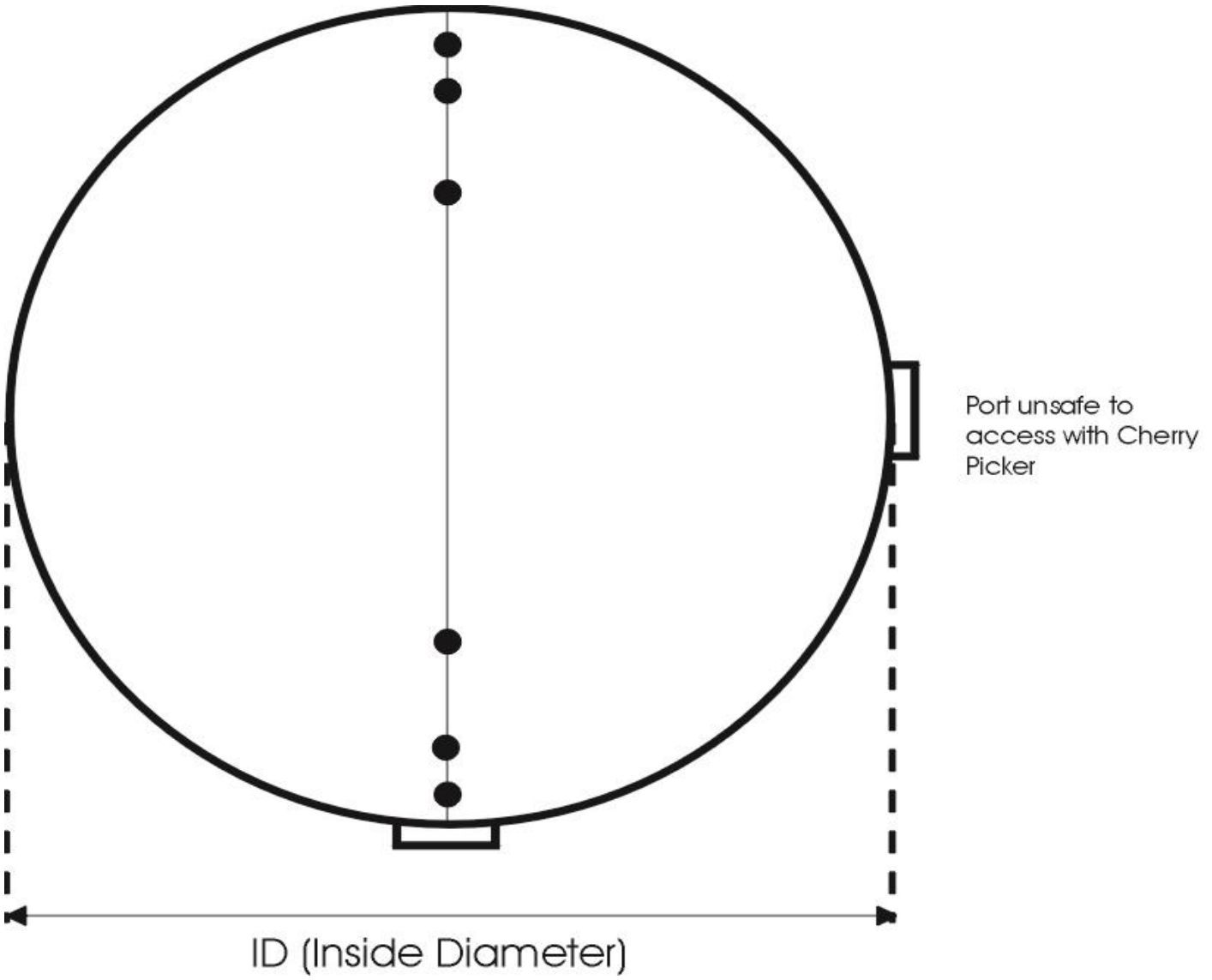
Approximate diameters downstream from Interferences (before sampling point) >6

This sampling point complies with the test method requirements

Inside Diameter (ID) of stack is 0.72 m

Stack orientation is vertical

Angle of gas flow is laminar



PARTICULATE EMISSIONS TEST SHEET

Test: 1

CRL Ref:	11-31508		Site:	Higgins & Sons Tauranga					
Traverse point	Time (min)	Sample point position (m)	Velocity pressure ("WG)	Rota-meter setting (l/min)	DGM temp (°C)	Stack temp (°C)	O_2 (%)	CO (ppm)	VAC (kPa)
1	10	0.032	0.31	**13.9**	25.1	58.1	13.7	13	-64
2	20	0.105	0.11	**8.3**	25.8	58.1	13.8	15	-58
3	30	0.213	0.09	**7.5**	25.8	59.6	13.8	14	-60
4	40	0.507	0.31	**13.9**	25.4	58.3	13.8	16	-72
5	50	0.615	0.75	**21.5**	25.4	59.3	13.8	22	-96
6	60	0.688	0.67	**20.3**	25.6	60.3	13.7	21	-98
AVERAGES			0.37	14.2	25.5	59.0	13.8	17	-75

Gas Meter START	1965.538	**Test Time**	(min)	60			
Gas Meter ½ way	n/a	**Static**	("WG)	0.18			
Gas Meter STOP	1966.399	**Nozzle ϕ**	(mm)	6.19			
Gas Meter Factor	1.016	**Stack ϕ**	(m)	0.72			
Leakage test by:	DV MA	**Duct**	(m)	d x w			
Pitot Constant	0.83	**Filter No.**		11-F52	**Mass (g)**	0.418	
Plant Description	Asphalt Plant						
Product	AC28	**Emission Control**		Wet Scrubber			
Production Load	52 Ton/Hr			**START**		**STOP**	
Date	31/01/2011	No. 1 (g)		766.0		823.1	
Start Time	11:42 AM	No. 2 (g)		763.5		807.9	
End Time	12:42 PM	No. 3 (g)		695.0		698.2	
FUEL		Silica (g)		1105.4		1107.3	
Moisture %	N/A	**Ash %**	N/A	**CV (MJ/kg)**	N/A	**Type**	Diesel
Assumed Duct Moisture %		16					

CRL Energy Ltd

PARTICULATE EMISSIONS TEST SHEET

Test: 2

CRL Ref:	11-31508	Site:	Higgins & Sons Tauranga					
Traverse point	Time (min)	Sample point position (m)	Velocity pressure ("WG)	Rota-meter setting (l/min)	DGM temp (°C)	Stack temp (°C)	O_2 (%)	CO (ppm)	VAC (kPa)
1	10	0.032	0.08	**7.1**	27.5	57.4	13.6	13	-58
2	20	0.105	0.24	**12.3**	27.6	57.2	13.5	13	-66
3	30	0.213	0.09	**7.5**	28.0	58.3	13.6	20	-62
4	40	0.507	0.48	**17.4**	29.2	60.1	13.6	12	-80
5	50	0.615	0.78	**22.2**	29.7	61.1	13.6	12	-100
6	60	0.688	0.69	**20.9**	30.0	60.6	13.6	12	-100
AVERAGES			0.393	14.6	28.7	59.1	13.6	14	-78

Gas Meter START	1966.403	**Test Time**	(min)	60	
Gas Meter ½ way	n/a	**Static**	("WG)	0.18	
Gas Meter STOP	1967.292	**Nozzle ϕ**	(mm)	6.19	
Gas Meter Factor	1.016	**Stack ϕ**	(m)	0.72	
Leakage test by:	DV MA	**Duct**	(m)	d x w	
Pitot Constant	0.83	**Filter No.**		11-F53	Mass (g) 0.4123
Plant Description	Asphalt Plant				
Product	AC28	**Emission Control**		Wet Scrubber	
Production Load	52 Ton/Hr			**START**	**STOP**
Date	31/01/2012	No. 1 (g)		823.1	882.0
Start Time	12:53 PM	No. 2 (g)		807.9	853.8
End Time	1:53 PM	No. 3 (g)		698.2	701.6
FUEL		Silica (g)		1107.3	1109.3
Moisture %	N/A **Ash %**	N/A	**CV (MJ/kg)**	N/A	**Type** Diesel
Assumed Duct Moisture %		16			

CRL Energy Ltd

PARTICULATE EMISSIONS TEST SHEET

Test: 3

CRL Ref:	11-31508	Site:	Higgins & Sons Tauranga

Traverse point	Time (min)	Sample point position (m)	Velocity pressure ("WG)	Rota-meter setting (l/min)	DGM temp (°C)	Stack temp (°C)	O_2 (%)	CO (ppm)	VAC (kPa)
1	10	0.032	0.42	**16.5**	31.9	57.2	13.6	11	-74
2	20	0.105	0.19	**11.1**	32.3	57.6	13.6	11	-66
3	30	0.213	0.09	**7.6**	31.6	58.3	13.6	13	-64
4	40	0.507	0.27	**13.2**	31.6	59.5	13.6	22	-74
5	50	0.615	0.40	**16.1**	33.5	60.6	13.6	11	-84
6	60	0.688	0.69	**21.1**	32.6	60.9	13.7	10	<-100
AVERAGES			0.34	14.3	32.3	59.0	13.6	13	-72

Gas Meter START	1967.295	**Test Time**	(min)	60	
Gas Meter ½ way	n/a	**Static**	("WG)	0.18	
Gas Meter STOP	1968.161	**Nozzle ϕ**	(mm)	6.19	
Gas Meter Factor	1.016	**Stack ϕ**	(m)	0.72	
Leakage test by:	DV MA	**Duct**	(m)	d x w	
Pitot Constant	0.83	**Filter No.**		11-F57	Mass (g) 0.4185
Plant Description	Asphalt Plant				
Product	AC28	**Emission Control**		Wet Scrubber	
Production Load	52 Ton/Hr			**START**	**STOP**
Date	31/01/2011	No. 1 (g)		882.0	939.4
Start Time	2:20 PM	No. 2 (g)		853.8	898.5
End Time	3:20 PM	No. 3 (g)		701.6	704.8
FUEL		Silica (g)		1109.3	1111.2
Moisture %	N/A **Ash %**	N/A	**CV (MJ/kg)**	N/A	**Type** Diesel
Assumed Duct Moisture %		16			

CRL Energy Ltd

Particulate Emissions Tests on the Tauranga Allied Asphalt Plant
Supplementary Information
CRL Report No: 11-31508

Sampling Plane: The stack exit is >8 diameters downstream of the sampling plane. The location of an upstream interference from the sampling plane is >6 diameters.

Angle of Gas Flow: Laminar

Leak Test: Carried out before each test by blocking off the air at the nozzle end and creating a vacuum of -80-90 Kpa within the sampling train for one minute. A drop in vacuum pressure, and a significant movement in the gas meter reading (0.6 litres) indicates a significant leak which must be rectified.

Test 1

Particulate Matter Collected		
Filter start weight	0.4180	g
Beaker start weight	108.6638	g
Filter & beaker stop weight	109.3013	g
Filter Gain	0.2195	g
Nozzle and fittings wash (beaker)	109.5859	g
Nozzle and fittings wash (beaker with residue)	109.6776	g
Nozzle Gain	0.0917	g
Nozzle and fittings blank (beaker)	111.8024	g
Nozzle and fittings blank (beaker with residue)	111.8016	g
Particulate matter collected	312.0	mg
Gas Parameters		
Stack gas density	1.040	kg/m3
Dry molecular weight	29.588	g/mol
Stack gas molecular weight	27.955	g/mol

Test 2

Particulate Matter Collected		
Filter start weight	0.4123	g
Beaker start weight	88.6976	g
Filter & beaker stop weight	89.3586	g
Filter Gain	0.2487	g
Nozzle and fittings wash (beaker)	99.6976	g
Nozzle and fittings wash (beaker with residue)	99.7455	g
Nozzle Gain	0.0479	g
Nozzle and fittings blank (beaker)	111.8024	g
Nozzle and fittings blank (beaker with residue)	111.8016	g
Particulate matter collected	297.4	mg
Gas Parameters		
Stack gas density	1.039	kg/m3
Dry molecular weight	29.609	g/mol
Stack gas molecular weight	27.957	g/mol

Test 3

Particulate Matter Collected		
Filter start weight	0.4185	g
Beaker start weight	90.5851	g
Filter & beaker stop weight	91.3003	g
Filter Gain	0.2967	g
Nozzle and fittings wash (beaker)	106.5343	g
Nozzle and fittings wash (beaker with residue)	106.5788	g
Nozzle Gain	0.0445	g
Nozzle and fittings blank (beaker)	111.8024	g
Nozzle and fittings blank (beaker with residue)	111.8016	g
Particulate matter collected	342.0	mg
Gas Parameters		
Stack gas density	1.039	kg/m3
Dry molecular weight	29.604	g/mol
Stack gas molecular weight	27.939	g/mol

Appendix B.3: Stack Emission Reports

Tests indicated as not accredited are outside the scope of the laboratory's accreditation

PARTICULATE EMISSION REPORT: TOTAL SUSPENDED PARTICULATES (TSP)

Author(s):	**S. Gale**
CRL Ref:	**12-31052**
Consent Number:	**03 0087**
Client Name:	**Higgins And Sons Asphalt Plant**
Client Address:	**Higgins Contactors 92 Hewletts Road Mount Maunganui**
Date of Issue:	**24 May 2012**
Signature:	_____
Name & Designation:	**Steven Gale BSc (Hons) Environmental Officer**
Approved:	_____
Name & Designation	**Maurice Arnott (NZCE) Environmental Officer**
Distribution: (other than client)	**Nil**

Contents:

Appendix

Introduction:

CRL Energy Ltd was commissioned by Higgins & Sons to perform particulate testing on the asphalt plant stack located at Mount Maunganui. The purpose of the monitoring was to undertake the annual compliance testing as per discharge permit No. 03 0087

The asphalt plant has one emission source which is equipped with a wet scrubber for particulate emission control.

Maurice Arnott and Steven Gale of CRL Energy carried out three consecutive particulate tests on the 18th of May 2012.

Test Method:

The method employed was USEPA Method 5 – Determination of Particulate Matter Emissions From Stationary Sources.

The principal behind USEPA Method 5 involves positioning a sharp-edged nozzle into a duct ensuring that the nozzle orifice faces the moving gas stream. A sample of the gas flow is thus extracted isokinetically for a measured period of time. In order to obtain a representative measurement of the flue gas, samples are taken over a number of pre-selected positions in the stack cross-section. Particulate matter present in the sampled gas flow is then separated by a pre-weighed glass fibre filter, which, following the completion of sampling is dried and weighed. The concentration of particulate is then determined using the weighed particulate mass and the gas sample volume.

An S Type pitot tube connected to a digital manometer was employed to measure the stack gas velocity. At each traverse point the differential pressure was recorded along with the stack temperature and dry gas meter temperature. These measurements were used to determine sample rate at each traverse point (along with moisture), and the stack gas velocity.

Moisture was condensed and collected into Greenburg-Smith impingers. The impingers were weighed before and after each test to determine the percentage moisture in the stack.

The Particulate result is expressed as mg/m^3 on a dry gas basis and at STP (STP being 1 atm and 0 ^oC).

Factors That May Influence The Test:

In accordance with USEPA Method 5 an ideal particulate sampling location should be in a straight piece of duct with a constant shape and cross-sectional area. The sampling plane should also be located downstream and upstream from any obstruction that may cause a flow disturbance (minimum 2 diameters downstream and 0.5 diameter upstream). The point of sampling was >8 diameters downstream from an interference and >6 diameters upstream of the stack exit. It is also important to note that despite 2 sampling ports being present, only one sampling port was accessible and as a result only one sampling traverse was performed.

Plant Operating Conditions:

The Asphalt Plant is fired by diesel and was operating at normal operating conditions. A production load of 40 t/hr was maintained during all three tests. The mixture being produced during testing was 'AC 28'.

Discussion and Conclusion:

On the 18th of May 2012 the concentration and mass emission of particulate matter from the asphalt plant was below the Air Discharge Consent limit.

Higgins and Son's Air Discharge Consent states under Emission Limits and Controls that the total emissions of particulate matter from the stack of the asphalt plant shall not exceed 250 mg/m^3 corrected to dry gas basis and STP (0^oC , one atmospheric pressure). Also the mass emission of particulate matter, from the asphalt plant stack shall not exceed 4.2 kg/hr.

Three consecutive particulate tests were carried out on the asphalt plant stack.

The particulate concentration for Test 1 was 94 mg/m^3 at STP ($0\ ^oC$ and 1 atm). The particulate emission rate was 0.8 kg/hr. Which are below the consent limits.

The particulate concentration for Test 2 was 105 mg/m^3 at STP ($0\ ^oC$ and 1 atm). The particulate emission rate was 0.9 kg/hr. Which are below the consent limits.

The particulate concentration for Test 3 was 110 mg/m^3 at STP ($0\ ^oC$ and 1 atm). The particulate emission rate was 1.0 kg/hr. Which are below the consent limits.

The average particulate concentration for the three tests was 103 mg/m^3 and the average emission rate was 0.9 kg/hr. Which are below the consent limits.

CRL Reference:	12-31052	**Date of Test:**	18-May-12	**Company:**	Higgins & Sons Tauranga
Description of Plant Tested:		**Test:**	1	**Fuel analysis:**	(as received basis)
Boiler:	Asphalt Plant			Moisture	N/A %
Product:	AC28			Ash	N/A %
Emission control:	Wet Scrubber			Calorific Value	N/A MJ/kg
Production Rate:	40 Ton/Hr			Type	Diesel

Measurement Standard:
USEPA Method 1 – Sample and velocity traverses for stationary sources
USEPA Method 2 – Determination of stack gas velocity and volumetric flow rate (type S Pitot tube)
USEPA Method 3 – Gas Analysis for the determination of dry molecular weight
USEPA Method 4 – Determination of moisture content in stack gases
USEPA Method 5 – Determination of Particulate Matter Emissions From Stationary Sources

Conditions at Sampling Plane:	See figures 1 & 2			Stack diameter/Duct dimensions:	0.720 m
Conditions of Gas at Sample Point:	% Dry (vol.)	% Wet (mass)		Sampling start time:	6:33
Oxygen content:	12.7	12.4	%	Stack gas pressure:	101.15 kPa
Carbon dioxide content *:	7.5	10.1	%	Average temperature:	55 °C
Carbon monoxide content *(ppm dry)* :	15	0.00	%	Stack gas density:	1.040 kg/m^3
Nitrogen content #:	79.8	68.5	%	Average gas velocity:	8.131 m/s
Gas moisture content:	14.0	9.0	%	Dry gas volumetric flow rate:	8,484 dsm^3/hr

Conditions of Sampling:				
Nozzle internal diameter:	6.17	mm	Sampling Method:	Cumulative sampling
Variation from isokinetic:	95.9	%	Suction nozzle type:	Sharp-edged stainless steel nozzle
Sample time at each point:	10	min	Equipment arrangement:	Water removal upstream of the gas meter
Total sample time:	60	min	Particulate drying :	Washing with Water, evaporating at clean ambient
Gas meter reading start:	2034.562	m^3		condition, drying in oven 105°C.
Gas meter reading stop:	2035.202	m^3	Particulate separator:	Circular 90mm glass microfibre filter
Gas meter static-pressure:	0	kpa	Leakage tests performed by:	SG MA
Gas meter inlet temperature:	14	°C	**Results:**	
Dry gas volume sampled:	0.598	dsm^3	**Actual concentration of particulate:**	**94** **mg/dsm^3**
Particulate matter collected:	56.2	mg	**Particulate matter emission rate:**	**0.8** **kg/hr**

Notes:
* CO_2 is calculated in accordance with $M(1-O_2/20.9)$ where M is the theoretical maximum CO_2 content for a given fuel when combusted with no excess air.
# dry N volume by difference
Allowable variation from isokinetic conditions is 90 to 110%
All gas volumes are expressed at 273 K and 101.325 kPa.
dsm^3 = dry standard cubic metre (273 K, 101.325 kPa)

CRL Energy Ltd

CRL Reference:	12-31052	**Date of Test:**	18-May-12	**Company:**	Higgins & Sons Tauranga
Description of Plant Tested:		**Test:**	2	**Fuel analysis:**	(as received basis)
Boiler:	Asphalt Plant			Moisture	N/A %
Product:	AC28			Ash	N/A %
Emission control:	Wet Scrubber			Calorific Value	N/A MJ/kg
Production Rate:	40 Ton/Hr			Type	Diesel

Measurement Standard:
USEPA Method 1 – Sample and velocity traverses for stationary sources
USEPA Method 2 – Determination of stack gas velocity and volumetric flow rate (type S Pitot tube)
USEPA Method 3 – Gas Analysis for the determination of dry molecular weight
USEPA Method 4 – Determination of moisture content in stack gases
USEPA Method 5 – Determination of Particulate Matter Emissions From Stationary Sources

Conditions at Sampling Plane:	See figures 1 & 2			Stack diameter/Duct dimensions:	0.720 m
Conditions of Gas at Sample Point:	% Dry (vol.)	% Wet (mass)		Sampling start time:	7:42
Oxygen content:	12.6	12.4	%	Stack gas pressure:	101.15 kPa
Carbon dioxide content *:	7.5	10.1	%	Average temperature:	55 °C
Carbon monoxide content *(ppm dry)* :	*30*	0.00	%	Stack gas density:	1.041 kg/m^3
Nitrogen content #:	79.8	68.5	%	Average gas velocity:	8.272 m/s
Gas moisture content:	14.1	9.0	%	Dry gas volumetric flow rate:	8,632 dsm^3/hr

Conditions of Sampling:				
Nozzle internal diameter:	6.17	mm	Sampling Method:	Cumulative sampling
Variation from isokinetic:	95.6	%	Suction nozzle type:	Sharp-edged stainless steel nozzle
Sample time at each point:	10	min	Equipment arrangement:	Water removal upstream of the gas meter
Total sample time:	60	min	Particulate drying :	Washing with Water, evaporating at clean ambient condition, drying in oven 105°C.
Gas meter reading start:	2035.209	m^3		
Gas meter reading stop:	2035.861	m^3	Particulate separator:	Circular 90mm glass microfibre filter
Gas meter static-pressure:	0	kpa	Leakage tests performed by:	SG MA
Gas meter inlet temperature:	16	°C		
Dry gas volume sampled:	0.607	dsm^3		
Particulate matter collected:	63.4	mg		

Results:

Actual concentration of particulate:	**105**	**mg/dsm^3**
Particulate matter emission rate:	**0.9**	**kg/hr**

Notes:

* CO_2 is calculated in accordance with $M(1-O_2/20.9)$ where M is the theoretical maximum CO_2 content for a given fuel when combusted with no excess air.

dry N volume by difference

Allowable variation from isokinetic conditions is 90 to 110%

All gas volumes are expressed at 273 K and 101.325 kPa.

dsm^3 = dry standard cubic metre (273 K, 101.325 kPa)

CRL Energy Ltd

CRL Reference:	12-31052	**Date of Test:**	18-May-12	**Company:**	Higgins & Sons Tauranga
Description of Plant Tested:		**Test:**	3	**Fuel analysis:**	(as received basis)
Boiler:	Asphalt Plant			Moisture	N/A %
Product:	AC28			Ash	N/A %
Emission control:	Wet Scrubber			Calorific Value	N/A MJ/kg
Production Rate:	40 Ton/Hr			Type	Diesel

Measurement Standard:

USEPA Method 1 – Sample and velocity traverses for stationary sources
USEPA Method 2 – Determination of stack gas velocity and volumetric flow rate (type S Pitot tube)
USEPA Method 3 – Gas Analysis for the determination of dry molecular weight
USEPA Method 4 – Determination of moisture content in stack gases
USEPA Method 5 – Determination of Particulate Matter Emissions From Stationary Sources

Conditions at Sampling Plane:	See figures 1 & 2			Stack diameter/Duct dimensions:	0.720 m
Conditions of Gas at Sample Point:	% Dry (vol.)	% Wet (mass)		Sampling start time:	8:52
Oxygen content:	12.6	12.4	%	Stack gas pressure:	101.15 kPa
Carbon dioxide content *:	7.5	10.1	%	Average temperature:	56 °C
Carbon monoxide content *(ppm dry)* :	*32*	0.00	%	Stack gas density:	1.039 kg/m^3
Nitrogen content #:	79.8	68.4	%	Average gas velocity:	8.351 m/s
Gas moisture content:	14.1	9.0	%	Dry gas volumetric flow rate:	8,692 dsm^3/hr

Conditions of Sampling:				
Nozzle internal diameter:	6.17	mm	Sampling Method:	Cumulative sampling
Variation from isokinetic:	95.5	%	Suction nozzle type:	Sharp-edged stainless steel nozzle
Sample time at each point:	10	min	Equipment arrangement:	Water removal upstream of the gas meter
Total sample time:	60	min	Particulate drying :	Washing with Water, evaporating at clean ambient condition, drying in oven 105°C.
Gas meter reading start:	2035.870	m^3		
Gas meter reading stop:	2036.528	m^3	Particulate separator:	Circular 90mm glass microfibre filter
Gas meter static-pressure:	0	kpa	Leakage tests performed by:	SG MA
Gas meter inlet temperature:	17	°C		
Dry gas volume sampled:	0.610	dsm^3		
Particulate matter collected:	66.6	mg		

Results:

Actual concentration of particulate:	**110**	**mg/dsm^3**
Particulate matter emission rate:	**1.0**	**kg/hr**

Notes:

* CO_2 is calculated in accordance with $M(1-O_2/20.9)$ where M is the theoretical maximum CO_2 content for a given fuel when combusted with no excess air.

dry N volume by difference

Allowable variation from isokinetic conditions is 90 to 110%

All gas volumes are expressed at 273 K and 101.325 kPa.

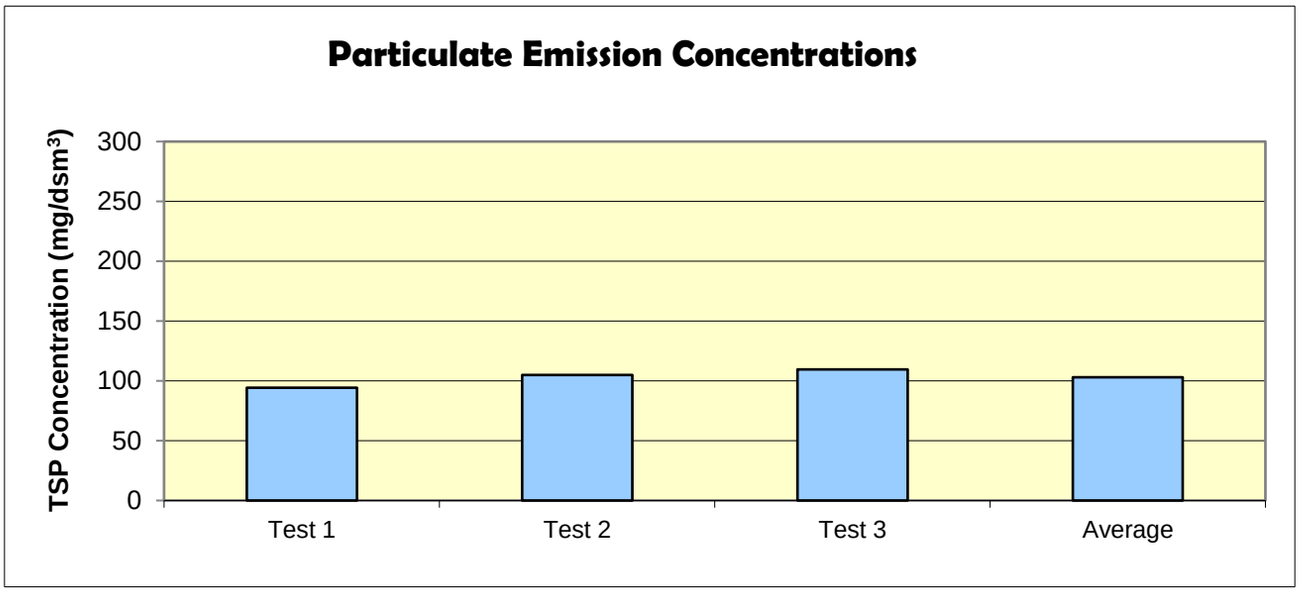
dsm^3 = dry standard cubic metre (273 K, 101.325 kPa)

CRL Energy Ltd

Summary Table

Higgins And Sons

	Test 1	Test 2	Test 3	Average	Units
Actual concentration of particulate:	94	105	110	103	mg/dsm^3
Particulate matter emission rate:	0.8	0.9	1.0	0.9	kg/hr



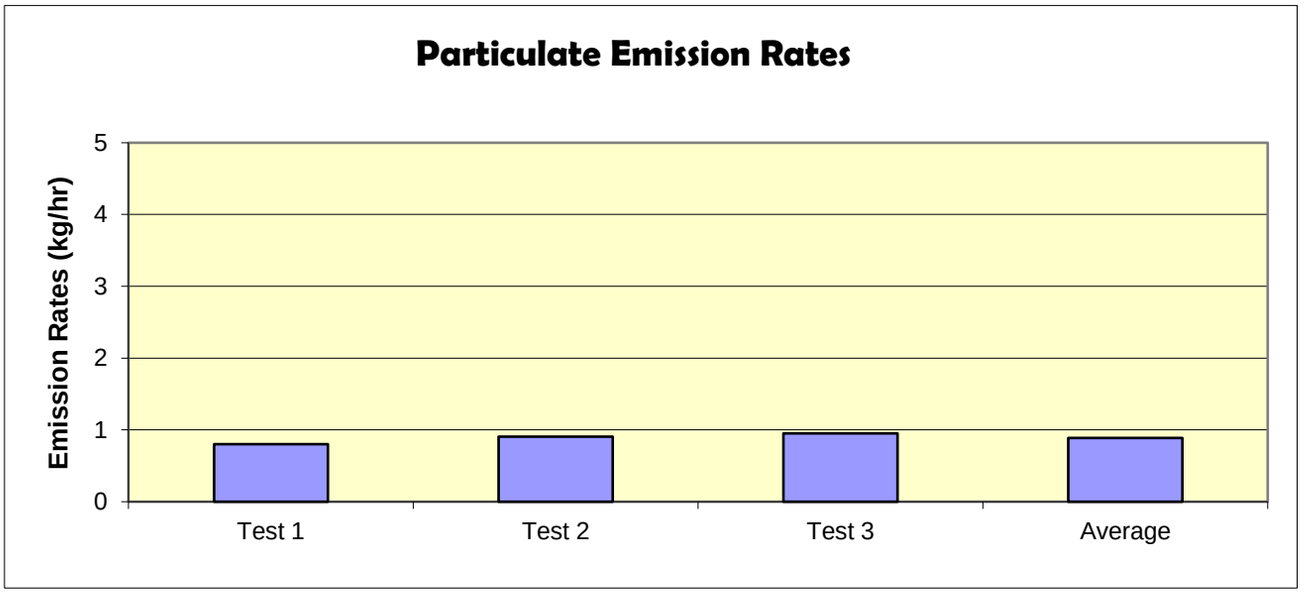


Figure 1: Sampling Location

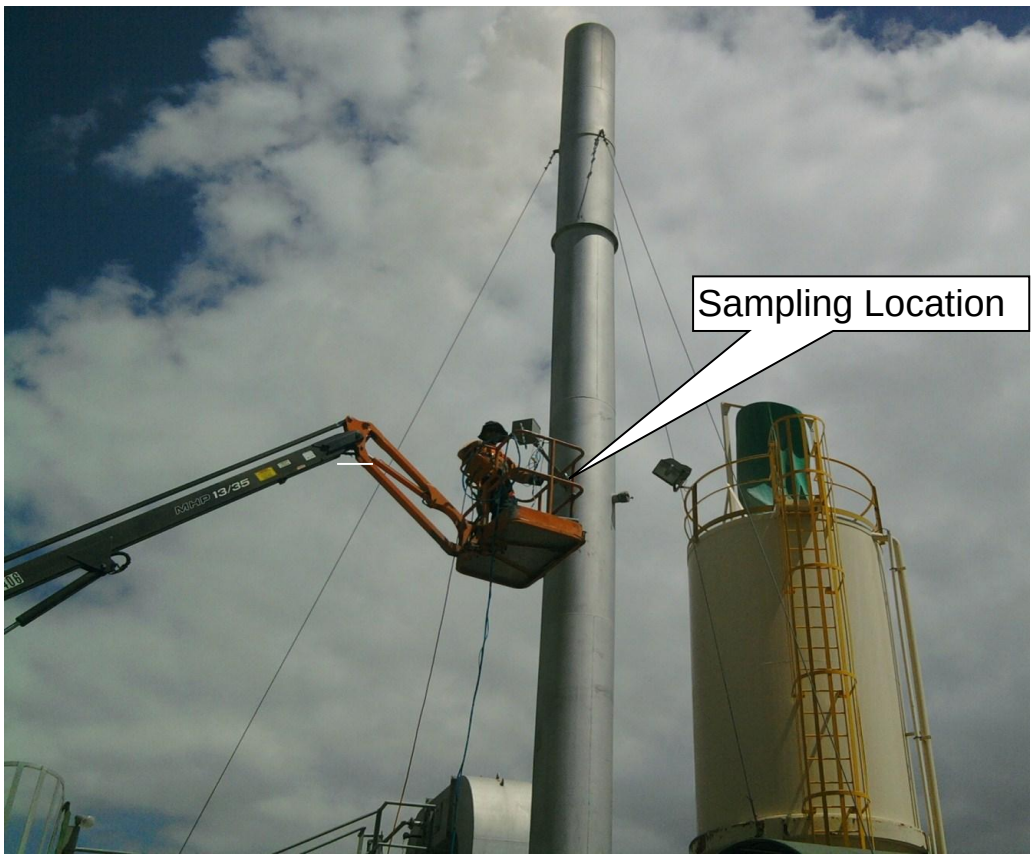


Figure 2: Sampling Plane

Shape: Circular

Approximate diameters upstream from Interferences (after sampling point) >8

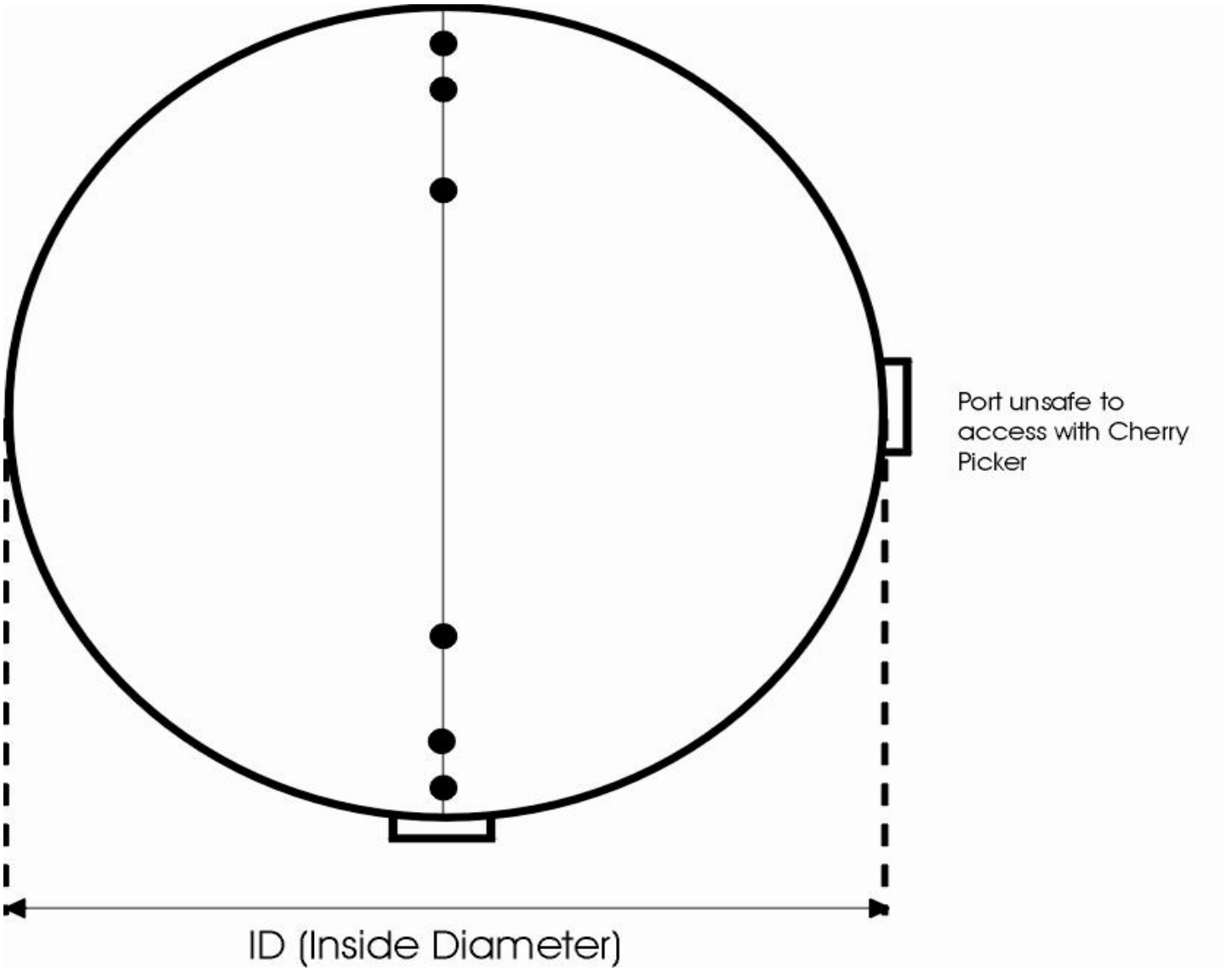
Approximate diameters downstream from Interferences (before sampling point) >6

This sampling point complies with the test method requirements

Inside Diameter (ID) of stack is 0.72 m

Stack orientation is vertical

Angle of gas flow is <20º



PARTICULATE EMISSIONS TEST SHEET

Test: 1

CRL Ref:	12-31052	Site:	Higgins & Sons Tauranga

Traverse point	Time (min)	Sample point position (m)	Velocity pressure ("WG)	Rota-meter setting (l/min)	DGM temp (°C)	Stack temp (°C)	O_2 (%)	CO (ppm)	VAC (kPa)
1	10	0.032	0.13	**9.0**	14.1	53.4	13.4	20	-60
2	20	0.105	0.12	**8.7**	14.4	53.7	12.8	11	-58
3	30	0.213	0.17	**10.3**	14.4	55.1	12.7	12	-64
4	40	0.507	0.18	**10.6**	14.3	55.7	12.5	13	-64
5	50	0.615	0.30	**13.6**	14.3	56.6	12.4	9	-68
6	60	0.688	0.25	**12.4**	14.3	56.5	12.3	22	-68
AVERAGES			0.19	10.8	14.3	55.2	12.7	15	-64

Gas Meter START	2034.562	**Test Time**	(min)	60	
Gas Meter ½ way	n/a	**Static**	("WG)	-0.21	
Gas Meter STOP	2035.202	**Nozzle ϕ**	(mm)	6.17	
Gas Meter Factor	0.985	**Stack ϕ**	(m)	0.72	
Leakage test by:	SG MA	**Duct**	(m)	d x w	
Pitot Constant	0.86	**Filter No.**		12-F18	**Mass (g)** 0.4600
Plant Description	Asphalt Plant				
Product	AC28	**Emission Control**		Wet Scrubber	
Production Load	40 Ton/Hr			**START**	**STOP**
Date	May 18, 2012	No. 1 (g)		740.1	741.0
Start Time	6:33 a.m.	No. 2 (g)		763.7	838.2
End Time	7:33 a.m.	No. 3 (g)		701.3	701.7
FUEL		Silica (g)		1050.5	1052.9
Moisture %	N/A **Ash %**	N/A	**CV (MJ/kg)**	N/A	**Type** Diesel
Assumed Duct Moisture %		16			

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PARTICULATE EMISSIONS TEST SHEET

Test: 2

CRL Ref:	12-31052		Site:	Higgins & Sons Tauranga					
Traverse point	Time (min)	Sample point position (m)	Velocity pressure ("WG)	Rota-meter setting (l/min)	DGM temp (°C)	Stack temp (°C)	O_2 (%)	CO (ppm)	VAC (kPa)
1	10	0.032	0.12	**8.7**	16.0	54.0	12.5	13	-62
2	20	0.105	0.13	**9.0**	15.5	54.7	12.4	26	-64
3	30	0.213	0.18	**10.6**	15.4	55.0	12.4	30	-66
4	40	0.507	0.21	**11.5**	15.5	55.8	12.5	45	-68
5	50	0.615	0.30	**13.7**	15.5	55.2	13.1	48	-70
6	60	0.688	0.25	**12.5**	15.8	54.8	12.9	17	-68
AVERAGES			0.198	11.0	15.6	54.9	12.6	30	-66

Gas Meter START	2035.209	**Test Time**	(min)	60	
Gas Meter ½ way	n/a	**Static**	("WG)	-0.21	
Gas Meter STOP	2035.861	**Nozzle ϕ**	(mm)	6.17	
Gas Meter Factor	0.985	**Stack ϕ**	(m)	0.72	
Leakage test by:	SG MA	**Duct**	(m)	d x w	
Pitot Constant	0.86	**Filter No.**		12-F20	Mass (g) 0.4630
Plant Description	Asphalt Plant				
Product	AC28	**Emission Control**		Wet Scrubber	
Production Load	40 Ton/Hr			**START**	**STOP**
Date	May 18, 2012	No. 1 (g)		741.0	742.0
Start Time	7:42 a.m.	No. 2 (g)		838.2	914.1
End Time	8:42 a.m.	No. 3 (g)		701.7	702.0
FUEL		Silica (g)		1052.9	1055.4
Moisture %	N/A **Ash %**	N/A	**CV (MJ/kg)**	N/A	**Type** Diesel
Assumed Duct Moisture %		16			

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PARTICULATE EMISSIONS TEST SHEET

Test: 3

CRL Ref:	12-31052		Site:	Higgins & Sons Tauranga					
Traverse point	Time (min)	Sample point position (m)	Velocity pressure ("WG)	Rota-meter setting (l/min)	DGM temp (°C)	Stack temp (°C)	O_2 (%)	CO (ppm)	VAC (kPa)
1	10	0.032	0.13	**9.1**	16.5	54.4	12.8	12	-62
2	20	0.105	0.15	**9.7**	16.5	54.9	12.6	12	-64
3	30	0.213	0.19	**10.9**	16.5	55.7	12.5	11	-66
4	40	0.507	0.20	**11.2**	16.6	56.8	12.3	26	-68
5	50	0.615	0.29	**13.5**	16.8	56.1	12.8	65	-70
6	60	0.688	0.24	**12.3**	17.0	55.6	12.7	68	-68
AVERAGES			0.20	11.1	16.7	55.6	12.6	32	-66

Gas Meter START	2035.870	**Test Time (min)**	60
Gas Meter ½ way	n/a	**Static ("WG)**	-0.21
Gas Meter STOP	2036.528	**Nozzle ϕ (mm)**	6.17
Gas Meter Factor	0.985	**Stack ϕ (m)**	0.72
Leakage test by:	SG MA	**Duct (m)**	d x w
Pitot Constant	0.86	**Filter No.**	12-F19 **Mass (g)** 0.4603
Plant Description	Asphalt Plant		
Product	AC28	**Emission Control**	Wet Scrubber
Production Load	40 Ton/Hr		

CRL Energy Ltd

Date	May 18, 2012		No. 1 (g)	742.0		742.9	
Start Time	8:52 a.m.		No. 2 (g)	914.1		990.7	
End Time	9:52 a.m.		No. 3 (g)	702.0		702.4	
FUEL			Silica (g)	1055.4		1057.9	
Moisture %	N/A	**Ash %**	N/A	**CV (MJ/kg)**	N/A	**Type**	Diesel
Assumed Duct Moisture %			16				

Supplementary Information
CRL Report No: 12-31052

Sampling Plane: The stack exit is >8 diameters downstream of the sampling plane. The location of an upstream interference from the sampling plane is >6 diameters.

Angle of Gas Flow: <20º

Leak Test: Carried out before each test by blocking off the air at the nozzle end and creating a vacuum of -80-90 Kpa within the sampling train for one minute. A drop in vacuum pressure, and a significant movement in the gas meter reading (0.6 litres) indicates a significant leak which must be rectified.

Test 1

Particulate Matter Collected		
Filter start weight	0.4600	g
Beaker start weight	86.3586	g
Filter & beaker stop weight	86.8671	g
Filter Gain	0.0485	g
Nozzle and fittings wash (beaker)	112.2250	g
Nozzle and fittings wash (beaker with residue)	112.2324	g
Nozzle Gain	0.0074	g
Nozzle and fittings blank (beaker)	93.4762	g
Nozzle and fittings blank (beaker with residue)	93.4759	g
Particulate matter collected	56.2	mg
Gas Parameters		
Stack gas density	1.040	kg/m3
Dry molecular weight	29.702	g/mol
Stack gas molecular weight	28.064	g/mol

Test 2

Particulate Matter Collected		
Filter start weight	0.4630	g
Beaker start weight	96.2583	g
Filter & beaker stop weight	96.7763	g
Filter Gain	0.0550	g
Nozzle and fittings wash (beaker)	94.6625	g
Nozzle and fittings wash (beaker with residue)	94.6706	g
Nozzle Gain	0.0081	g
Nozzle and fittings blank (beaker)	93.4762	g
Nozzle and fittings blank (beaker with residue)	93.4759	g
Particulate matter collected	63.4	mg
Gas Parameters		
Stack gas density	1.041	kg/m3
Dry molecular weight	29.708	g/mol
Stack gas molecular weight	28.061	g/mol

Test 3

Particulate Matter Collected		
Filter start weight	0.4603	g
Beaker start weight	99.8945	g
Filter & beaker stop weight	100.4115	g
Filter Gain	0.0567	g
Nozzle and fittings wash (beaker)	110.7709	g
Nozzle and fittings wash (beaker with residue)	110.7805	g
Nozzle Gain	0.0096	g
Nozzle and fittings blank (beaker)	93.4762	g
Nozzle and fittings blank (beaker with residue)	93.4759	g
Particulate matter collected	66.6	mg
Gas Parameters		
Stack gas density	1.039	kg/m3
Dry molecular weight	29.710	g/mol
Stack gas molecular weight	28.058	g/mol

Appendix B.4: Stack Emission Reports

IANZ
ACCREDITED LABORATORY
All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

PARTICULATE EMISSION REPORT:

TOTAL SUSPENDED PARTICULATES (TSP)

Asphalt Plant

Author(s):	**D.Howie**
CRL Ref:	**18-32424**
Consent Number:	**63317**
Client Name:	**Higgins and Sons**
Client Address:	**Higgins Contactors 92 Hewletts Road Mount Maunganui**
Date of Issue:	**18 July 2018**
Signature:	
Name & Designation:	**Daniel Howie BSc Environmental Officer**
Approved:	
Name & Designation:	**Nathan Frost BSc (Tech) Environmental Officer**
Distribution: (other than client)	Nil

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Contents:

Appendix

Particulate Emission Report
Higgins and Sons

CRL Energy Ltd

Introduction

CRL Energy was engaged by Higgins and Sons to perform particulate testing on the Asphalt Plant. The purpose of the monitoring was to satisfy the conditions of Resource Consent 63317. Testing was carried out on the 19th December 2017.

Methodology

The method employed for the test was USEPA Method 5 – Determination of Particulate Matter Emissions From Stationary Sources which included USEPA Methods 1 - 4. These methods are accredited by IANZ under CRL Hamilton's scope of accreditation.

In deviation from USEPA Method 1 only one sampling traverse was made and the sampling interval at each point increased due to safety being compromised in accessing the second sampling port from the cherry picker.

Results

Higgin's Discharge Consent states under Emission Limits and Controls that; “5.4 The permit holder shall ensure that the total emissions of particulate matter from the asphalt plant stack do not exceed 250 mg/m³ corrected to 0°C, dry gas basis, and one atmospheric pressure.”

"5.5 The mass discharge of particle matter from the asphalt plant shall not exceed 2.5 kg/hr."

The results are within the air discharge limits set out by the resource consent. The average particulate concentration and emission rate from testing, as well as the resource consent limit are summarised below:

Actual concentration of particulate matter	113	mg/dsm^3
Resource Consent concentration limit	250	mg/dsm^3
Particulate matter emission rate	1.0	kg/hr
Resource Consent emission rate limit	2.5	kg/hr

Test 1 Summary

Site	Higgins and Sons	CRL Ref	18-32424	Date of Test	19 December 2017

Plant Description			**Fuel Analysis** (as received basis)		
Plant Description	Asphalt Plant		Moisture:	n/a	%
Product	n/a		Ash:	n/a	%
Emission Control	Wet Scrubber		Calorific Value:	n/a	MJ/kg
Load	n/a		Type:	n/a	
Stack Diameter:	0.720	m			

Method Details

Measurement Standard:	USEPA Method 5: Determination of Particulate Matter Emissions From Stationary Sources which included USEPA Methods 1 - 4
Sampling Method:	Cumulative sampling
Suction Nozzle Type:	Sharp-edged stainless steel nozzle
Equipment Arrangement:	Water removal upstream of the gas meter
Particulate Drying:	Washing with Acetone, evaporating at clean ambient condition, drying in oven at 105°C
Particulate Separator:	Glass microfiber flat filter (90mm)
Leakage Tests Performed By:	BK TR

Sampling Start Time: 9:36 a.m. Total Sample Time: 60 mins Sample Time at Each Point: 10 mins

Stack Gas Conditions at Sample Point			**Conditions of Sampling**		
Stack Gas Pressure:	102.75	kPa	Nozzle Internal Diameter:	7.56	mm
Stack Gas Density:	1.051	kg/m^3	Isokinetics:	99.5	%
Average Temperature:	54.8	°C	Gas Meter START Reading:	249.805	m^3
Average Velocity:	8.0	m/s	Gas Meter STOP Reading:	250.793	m^3
Dry Gas Volumetric Flow Rate:	8431	dsm^3/hr	Gas Meter Static Pressure:	-0.15	kPa
			Gas Meter Inlet Temperature:	23.6	°C
For conditions at the sampling plane see figures 1 & 2			Dry Gas Volume Sampled:	0.926	dsm^3
			Particulate Matter Collected:	116.70	mg

Gas Composition at Sample Point

	% Dry (vol.)	% Wet (mass)	
Oxygen content[#]:	13.9	13.6	%
Carbon Dioxide content*:	6.4	8.6	%
Carbon Monoxide content (*ppm dry*)[#]:	*71.0*	*0.01*	%
Nitrogen content[#]:	79.7	68.3	%
Gas Moisture content:	14.7	9.5	%

Results

Actual Concentration of Particulates:	**126**	**mg/dsm^3**
Particulate Matter Emission Rate:	**1.1**	**kg/hr**

Notes

* CO_2 is calculated in accordance with $M(1-O_2/20.9)$ where M is the theoretical maximum CO_2 content for a given fuel when combusted with no excess air.

[#] These values are not measured and typical of non combustion processes

Allowable variation from isokinetic conditions is 90 to 110%

All gas volumes are expressed at 273 K and 101.325 kPa.

dsm^3 = dry standard cubic metre (273 K, 101.325 kPa)

Test 2 Summary

Site	Higgins and Sons	CRL Ref	18-32424	Date of Test	19 December 2017

Plant Description			**Fuel Analysis** (as received basis)		
Plant Description	Asphalt Plant		Moisture:	n/a	%
Product	n/a		Ash:	n/a	%
Emission Control	Wet Scrubber		Calorific Value:	n/a	MJ/kg
Load	n/a		Type:	n/a	
Stack Diameter:	0.720	m			

Method Details

Measurement Standard:	USEPA Method 5: Determination of Particulate Matter Emissions From Stationary Sources which included USEPA Methods 1 - 4
Sampling Method:	Cumulative sampling
Suction Nozzle Type:	Sharp-edged stainless steel nozzle
Equipment Arrangement:	Water removal upstream of the gas meter
Particulate Drying:	Washing with Acetone, evaporating at clean ambient condition, drying in oven at 105°C
Particulate Separator:	Glass microfiber flat filter (90mm)
Leakage Tests Performed By:	BK TR

Sampling Start Time: 10:49 a.m. Total Sample Time: 60 mins Sample Time at Each Point: 10 mins

Stack Gas Conditions at Sample Point			**Conditions of Sampling**		
Stack Gas Pressure:	102.75	kPa	Nozzle Internal Diameter:	7.56	mm
Stack Gas Density:	1.034	kg/m^3	Isokinetics:	99.7	%
Average Temperature:	58.7	°C	Gas Meter START Reading:	250.801	m^3
Average Velocity:	9.4	m/s	Gas Meter STOP Reading:	251.950	m^3
Dry Gas Volumetric Flow Rate:	9727	dsm^3/hr	Gas Meter Static Pressure:	-0.15	kPa
			Gas Meter Inlet Temperature:	25.7	°C
For conditions at the sampling plane see figures 1 & 2			Dry Gas Volume Sampled:	1.070	dsm^3
			Particulate Matter Collected:	106.60	mg

Gas Composition at Sample Point

	% Dry (vol.)	% Wet (mass)	
Oxygen content[#]:	15.3	15.0	%
Carbon Dioxide content*:	5.1	6.9	%
Carbon Monoxide content (*ppm dry*)[#]:	*58.0*	*0.00*	%
Nitrogen content[#]:	79.6	68.5	%
Gas Moisture content:	14.8	9.6	%

Results

Actual Concentration of Particulates:	**100**	**mg/dsm^3**
Particulate Matter Emission Rate:	**1.0**	**kg/hr**

Notes

* CO_2 is calculated in accordance with $M(1-O_2/20.9)$ where M is the theoretical maximum CO_2 content for a given fuel when combusted with no excess air.

[#] These values are not measured and typical of non combustion processes

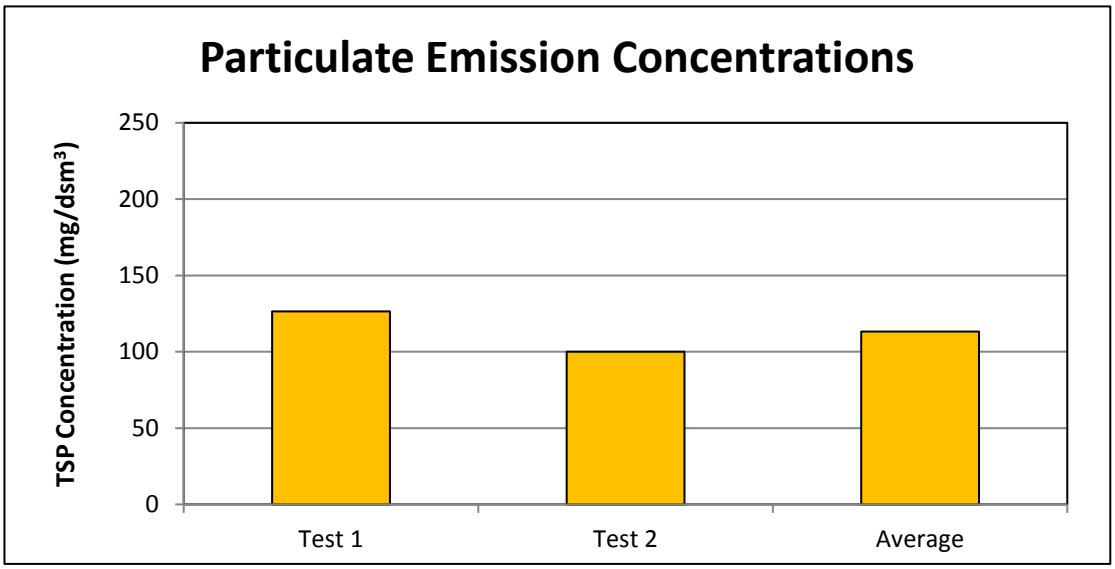
Allowable variation from isokinetic conditions is 90 to 110%

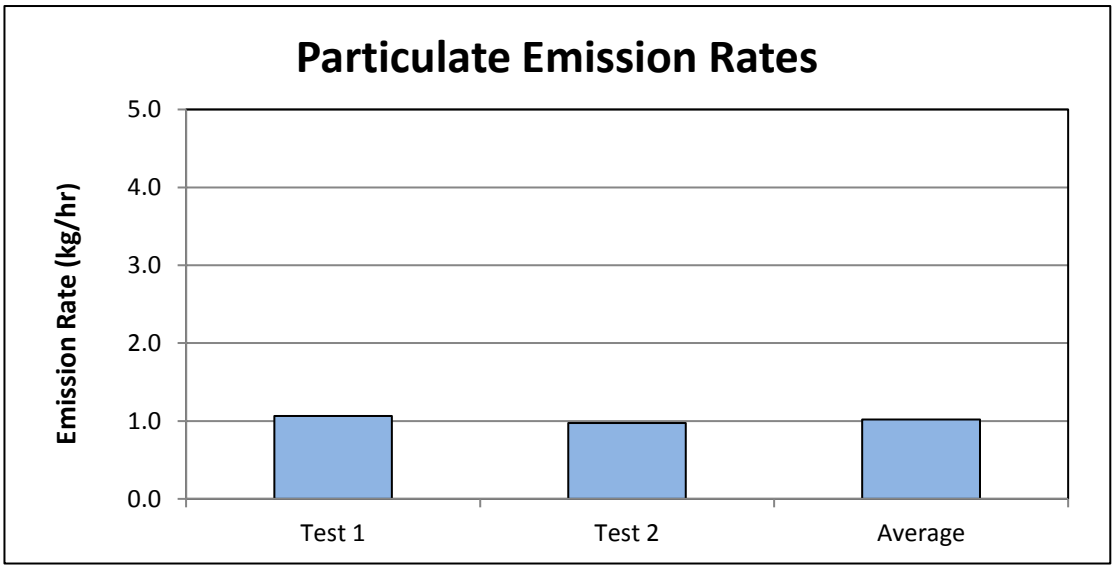
All gas volumes are expressed at 273 K and 101.325 kPa.

dsm^3 = dry standard cubic metre (273 K, 101.325 kPa)

Summary of Data
Asphalt Plant

	Test 1	Test 2	Average	Units
Actual concentration of particulates:	126	100	113	mg/dsm^3
Particulate matter emission rate:	1.1	1.0	1.0	kg/hr





Figures

Shape: Circular
Approximate diameters upstream from interferences (after sampling point): 8
Approximate diameters downstream from interferences (before sampling point): 6
Inside Diameter (ID) of stack: 0.72m
Stack orientation is vertical
No of sampling traverses :1
Angle of gas flow <20°

Figure 1

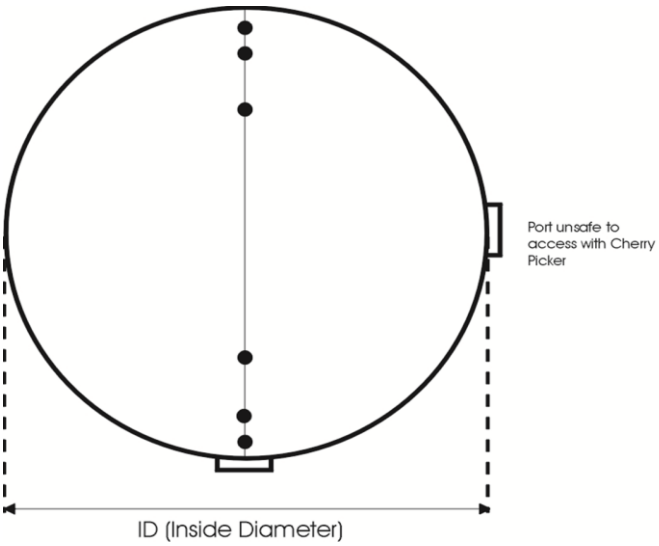


Figure 2

PARTICULATE EMISSIONS TEST SHEET

Test 1

CRL Energy Ltd

CRL Ref	18-32424		Site	Higgins and Sons					
Traverse Point	Time (min)	Sample Point (m)	Velocity Pressure ("WG)	Rota-meter Setting (l/min)	DGM Temp (°C)	Stack Temp (°C)	O_2 (%)	CO (ppm)	VAC (kPa)
1	10	0.032	0.12	13.1	22.5	55	13.8	57	-16
2	20	0.105	0.11	12.6	23.0	55	13.9	63	-16
3	30	0.213	0.07	10.1	23.7	55	13.9	71	-14
4	40	0.507	0.19	16.6	23.6	55	13.9	75	-18
5	50	0.615	0.36	22.8	24.3	55	13.9	73	-26
6	60	0.688	0.38	23.5	24.7	55	13.9	87	-26
Averages			0.21	16.4	23.6	55	13.9	71	-19

Plant Description	Asphalt Plant	Test Date	19 December 2017
Product	n/a	Start Time	9:36 a.m.
Emission Control	Wet Scrubber	End Time	10:36 a.m.
Load	n/a	Test Time	60

GAS METER		LEAK TEST		
Start (m^3)	249.805	Test done by	BK TR	
Half Way (m^3)	250.164		Start (m^3)	Stop (m^3)
Stop (m^3)	250.793	Pre	249.8016	249.8018
Factor	1.003	Post	250.7960	250.7962

GENERAL DETAILS			
Pitot Constant	0.85	Filter No.	17-F33
Static ("WG)	-0.60	Filter Mass (g)	0.3250
Atmos Press (hPa)	1029.0	Asmd Duct Moisture %	16
Nozzle ϕ (mm)	7.56	Balance Check (+/-)	399.4
Stack ϕ (m)	0.720	Duct (d x w)	x

FUEL DETAILS		IMPINGER WEIGHTS		
Moisture %	n/a		Start	Stop
Ash %	n/a	No. 1 (g)	760.2	853.9
CV (MJ/kg)	n/a	No. 2 (g)	705.9	737.8
Fuel Type	n/a	No. 3 (g)	664.9	667.2
Fuel Composition	Diesel	Silica (g)	1093.0	1092.8

EQUIPMENT DETAILS					
Pitot ID	EW185	Nozzle ID	EW136		
Gas Meter ID	EW169	Barometer ID	EW70		
Reader ID	EW105	Balance ID	EW39		
Thermo ID	EW86	Manometer ID	EW179		
Testo ID	EW165	4th Impinger Temp start	8.4	stop	9

Appendix 1

PARTICULATE EMISSIONS TEST SHEET

Test 2

CRL Energy Ltd

CRL Ref	18-32424		Site	Higgins and Sons					
Traverse Point	Time (min)	Sample Point (m)	Velocity Pressure ("WG)	Rota-meter Setting (l/min)	DGM Temp (°C)	Stack Temp (°C)	O_2 (%)	CO (ppm)	VAC (kPa)
1	10	0.032	0.23	18.2	25.0	58	15.4	56	-18
2	20	0.105	0.16	15.2	25.3	59	15.3	72	-22
3	30	0.213	0.12	13.2	25.7	59	15.3	55	-22
4	40	0.507	0.38	23.5	25.8	59	15.3	57	-26
5	50	0.615	0.37	23.2	25.9	59	15.2	55	-30
6	60	0.688	0.31	21.3	26.4	59	15.2	53	-30
Averages			0.26	19.1	25.7	59	15.3	58	-25

Plant Description	Asphalt Plant	Test Date	19 December 2017
Product	n/a	Start Time	10:49 a.m.
Emission Control	Wet Scrubber	End Time	11:49 a.m.
Load	n/a	Test Time	60

GAS METER		LEAK TEST		
Start (m^3)	250.801	Test done by	BK TR	
Half Way (m^3)	251.271		Start (m^3)	Stop (m^3)
Stop (m^3)	251.950	Pre	250.7992	250.7994
Factor	1.003	Post	251.9536	251.9538

GENERAL DETAILS			
Pitot Constant	0.85	Filter No.	17-F35
Static ("WG)	-0.60	Filter Mass (g)	0.3316
Atmos Press (hPa)	1029.0	Asmd Duct Moisture %	16
Nozzle ϕ (mm)	7.56	Balance Check (+/-)	399.4
Stack ϕ (m)	0.720	Duct (d x w)	x

FUEL DETAILS		IMPINGER WEIGHTS		
Moisture %	n/a		Start	Stop
Ash %	n/a	No. 1 (g)	853.9	962.9
CV (MJ/kg)	n/a	No. 2 (g)	737.8	775.0
Fuel Type	n/a	No. 3 (g)	667.2	669.8
Fuel Composition	Diesel	Silica (g)	1092.8	1092.6

EQUIPMENT DETAILS					
Pitot ID	EW185	Nozzle ID	EW136		
Gas Meter ID	EW169	Barometer ID	EW70		
Reader ID	EW105	Balance ID	EW39		
Thermo ID	EW86	Manometer ID	EW179		
Testo ID	EW165	4th Impinger Temp start	8.5	stop	8.7

Appendix 2

Supplementary Information

Asphalt Plant

CRL Report No: **18-32424**

Leak Test Criteria:	A leak test is carried out before and after each test by blocking off the air at the inlet of the sampling train and creating a vacuum of -80-90 Kpa within the sampling train for one minute. Leakage rates in excess of 0.00057 m^3/min, are unacceptable. Leak test data is found in the test sheets.

Particulate Matter Collected	**Units**	**Test 1**	**Test 2**
Filter start weight	g	0.3250	0.3316
Beaker start weight	g	119.5315	112.2266
Filter & beaker stop weight (corrected to blank)	g	119.9394	112.6324
Filter gain	g	0.0829	0.0742
Nozzle and fittings wash (beaker)	g	104.4615	110.3058
Nozzle and fittings wash (beaker with residue)	g	104.4948	110.3377
Nozzle gain	g	0.0333	0.0319
Nozzle and fittings blank (beaker)	g	121.5867	121.5867
Nozzle and fittings blank (beaker with residue)	g	121.5862	121.5862
Blank gain/loss	g	-0.0005	-0.0005
Gas Parameters			
Stack gas density	kg/m^3	1.051	1.034
Dry molecular weight	g/mol	29.576	29.428
Stack gas molecular weight	g/mol	27.879	27.742

Appendix B.5: Stack Emission Reports

Higgins Contractors Limited
Bay of Plenty

AIR DISCHARGE MONITORING OF THE HOT MIX ASPHALT PLANT, MARCH 2022

Issue

March 2022

Higgins Contractors Limited
Bay of Plenty

AIR DISCHARGE MONITORING OF THE HOT MIX ASPHALT PLANT, MARCH 2022

Issue

February 2022

Source Testing New Zealand Ltd
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Document history and status

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Approved by

Name	Title	Signature
Matthew Newby, CAQP	Senior Air Quality Scientist	

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Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Contents

Executive Summary

Source Testing New Zealand Limited (STNZ) was commissioned by Higgins Contractors Limited, Bay of Plenty (BoP) to undertake particulate air discharge monitoring of the Drum Hot Mix Asphalt Plant located at their Mt Maunganui depot.

The objective of the monitoring was to assess compliance with the Company's Resource Consent (63317). Condition 5.4 of the Resource Consent sets a discharge limit of 250 mg/m^3 for particulate matter adjusted to 0^{o}C, 101.3 kPa, and dry gas basis. Condition 5.5 states the mass emission of particulate matter shall not exceed 2.5 kg/hr. Condition 6 requires the permit holder to undertake stack testing for particulate matter from the asphalt plant in accordance with ASTM D 3685-90 (Method a) (or any other equivalent method approved by the Chief executive of the Regional Council or delegate) when requested.

Table 1 summarises the results of the air discharge monitoring performed on 1 March 2022.

Table 1: Results Summary, 1 March 2022

Parameter	Range	Average Result	Consent Limit
Total Particulate Matter (mg/m^3)[1]	53.1 – 90.0	73.1	250
Total Particulate Matter (kg/hr)	0.510 – 0.806	0.663	2.5
Odour Concentration (OU)[2,4]	16,782 – 24,679	21,289	
Odour Emission Rate (OU/s)[2,4]	45,740 – 67,265	58,025	
Oxygen (%)[4]	15.0 – 15.2	15.1	
Carbon Dioxide (%)[4]	4.1 – 4.3	4.2	
Carbon Monoxide (ppmv) [3,4]	54 - 61	58	
Oxides of Nitrogen (ppmv)[3,4]	54.1 – 61.0	57.9	

1. Corrected to 0 ^{o}C, 101.3 kPa, dry gas basis.
2. Corrected to 25 ^{o}C, 101.3 kPa, dry gas basis
3. parts per million by volume
4. The above data is beyond the scope of STNZ's IANZ accreditation

All three test results were below the particulate discharge limit of 250 mg/Sm^3 as stipulated in Condition 5.4 and less than the mass emission rate of 2.5 kg/hr as stipulated in Condition 5.5 of the Company's Resource Consent.

The description of the samples provided by the odour panellist was Strong Chemical (gasoline like).

1. Introduction

Source Testing New Zealand Limited (STNZ) was commissioned by Higgins Contractors Limited, Bay of Plenty (BoP) to undertake particulate air discharge monitoring of the Drum Hot Mix Asphalt Plant located at their Mt Maunganui depot.

The objective of the monitoring was to assess compliance with the Company's Resource Consent (63317). Condition 5.4 of the resource consent sets a discharge limit of 250 mg/m^3 for particulate matter adjusted to 0^{o}C, 101.3 kPa, and dry gas basis. Condition 5.5 states the mass emission of particulate matter shall not exceed 2.5 kg/hr. Condition 6 requires the permit holder to undertake stack testing for particulate matter from the asphalt plant in accordance with ASTM D 3685-90 (Method a) (or any other equivalent method approved by the Chief executive of the Regional Council or delegate) when requested.

In addition to the particulate compliance monitoring, Higgins requested samples also be collected for odour analysis.

Matthew Newby, Senior Air Quality Scientist, performed the testing on 1 March 2022. Matthew has 25 year's air quality monitoring experience and is designated as a Key Technical Person under STNZ's IANZ accreditation. Matthew is also a Certified Air Quality Professional (CAQP) under the Clean Air Society of Australia and New Zealand (CASANZ) certification programme.

This report presents the results of the air discharge monitoring and relates these to the Company's Resource Consent.

2. Sampling Methodologies

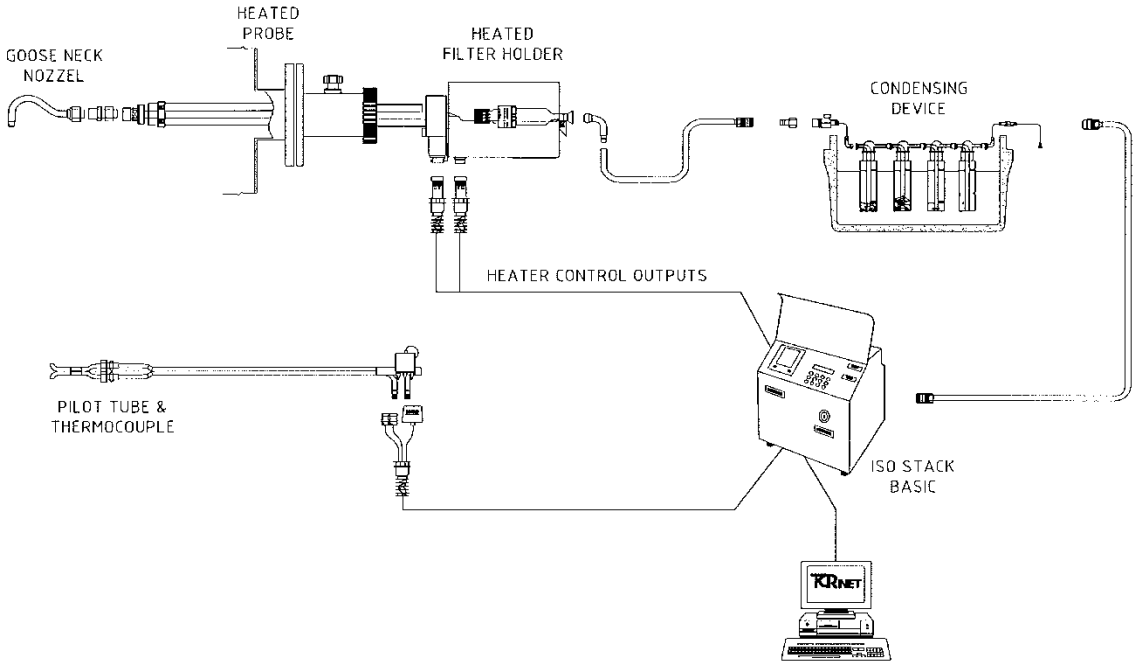
2.1 Isokinetic Stack Sampling Train

STNZ uses a Tecora G4 Stack Sampling Train for isokinetic source sampling as depicted in Figures 1 and 2. The Tecora G4 console incorporates the following components:

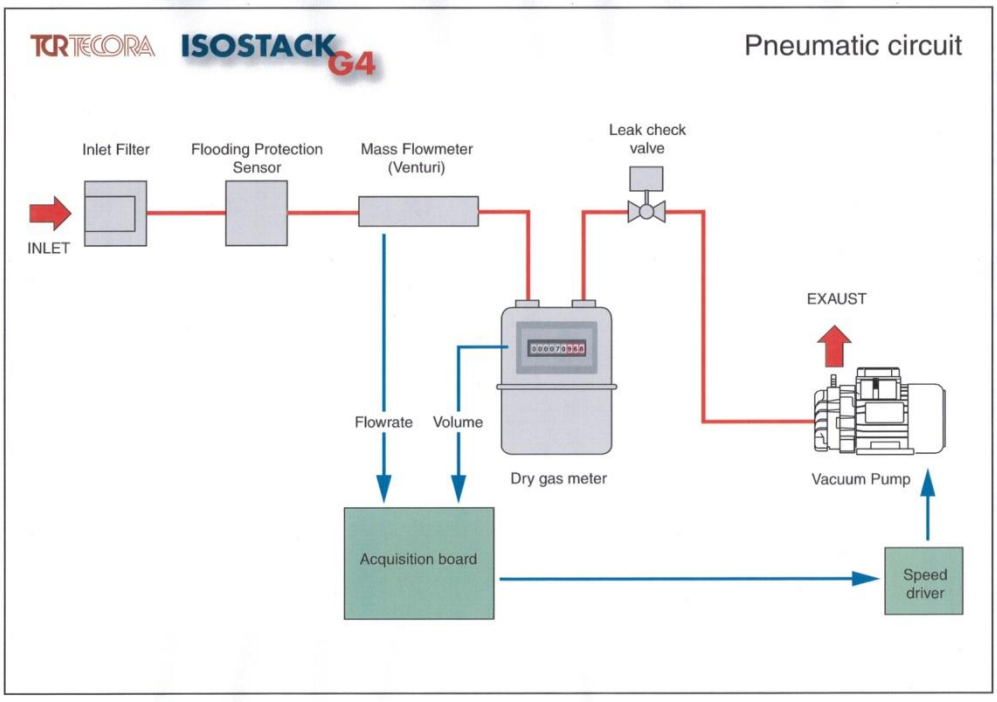
- Leak free rotary sampling pump;
- Electronic mass flow monitor and controller;
- Dry gas meter;
- Stack and dry gas meter temperature indicators;
- Differential and ambient pressure transducers; and
- Electronic data logger and printer.

These components allow for the following parameters to be constantly monitored with automatic adjustment of the sampling rate to isokinetic conditions.

- Stack temperature;
- Pitot differential pressure;
- Stack absolute and ambient pressure;
- Sampling flow rate at standard conditions;
- Sample volume at actual and standard conditions;
- Gas meter temperature;
- Elapsed sampling time; and
- Permanent real time clock and calendar.



- **Figure 1: Isostack Basic Out-Stack Filter Sampling Train**

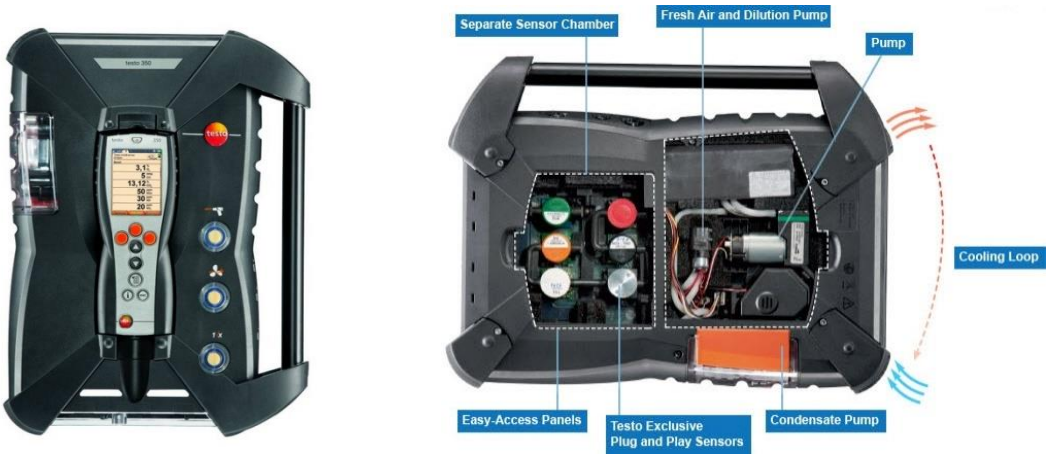


- **Figure 2: Isostack Basic Internal Flow Schematic**

2.2 Testo 350 Portable Combustion Analyser

Gaseous products of combustion were measured using a Testo 350 combustion gas analyser. The Testo 350 utilises electrochemical cells to monitor oxygen (O_2 %), carbon monoxide (CO ppmv), nitric oxide (NO ppmv), and nitrogen dioxide (NO_2 ppmv). The concentration of carbon dioxide (CO_2 %) was measured using an Infra-Red (IR) cell.

The Testo 350 is a self-contained emission analyser system capable of measuring O_2, CO, CO_2, NO, and NO_2 in combustion sources, while capturing data on pressure, temperature, and flow. The unit employs temperature-controlled electrochemical sensors which operate over an ambient temperature range of -5 ºC to +45 ºC and can be calibrated, exchanged, and upgraded in the field without hand tools (see Figure 3). The Model 350 has an automatic sample conditioning system that includes a Peltier cooler, moisture removal pump, and a patented non-heated sample line to provide representative samples from engines, turbines, boilers, burners, and other combustion sources. Table 2 presents the measurement specifications for the Testo 350 combustion gas analyser.



- **Figure 3: Testo 350 Combustion Gas Analyser**

- **Table 2: Testo 350 Cell Specifications**

Cell	Range	Accuracy	Resolution	Response Time
O_2	0 to 25% vol.	±0.8% of f.s.	0.01 vol. %	20 s (t95)
CO_2i	0 to 50% vol.	± 0.3% vol. +1% of m.v. (0 to 25% vol.) ± 0.5% vol. +1.5% of m.v (> 25 to 50% vol.)	0.01% vol. (0 to 25% vol.) 0.1% vol. (> 25% vol.)	10 s (t90)
CO	0 to 10,000 ppm H2 comp.	± 10 ppm of mv (0 to 199 ppm) ± 5% of m.v. (200 to 2,000 ppm) ± 10% of m.v. (2,001 to 10,000 ppm)	1 ppm	40 s (t90)
NO	0 to 4,000 ppm	± 5 ppm (0 to 99 ppm) ± 5% of m.v. (100 to 1,999 ppm) ± 10% of m.v. (2,000 to 3,000 ppm)	1 ppm	30 s (t90)
NO_2	0 to 500 ppm	± 5 ppm (0 to 99.9 ppm) ± 5% of m.v. (100 to 500 ppm)	0.1 ppm	40 s (t90)
SO_2	0 to 5,000 ppm	± 5 ppm (0 to 99 ppm) ± 5% of m.v. (100 to 1,999 ppm) ± 10% of m.v. (2,000 to 3,000 ppm)	1 ppm	30 s (t90)

2.3 Sampling Methods

Table 3 summarises the testing methodologies used by STNZ for particulate air discharge monitoring. Three separate samples were collected in accordance with USEPA protocols.

- **Table 3: Sampling Methods**

Contaminant	STNZ Standard Test Methods	IANZ Accredited
Sampling Points	Method 1 “Sample and Velocity Traverse for Stationary Sources”	Yes
Velocity & Volumetric Flow Rate	Method 2 “Determination of Stack Gas Velocity and Volumetric Flow rate (Type “S” Pitot Tube)”	Yes
Gas Molecular Mass Determination (Products of Combustion)	Method 3 “Gas Analysis for Carbon Dioxide, Oxygen, Excess Air and Dry Molecular Weight”	Yes
Moisture Content Determination	Method 4 “Determination of Moisture Content in Stack Gases”	Yes
Total Particulate Matter Determination	Method 5 “Determination of Particulate Emissions From Stationary Sources’	Yes
Odour Determination	AS4323.3:2001 “Determination of odour concentration by dynamic olfactometry”	Sampling No[2] Analysis Yes[1]

1. Odour analysis was performed by Watercare Services Ltd – Laboratory Services who are IANZ accredited for the analysis.
2. While STNZ are not IANZ accredited for the collection of odour samples, Matthew Newby has extensive experience collecting odour samples having previously been a Team Leader in Watercare’s Air Quality Group

2.3.1 Stack Sampling Locations

Table 4 describes the sampling point characteristics of the Higgins Contractors Ltd, BoP Hot Mix Asphalt Plant stack. The sampling port was located 6 m above the outlet of the wet scrubber and approximately 6 m below the outlet of the stack which complies with Method 1. However, the flow was cyclonic at an angle of approximately 33º. To account for the cyclonic flow, the nozzle was aligned with the maximum velocity with subsequent flow rate calculations adjusted for the angle of flow.

- **Table 4: Sampling Locations**

Source	Port	Dimensions	Up Stream from Disturbances (Equ Stack Dia)		Down Stream from Disturbances (Equ Stack Dia)		No. of Sampling Lines	No. of Sampling Points	
Wet Scrubber	4" BSP	Circular 0.71 m	8.4	*>2*	8.4	*>8*	2	6	*12*

Note: Values highlighted in grey represent the ideal method requirement.

2.3.2 Stack Gas Velocity

Stack temperatures were measured using a K Type thermocouple connected to a digital thermometer. Stack gas velocities were measured at specific points across the duct using an S Type Pitot tube connected to a digital manometer in accordance with USEPA Methods 1 & 2. These measurements were conducted continuously during each of the monitoring periods. As noted in Section 2.3.1 the flow was cyclonic at an angle of approximately 45º. To account for the cyclonic flow, the nozzle was aligned with the maximum velocity, with subsequent flow rate calculations adjusted for the angle of flow.

2.3.3 Gaseous Products of Combustion

Gaseous products of combustion were monitored using a Testo 350 combustion gas analyser. The Testo 350 utilises electrochemical cells to monitor oxygen (O_2 %), carbon monoxide (CO ppmv), nitric oxide (NO ppmv), and nitrogen dioxide (NO_2 ppmv). The concentration of carbon dioxide (CO_2 %) was monitored using an Infra-Red (IR) cell. USEPA Method 3 was subsequently used to determine the molecular weight of the stack gas.

2.3.4 Particulate Matter

Particulate matter was withdrawn isokinetically from the source and collected on a glass fibre filter maintained at a temperature of 120 °C ± 14 °C. The particulate mass was determined gravimetrically, after the removal of un-combined water. This approach conforms to USEPA Method 5 "Determination of Particulate Matter from Stationary Sources". Particulate analysis was performed by STNZ staff in Wellington.

2.3.5 Odour Concentration

Samples for odour analysis were collected in accordance with AS/NZS 4323.3:2001 "Determination of odour concentration by dynamic olfactometery". Due to the elevated moisture content of the source, the sample was pre-diluted using the static pre-dilution method described in Section 10.3.2.2(a) of the method whereby a portion of the bag was pre-filled with a known volume of ultra-pure nitrogen prior to a known volume of stack gas being collected. The sampling bag was flushed three times with pre-diluted sample to condition the bag prior to the final sample being collected.

The samples were then couriered over night to Watercare Services – Laboratory Services, Auckland for analysis. Watercare Services – Laboratory Services are IANZ accredited for olfactometry analysis as per AS/NZS 4323.3:2001. While STNZ are not formally IANZ accredited for odour sampling, Mathew Newby has extensive odour sampling and analysis experience having previously worked at Watercare Services as a Team Leader in the air quality group for over eight years.

3. Plant Operating Conditions

On 1 March 2022, the asphalt plant was operating under normal conditions producing AC-28TAO-SS at a rate of 44 T/hr and at a temperature of 160 °C. AC-28TAO-SS consists of 4.7 % bitumen 60/70, 8.5 % Grade 3, 5 % Grade 2, 18.1 % SWAP 40/20, 44.4 % Crusher Dust, 9.8 % Grade 4 and 9.5 % Grade 5.

4. Air Discharge Monitoring Results

4.1 Particulate Monitoring Results

Presented below are the results of the particulate monitoring performed on the Higgins Contractors Ltd, BoP asphalt plant on 1 March 2022. Table 4 presents the results of the particulate emission testing with Table 5 outlining a summary of the relevant stack data. Appendix A presents the raw sampling data. Appendix B contains the moisture content and mass determination calculations.

- **Table 5: Particulate Matter Discharge Results, 1 March 2022**

Sampling Run	Sampling Date	Sampling Period	Volume Sampled (m^3)	Stack Flow Rate (m^3/h)[1]	Mass (mg)	Conc, (mg/m^3)[1]	Emission Rate (kg/h)
PM Run 1	1/03/2022	9:52 - 10:44	1.016	9,592	54.0	53.1	0.510
PM Run 2	1/03/2022	11:04 - 11:44	0.733	8,954	66.0	90.0	0.806
PM Run 3	1/03/2022	11:56 - 12:38	0.680	8,832	51.8	76.2	0.673

1. Corrected to 0 °C, 101.3 kPa, dry gas basis.

- **Table 6: Summary of Stack Conditions, 1 March 2022**

Source	Average Temp. (°C)	Average Moisture Content (% v/v)	Average Velocity (m/s)[2]	Average Volumetric Flow Rate (m^3/hr)[2]	Average Volumetric Flow Rate (m^3/hr)[2,3]	Average Volumetric Flow Rate (m^3/hr)[2,4]
Asphalt Plant	55.0	12.0	8.7	12,410	9,126	9,812

1. Actual conditions
2. Adjusted for the cyclonic flow
3. Corrected to 0 °C, 101.3 kPa, dry gas basis.
4. Corrected to 25 °C, 101.3 kPa, dry gas basis

The particulate discharge concentrations from the Higgins Contractors Ltd, BoP Drum Hotmix Asphalt Plant measured on 1 March 2022 ranged from 53.1 to 90.0 mg/m^3 adjusted to 0 °C, one atmosphere pressure and dry gas basis (mg/Sm^3) with an average of 73.1 mg/Sm^3. The particulate matter mass emission ranged from 0.510 to 0.806 kg/hr with an average of 0.663 kg/hr.

All three test results were below the particulate discharge limit of 250 mg/Sm^3 as stipulated in Condition 5.4 and less than the mass emission rate of 2.5 kg/hr as stipulated in Condition 5.5 of the Company's Resource Consent.

4.1.1 Quality Control Data

Tables 7 and 8 present the relevant quality control parameters for the particulate emission testing. In addition, all equipment was calibrated and maintained as per the STNZ Air Quality Equipment Manual (available on request).

- **Table 7: Sampling Quality Control Data, 1 March 2022**

Sampling Run	Pre Leak Check Vacuum (kPa)	Pre Leak Rate (cc/min)	Post Leak Check Vacuum (kPa)	Post Leak Rate (cc/min)	Isokinetic Deviation (%)
Method Specs	> -70	<570	> -70	<570	+/-10
PM Run 1	69	0	69	50	-7.2
PM Run 2	69	170	69	0	-3.3
PM Run 3	69	0	69	0	-9.8

- **Table 8: Mass Determination Quality Control Data, 1 March 2022**

	Field Blank Mass (g)	Acetone Blank (g)
Pre	0.5924	84.6825
Post	0.5928	84.6828
Diff	0.0004	0.0003

All quality control parameters were within the methods specification.

4.2 Odour Monitoring Results

The results of the odour monitoring performed on the Higgins Contractors BoP Hot Mix Asphalt Plant on 1 March 2022 are presented below. Table 9 presents the results of the odour emission testing with Appendix B containing the odour concentration calculations. Appendix C presents the odour laboratory report.

- **Table 9: Odour Discharge Monitoring Results, 1 March 2022**

Sampling Run	Sampling Date	Stack Flow Rate (m^3/h)[1]	Stack Flow Rate (m^3/h)[1]	Odour Conc. (OU/m^3)[1]	Odour Emission Rate (OU/s)
Run 1	18/08/2016	9,812	2.73	22,407	61,072
Run 2	18/08/2016	9,812	2.73	16,782	45,740
Run 3	18/08/2016	9,812	2.73	24,679	67,265

1. Corrected to 25 °C, 101.3 kPa, dry gas basis.

The odour discharge concentrations from the Higgins Contractors, BoP Hot Mix Asphalt Plant measured on 1 March 2022 ranged from 16,782 to 24,679 OU/m^3 adjusted to 25 °C, 101.3 kPa, dry gas basis (OU/Sm^3) with an average of 21,289 OU/Sm^3. The odour mass emission ranged from 45,740 to 67,265 OU/s with an average of 58,025 OU/s.

The description of the samples provided by the odour panellist was Strong Chemical (gasoline like).

4.3 Gaseous Products of Combustion Monitoring Results

Table 10 presents the results of the Testo 350 combustion gas analyser collected from the Higgins BoP asphalt plant on 1 March 2022. Appendix D presents the raw Testo 350 data in a graphical format.

Table 10: Products of Combustion Results, 1 March 2022

		O_2 (%)[1]	CO_2 (%)[1]	CO (ppmv)[2]	NO (ppmv)[2]	NO_2 (ppmv)[2]	NO_X (ppmv)[2]
PM Run 1	Ave.	15.1	4.2	23	59	<0.1	59.0
	Min.	15.0	4.1	20	55	<0.1	54.8
	Max.	15.2	4.2	25	61	0.1	61.0
PM Run 2	Ave.	15.2	4.2	25	56	0.1	56.5
	Min.	15.1	4.2	23	54	0.1	54.1
	Max.	15.2	4.2	29	59	0.1	59.0
PM Run 3	Ave.	15.1	4.2	32	57	0.1	57.5
	Min.	15.0	4.2	28	56	0.1	55.8
	Max.	15.1	4.3	37	59	0.2	59.1
All Data	Ave.	15.1	4.2	26	58	0.1	57.9
	Min.	15.0	4.1	20	54	<0.1	54.1
	Max.	15.2	4.3	37	61	0.2	61.0

1. Dry gas basis
2. parts per million per volume, dry gas basis
3. The above combustion data is beyond the scope of STNZ's IANZ accreditation

The results of the combustion gas monitoring performed on 1 March 2022 showed the O_2 concentration ranged from 15.0 to 15.2 % with an average of 15.1 %; the CO_2 concentration ranged from 4.1 to 4.3 % with an average of 4.2 %; the CO concentration ranged from 20 to 37 ppmv with an average of 26 ppmv, and the NOx concentration ranged from 54.1 to 61.0 ppmv with an average of 57.9 ppmv

Appendix A Raw Sampling Data

This Appendix contains 8 pages including cover.

The data presented in the IsoStack G4 data sheets are based on assumed moisture contents. The tabulated data presented is based on actual measured moisture content. As a result, the corrected volumetric flow rates may differ.

Sample Description:	Run 1	Run 2	Run 3	Averages
Sampling Date:	1/03/2022	1/03/2022	1/03/2022	
Filter ID:	ST1952	ST1953	ST1954	
Sampling Period:	9:52 - 10:44	11:04 - 11:44	11:56 - 12:38	
Total Sample Time (minutes)	48	36	36	
Stack Diameter (m)	0.71	0.71	0.71	
Angle of swirl (degrees)	33	33	33	
Nozzle Diameter (mm)	7.47	7.47	7.47	
Nozzle Area (m2)	0.0000438	0.0000438	0.0000438	
DGM Calibration Factor	0.9960	0.9960	0.9960	
Intial DGM Reading	225.6210	227.2958	228.4762	
Final DGM Reading	227.2948	228.4734	229.5154	
DGM Sample Volume (m^3):	1.6738	1.1776	1.0392	
DGM Std. Sample Volume (m^3):	1.0159	0.7331	0.6801	
Initial Leak Test Vacuum (kPa):	69	69	69	
Initial Leak Test Flow Rate (cc/min):	0	170	0	
Final Leak Test Vacuum (kPa):	69	69	69	
Final Leak Test Flow Rate (cc/min):	50	0	0	
Moisture Collected (g):	97.0	78.4	86.9	
Moisture Content (%):	10.6	11.7	13.7	12.0
TCR DGM Sample Volume (m^3):	1.5487	1.0553	1.0210	
Sampling Plane Mean Velocity (m/s):	11.5	10.8	11.0	
Sampling Plane Mean Velocity (m/s) corrected for angle:	9.0	8.5	8.6	8.7
TCR Isokinetic Deviation (%):	-3.3	-4.4	-3.7	
Actual Isokinetic Deviation (%):	-7.2	-3.3	-9.8	
Duct Volumetric Flow Rates				
Moist (m^3/h):	12,799	12,129	12,300	12,410
Moist Standards (m^3/h):	10,731	10,145	10,236	
Dry Standard (m^3/h):	9,592	8,954	8,832	9,126
Mean Temperatures				
At Sampling Plane (^oC):	54.0	54.7	56.2	55.0
At DGM (^oC):	23.3	24.7	24.9	
Ambient Pressure (kPa):	101.755	101.726	101.673	101.718
Stack Absolute Pressure (kPa)	101.722	101.681	101.633	
Dry Gas Meter Pressure (kPa)	67.013	69.061	72.653	

Higgins Tauranga Run 1 ST1031

Isokinetic sampling 01/03/2022 09:52:31

MACHINE INFORMATION

Master Firmware	v2.0.0001
Master Serial Number	20400114P
Slave Firmware	v0.7.7000
Slave Serial Number	20400114P
Last calibration date	29/09/2020

CV GAMMA [#] CALIBRATION

Point	Flowrate	Gamma
1	0	1

POINT LIST

start ts [timestamp]	Port [###]	Point [###]	Distance [cm]	Elapsed Time [hh:mm:ss]	t_{fumes} avg [°C]	t_{dgm} avg [°C]	P_{stat} avg [kPa]	P_c avg [kPa]	dP pitot avg [Pa]	P_{time} avg [kPa]	P_{amb} avg [kPa]	v'_a avg [$^m/_{sec}$]	qV_n avg [$^{l1}/_{min}$]	DI [%]	v'_N avg [$^m/_{sec}$]	$Q'Va$ [$^{m3}/_h$]	$Q'Vn$ [$^{m3}/_h$]	QVn [$^{m3}/_h$]	V_{gn} [lt]	V'_{ga} [lt]	V_{dgm} [lt]
1/03/2022																					
9:53:06	1	1	3.1	0:04:00	53.328	22.236	0.024	101.779	74.979	74.704	101.755	10.61	18.966	-2.5	10.339	15122	12709	10548	73.93	105.93	108.37
1/03/2022																					
9:57:13	1	2	10.4	0:04:00	53.596	22.254	-0.016	101.739	85.757	71.081	101.755	11.353	20.066	-3.5	10.952	16181	13582	11273	78.39	112.47	120.8
1/03/2022																					
10:01:31	1	3	21.1	0:04:00	53.83	22.478	-0.062	101.693	57.378	81.08	101.755	9.263	16.571	-2.2	9.055	13202	11069	9187	63.91	91.86	86.46
1/03/2022																					
10:05:41	1	4	50	0:04:00	53.971	22.33	-0.083	101.672	101.062	64.657	101.755	12.308	21.557	-4.2	11.787	17542	14698	12199	83.02	119.18	140.49
1/03/2022																					
10:10:11	1	5	60.7	0:04:00	53.943	22.435	-0.029	101.726	120.46	57.852	101.755	13.462	23.522	-4.5	12.854	19187	16086	13351	90.47	129.73	171.09
1/03/2022																					
10:14:14	1	6	68	0:04:00	54.009	22.811	-0.003	101.752	102.054	65.169	101.755	12.388	21.992	-2.9	12.017	17656	14803	12287	85.06	122.08	143.12
1/03/2022																					
10:18:35	2	1	3.1	0:04:00	53.937	23.369	0.016	101.771	82.475	71.772	101.755	11.138	19.786	-2.9	10.807	15875	13315	11051	76.78	110.19	117.56
1/03/2022																					
10:22:59	2	2	10.4	0:04:00	54.266	23.627	-0.024	101.731	83.343	71.006	101.755	11.204	19.903	-2.8	10.887	15969	13375	11101	77.26	111.04	119.69
1/03/2022																					
10:27:11	2	3	21.1	0:04:00	54.649	23.89	-0.081	101.674	50.394	82.122	101.755	8.691	15.624	-1.4	8.561	12387	10357	8596	60.44	87.1	81.1
1/03/2022																					
10:31:20	2	4	50	0:04:00	54.661	24.073	-0.088	101.667	106.67	62.021	101.755	12.663	22.018	-4.7	12.065	18048	15089	12524	84.52	121.59	149.99
1/03/2022																					
10:36:04	2	5	60.7	0:04:00	54.277	24.501	-0.034	101.721	120.605	55.661	101.755	13.48	23.557	-4.4	12.886	19213	16090	13355	90.94	130.53	179.98
1/03/2022																					
10:40:37	2	6	68	0:04:00	53.877	25.079	-0.007	101.748	89.6	68.18	101.755	11.593	20.686	-2.5	11.299	16523	13858	11502	80.26	115.17	130.09

NORMALIZATION FACTOR

T_{norm}	[K]	273.15
P_{norm}	[kPa]	101.325

PITOT DATA SPECIFICATION

Name			TCR SHORT
Velocity	[$^m/_{sec}$]	2.03	0.869
Velocity	[$^m/_{sec}$]	5.12	0.839
Velocity	[$^m/_{sec}$]	11.21	0.828
Velocity	[$^m/_{sec}$]	14.25	0.827
Velocity	[$^m/_{sec}$]	17.18	0.829

DUCT AND GAS SPECIFICATION

Name			HIGGINS MT
Section			Circular
Diameter		[m]	0.71
Area		[m^2]	0.395
Port	B	[#]	2
Points	P	[#]	6
Dry gas density	ρn	[$^{kg}/_{m^3}$]	1.276 [1.276; 1.276]
Carbon dioxide	CO_2	[%]	4.1 [4.100; 4.100]
Oxygen	O_2	[%]	15 [15.000; 15.000]
Water vapor ratio	rw	[0;1]	0.17 [0.170; 0.170]
Nozzle	nz	[mm]	7.47
Turbolence factor	ft	[sec]	5

DUCT FLOW RATE

Dry actual	QV_a	[$^{m3}/_h$]	13618 [7927; 17465]
Moist actual	$Q'V_a$	[$^{m3}/_h$]	16408 [12387; 19213]
Moist standard [T_{norm} P_{norm}]	$Q'V_n$	[$^{m3}/_h$]	13752 [10357; 16090]
Dry standard [T_{norm} P_{norm}]	QV_n	[$^{m3}/_h$]	11415

AVERAGE VALUES

Total Points		[#]	12
Velocity	v'_a	[$^m/_{sec}$]	11.512 [6.702; 14.764]
Stack temperature	t_{fumes}	[°C]	54.028 [53.098; 54.905]
Stack Absolute Pressure	P_c	[kPa]	101.722 [101.622; 101.797]
Stack Static Pressure	P_{stat}	[kPa]	-0.033 [-0.133; 0.042]
Isokinetic Deviation	DI	[%]	-3.3
Velocity at nozzle	v'_N	[$^m/_{sec}$]	11.125 [0.000; 13.599]
Stack Differential Pitot Pressure	dP_{pitot}	[Pa]	88.219 [29.826; 144.490]
Ambient Pressure	P_{amb}	[kPa]	101.755 [101.755; 101.755]

SAMPLED VOLUMES

Elapsed time	et	[hh:mm:ss]	0:48:00
Total encoder impulses		[#]	15334
Standard Volume [T_{norm} P_{norm}]	V_{gn}	[m^3]	0.945
Moist Volume at stack conditions	V'_{ga}	[m^3]	1.3568
Volume at dgm conditions	V_{dgm}	[m^3]	1.5487
Gas meter temperature	t_{dgm}	[°C]	23.294 [22.189; 25.199]
Gas Meter Pressure	P_{dgm}	[kPa]	67.013 [52.842; 98.008]

Preliminary Stack Survey

Source	Higgins Tauranga	
Date	1-Mar-22	
Pitot	S-Type Pitot	
Number of lines used for survey	Run 3	
	a	

Molecular Weight of Stack Gas

Was CO2 measured in the stack?	No	
Accurately state fuel for CO2 calculation	None	Choose: None / Natural Gas / Light Fuel Oil / Heavy Fuel Oil / Coal
Calculated CO2 Value	0.00	
O2 Reference?	NA	%

Duct Characteristics

Type	Circular	
Depth/Dia	0.71	m
Width	-	m
Area	0.396	m^2
Port Depth	0	mm

Sampling Lines & Sample Points

	Line A						
Traverse Point		ΔP pt mmH_2O	ΔP pt Pa	Temp °C	Velocity (corrected for swirl) m	O_2 % Vol	Angle of Swirl °
1		9.0	88.6	56.2	9.43	15.1	30
2		11.6	113.3	56.2	10.66	15.1	30
3		8.3	81.0	56.2	7.97	15.1	40
4		7.8	76.4	56.2	7.74	15.1	40
5		7.4	72.2	56.2	8.51	15.1	30
6		7.4	72.3	56.2	8.52	15.1	30
7		7.3	72.0	56.2	8.50	15.1	30
8		8.0	78.7	56.2	8.89	15.1	30
9		5.4	53.1	56.2	6.46	15.1	40
10		6.3	61.6	56.2	6.95	15.1	40
11		11.0	107.9	56.2	10.41	15.1	30
12		9.2	90.3	56.2	9.52	15.1	30
Mean		7.8	80.6	56.2	8.63	15.1	33

	Line B						
Traverse Point	Distance into duct (m)	ΔP pt mmH_2O	ΔP pt Pa	Temp °C	Velocity m/s	O_2 % Vol	Angle of Swirl °
1	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-
Mean	-	-	-	-	-	-	
AVERAGE	-	7.8	76.9	56	8.36	-	

Pitot tube velocity constant, K_p		34.97		
Velocity pressure coefficient, C_p	0.83			
Mean Oxygen		15.1	Moisture Cointent Calculations	
Mean CO_2		4.20	RH, %	
Mean Md		29.28	Saturated Vapour Pressure. mmHg	
Moisture %	13.7	0.137		
Mean Ms		27.73		
Barometric Pressure, kPa	101.673	762.6		
Static Pressure, Pa	-40	-0.30		
Absolute Stack Pressure		762.3		
Angle of Swirl		33		
Lowest Gas Velocity,m/s		6.46		
Highest Gas Velocity, m/s		10.66		
Mean Velocity, m/s		8.63		
Duct Volumetric Flow Rates				
Moist, m^3/h		12,302		
Moist Standards, m^3/h		10,238		
Dry Standard, m^3/h		8,835		

SOURCE TESTING NZ

Higgins Tauranga Run 2 ST1031

Isokinetic sampling 01/03/2022 11:03:42

MACHINE INFORMATION

Master Firmware	v2.0.0001
Master Serial Number	20400114P
Slave Firmware	v0.7.7000
Slave Serial Number	20400114P
Last calibration date	29/09/2020

CV GAMMA [#] CALIBRATION

Point	Flowrate	Gamma
1	0	1

POINT LIST

start ts [timestamp]	Port [###]	Point [###]	Distance [cm]	Elapsed Time [hh:mm:ss]	t_{fumes} avg [°C]	t_{dgm} avg [°C]	P_{stat} avg [kPa]	P_c avg [kPa]	dP pitot avg [Pa]	P_{time} avg [kPa]	P_{amb} avg [kPa]	v'_a avg [$^m/_{sec}$]	qV_n avg [$^{l1}/_{min}$]	DI [%]	v'_N avg [$^m/_{sec}$]	$Q'Va$ [$^{m3}/_h$]	$Q'Vn$ [$^{m3}/_h$]	QVn [$^{m3}/_h$]	V_{gn} [lt]	V'_{ga} [lt]	V_{dgm} [lt]
1/03/2022																					
11:04:06	1	1	3.1	0:03:00	53.914	25.786	0.01	101.736	63.279	69.361	101.726	9.623	16.333	-7.2	8.923	13715	11501	9546	47.64	68.35	76.05
1/03/2022																					
11:07:14	1	2	10.4	0:03:00	54.034	25.61	-0.035	101.691	70.038	68.687	101.726	10.04	17.14	-6.6	9.372	14310	11989	9951	50.08	71.74	80.5
1/03/2022																					
11:11:10	1	3	21.1	0:03:00	54.17	25.297	-0.047	101.679	64.396	79.158	101.726	9.807	17.063	-4.8	9.335	13978	11705	9715	49.69	71.49	69.49
1/03/2022																					
11:14:17	1	4	50	0:03:00	54.29	24.979	-0.099	101.627	60.82	79.128	101.726	9.516	16.999	-2.1	9.308	13563	11348	9418	49.66	71.49	69.39
1/03/2022																					
11:17:29	1	5	60.7	0:03:00	54.532	24.737	-0.023	101.703	111.488	61.526	101.726	12.958	22.281	-5.8	12.2	18469	15453	12825	64.93	93.29	116.35
1/03/2022																					
11:20:30	1	6	68	0:03:00	54.765	24.695	-0.001	101.725	93.667	67.044	101.726	11.884	21.188	-2.3	11.607	16938	14165	11757	60.94	87.68	100.29
1/03/2022																					
11:23:54	2	1	3.1	0:03:00	55.1	24.783	0.001	101.727	83.408	71.126	101.726	11.223	19.686	-3.8	10.796	15996	13363	11092	57.65	83.06	89.49
1/03/2022																					
11:27:48	2	2	10.4	0:03:00	55.138	24.595	-0.045	101.681	77.384	73.334	101.726	10.812	18.987	-3.6	10.418	15410	12867	10679	55.31	79.74	83.22
1/03/2022																					
11:31:17	2	3	21.1	0:03:00	55.044	24.432	-0.102	101.624	41.965	84.698	101.726	7.926	14.297	-1	7.846	11297	9430	7826	41.59	60.07	54.24
1/03/2022																					
11:34:20	2	4	50	0:03:00	55.092	24.271	-0.101	101.625	79.266	71.722	101.726	10.923	18.936	-4.8	10.394	15568	12993	10784	55.39	79.9	85.14
1/03/2022																					
11:38:01	2	5	60.7	0:03:00	55.144	24.127	-0.061	101.665	116.624	57.094	101.726	13.268	22.718	-6	12.468	18911	15787	13103	65.92	94.87	126.96
1/03/2022																					
11:41:12	2	6	68	0:03:00	55.258	24.068	-0.033	101.693	94.996	65.139	101.726	11.975	20.983	-3.8	11.516	17068	14247	11825	61.69	88.89	104.23

NORMALIZATION FACTOR

T_{norm}	[K]	273.15
P_{norm}	[kPa]	101.325

PITOT DATA SPECIFICATION

Name			TCR SHORT
Velocity	[$^m/_{sec}$]	2.03	0.869
Velocity	[$^m/_{sec}$]	5.12	0.839
Velocity	[$^m/_{sec}$]	11.21	0.828
Velocity	[$^m/_{sec}$]	14.25	0.827
Velocity	[$^m/_{sec}$]	17.18	0.829

DUCT AND GAS SPECIFICATION

Name			HIGGINS MT
Section			Circular
Diameter		[m]	0.71
Area		[m^2]	0.395
Port	B	[#]	2
Points	P	[#]	6
Dry gas density	ρn	[$^{kg}/_{m^3}$]	1.276 [1.276; 1.276]
Carbon dioxide	CO_2	[%]	4.1 [4.100; 4.100]
Oxygen	O_2	[%]	15 [15.000; 15.000]
Water vapor ratio	rw	[0;1]	0.17 [0.170; 0.170]
Nozzle	nz	[mm]	7.47
Turbolence factor	ft	[sec]	5

DUCT FLOW RATE

Dry actual	QV_a	[$^{m3}/_h$]	12810 [0; 17080]
Moist actual	$Q'V_a$	[$^{m3}/_h$]	15435 [11297; 18911]
Moist standard [T_{norm} P_{norm}]	$Q'V_n$	[$^{m3}/_h$]	12904 [9430; 15787]
Dry standard [T_{norm} P_{norm}]	QV_n	[$^{m3}/_h$]	10710

AVERAGE VALUES

Total Points		[#]	12
Velocity	v'_a	[$^m/_{sec}$]	10.829 [0.000; 14.438]
Stack temperature	t_{fumes}	[°C]	54.706 [53.741; 55.434]
Stack Absolute Pressure	P_c	[kPa]	101.681 [101.591; 101.756]
Stack Static Pressure	P_{stat}	[kPa]	-0.045 [-0.135; 0.030]
Isokinetic Deviation	DI	[%]	-4.4
Velocity at nozzle	v'_N	[$^m/_{sec}$]	10.348 [0.000; 13.289]
Stack Differential Pitot Pressure	dP_{pitot}	[Pa]	78.382 [0.000; 137.980]
Ambient Pressure	P_{amb}	[kPa]	101.726 [101.726; 101.726]

SAMPLED VOLUMES

Elapsed time	et	[hh:mm:ss]	0:36:00
Total encoder impulses		[#]	10449
Standard Volume [T_{norm} P_{norm}]	V_{gn}	[m^3]	0.6605
Moist Volume at stack conditions	V'_{ga}	[m^3]	0.9506
Volume at dgm conditions	V_{dgm}	[m^3]	1.0553
Gas meter temperature	t_{dgm}	[°C]	24.727 [24.042; 26.204]
Gas Meter Pressure	P_{dgm}	[kPa]	69.061 [53.642; 94.840]

Preliminary Stack Survey

Source	Higgins Tauranga	
Date	1-Mar-22	
Pitot	S-Type Pitot	
Number of lines used for survey	Run 2	
	a	

Molecular Weight of Stack Gas

Was CO2 measured in the stack?	No	
Accurately state fuel for CO2 calculation	None	Choose: None / Natural Gas / Light Fuel Oil / Heavy Fuel Oil / Coal
Calculated CO2 Value	0.00	
O2 Reference?	NA	%

Duct Characteristics

Type	Circular	
Depth/Dia	0.71	m
Width	-	m
Area	0.396	m^2
Port Depth	0	mm

Sampling Lines & Sample Points

	Line A					
Traverse Point	ΔP pt mmH_2O	ΔP pt Pa	Temp °C	Velocity (corrected for swirl) m	O_2 % Vol	Angle of Swirl °
1	6.5	63.3	54.7	7.92	15.2	30
2	7.1	70.0	54.7	8.33	15.2	30
3	6.6	64.4	54.7	7.06	15.2	40
4	6.2	60.8	54.7	6.86	15.2	40
5	11.4	111.5	54.7	10.51	15.2	30
6	9.6	93.7	54.7	9.63	15.2	30
7	8.5	83.4	54.7	9.09	15.2	30
8	7.9	77.4	54.7	8.75	15.2	30
9	4.3	42.0	54.7	5.70	15.2	40
10	8.1	79.3	54.7	7.84	15.2	40
11	11.9	116.6	54.7	10.75	15.2	30
12	9.7	95.0	54.7	9.70	15.2	30
Mean	7.6	79.8	54.7	8.51	15.2	33

	Line B						
Traverse Point	Distance into duct (m)	ΔP pt mmH_2O	ΔP pt Pa	Temp °C	Velocity m/s	O_2 % Vol	Angle of Swirl °
1	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-
Mean	-	-	-	-	-	-	
AVERAGE	-	7.6	74.6	55	8.17	-	

Pitot tube velocity constant, K_p		34.97		
Velocity pressure coefficient, C_p	0.83			
Mean Oxygen		15.2	Moisture Cointent Calculations	
Mean CO_2		4.20	RH, %	
Mean Md		29.28	Saturated Vapour Pressure. mmHg	
Moisture %	11.7	0.117		
Mean Ms		27.96		
Barometric Pressure, kPa	101.726	763.0		
Static Pressure, Pa	-45	-0.34		
Absolute Stack Pressure		762.6		
Angle of Swirl		33		
Lowest Gas Velocity,m/s		5.70		
Highest Gas Velocity, m/s		10.51		
Mean Velocity, m/s		8.51		
Duct Volumetric Flow Rates				
Moist, m^3/h		12,133		
Moist Standards, m^3/h		10,148		
Dry Standard, m^3/h		8,961		

SOURCE TESTING NZ

Higgins Tauranga Run 3 ST1031

Isokinetic sampling 01/03/2022 11:56:22

MACHINE INFORMATION

Master Firmware	v2.0.0001
Master Serial Number	20400114P
Slave Firmware	v0.7.7000
Slave Serial Number	20400114P
Last calibration date	29/09/2020

CV GAMMA [#] CALIBRATION

Point	Flowrate	Gamma
1	0	1

POINT LIST

start ts [timestamp]	Port [###]	Point [###]	Distance [cm]	Elapsed Time [hh:mm:ss]	t_{fumes} avg [°C]	t_{dgm} avg [°C]	P_{stat} avg [kPa]	P_c avg [kPa]	dP pitot avg [Pa]	P_{time} avg [kPa]	P_{amb} avg [kPa]	v'_a avg [$^m/_{sec}$]	qV_n avg [$^{l1}/_{min}$]	DI [%]	v'_N avg [$^m/_{sec}$]	$Q'Va$ [$^{m3}/_h$]	$Q'Vn$ [$^{m3}/_h$]	QVn [$^{m3}/_h$]	V_{gn} [lt]	V'_{ga} [lt]	V_{dgm} [lt]
1/03/2022																					
11:56:44	1	1	3.1	0:03:00	55.436	24.661	0.013	101.686	88.559	72.053	101.673	11.574	20.097	-4.6	11.036	16496	13762	11422	58.34	84.2	89.39
1/03/2022																					
11:59:50	1	2	10.4	0:03:00	55.51	24.876	-0.022	101.651	113.343	64.242	101.673	13.09	22.503	-5.5	12.365	18657	15556	12911	65.17	93.97	111.91
1/03/2022																					
12:03:19	1	3	21.1	0:03:00	55.667	25.175	-0.091	101.582	80.95	73.371	101.673	11.06	19.544	-2.7	10.752	15763	13128	10896	57.5	83.12	86.66
1/03/2022																					
12:06:53	1	4	50	0:03:00	55.946	25.159	-0.031	101.642	76.354	74.901	101.673	10.753	19.018	-2.6	10.465	15326	12760	10591	55.25	79.94	81.61
1/03/2022																					
12:10:22	1	5	60.7	0:03:00	55.849	25.01	0.003	101.676	72.212	76.194	101.673	10.456	18.356	-3.4	10.094	14903	12416	10305	53.73	77.68	77.97
1/03/2022																					
12:13:44	1	6	68	0:03:00	56.155	24.793	0.002	101.675	72.262	76.273	101.673	10.467	18.329	-3.6	10.089	14918	12417	10306	53.74	77.79	77.87
1/03/2022																					
12:17:45	2	1	3.1	0:03:00	56.532	24.665	-0.003	101.67	72.037	76.339	101.673	10.457	18.275	-3.6	10.071	14904	12390	10284	52.85	76.57	76.46
1/03/2022																					
12:20:52	2	2	10.4	0:03:00	56.56	24.656	-0.05	101.623	78.746	73.205	101.673	10.902	19.286	-2.4	10.634	15538	12910	10716	56.02	81.23	84.54
1/03/2022																					
12:24:12	2	3	21.1	0:03:00	56.918	24.864	-0.106	101.567	53.09	81.853	101.673	8.974	15.773	-2.9	8.711	12790	10610	8806	46.19	67.13	62.42
1/03/2022																					
12:27:59	2	4	50	0:03:00	56.769	25.165	-0.115	101.558	61.585	78.582	101.673	9.579	16.748	-3.4	9.246	13653	11329	9403	48.92	71.02	68.88
1/03/2022																					
12:31:28	2	5	60.7	0:03:00	56.566	24.989	-0.047	101.626	107.931	64.304	101.673	12.797	21.932	-5.5	12.093	18239	15155	12578	63.41	91.8	108.88
1/03/2022																					
12:35:07	2	6	68	0:03:00	56.558	25.056	-0.025	101.648	90.269	70.423	101.673	11.708	20.534	-3.3	11.319	16687	13869	11511	60.18	87.16	94.44

NORMALIZATION FACTOR

T_{norm}	[K]	273.15
P_{norm}	[kPa]	101.325

PITOT DATA SPECIFICATION

Name			TCR SHORT
Velocity	[$^m/_{sec}$]	2.03	0.869
Velocity	[$^m/_{sec}$]	5.12	0.839
Velocity	[$^m/_{sec}$]	11.21	0.828
Velocity	[$^m/_{sec}$]	14.25	0.827
Velocity	[$^m/_{sec}$]	17.18	0.829

DUCT AND GAS SPECIFICATION

Name			HIGGINS MT
Section			Circular
Diameter		[m]	0.71
Area		[m^2]	0.395
Port	B	[#]	2
Points	P	[#]	6
Dry gas density	ρn	[$^{kg}/_{m^3}$]	1.276 [1.276; 1.276]
Carbon dioxide	CO_2	[%]	4.1 [4.100; 4.100]
Oxygen	O_2	[%]	15 [15.000; 15.000]
Water vapor ratio	rw	[0;1]	0.17 [0.170; 0.170]
Nozzle	nz	[mm]	7.47
Turbolence factor	ft	[sec]	5

DUCT FLOW RATE

Dry actual	QV_a	[$^{m3}/_h$]	12994 [0; 16868]
Moist actual	$Q'V_a$	[$^{m3}/_h$]	15656 [12790; 18657]
Moist standard [T_{norm} P_{norm}]	$Q'V_n$	[$^{m3}/_h$]	13025 [10610; 15556]
Dry standard [T_{norm} P_{norm}]	QV_n	[$^{m3}/_h$]	10811

AVERAGE VALUES

Total Points		[#]	12
Velocity	v'_a	[$^m/_{sec}$]	10.984 [0.000; 14.260]
Stack temperature	t_{fumes}	[°C]	56.205 [55.346; 57.038]
Stack Absolute Pressure	P_c	[kPa]	101.633 [101.539; 101.700]
Stack Static Pressure	P_{stat}	[kPa]	-0.04 [-0.134; 0.027]
Isokinetic Deviation	DI	[%]	-3.7
Velocity at nozzle	v'_N	[$^m/_{sec}$]	10.572 [0.000; 13.318]
Stack Differential Pitot Pressure	dP_{pitot}	[Pa]	79.768 [0.000; 134.191]
Ambient Pressure	P_{amb}	[kPa]	101.673 [101.673; 101.673]

SAMPLED VOLUMES

Elapsed time	et	[hh:mm:ss]	0:36:00
Total encoder impulses		[#]	10109
Standard Volume [T_{norm} P_{norm}]	V_{gn}	[m^3]	0.6713
Moist Volume at stack conditions	V'_{ga}	[m^3]	0.9717
Volume at dgm conditions	V_{dgm}	[m^3]	1.021
Gas meter temperature	t_{dgm}	[°C]	24.922 [24.609; 25.401]
Gas Meter Pressure	P_{dgm}	[kPa]	72.653 [61.453; 98.399]

Preliminary Stack Survey

Source	Higgins Tauranga	
Date	1-Mar-22	
Pitot	S-Type Pitot	
Number of lines used for survey	Run 3	
	a	

Molecular Weight of Stack Gas

Was CO2 measured in the stack?	No	
Accurately state fuel for CO2 calculation	None	Choose: None / Natural Gas / Light Fuel Oil / Heavy Fuel Oil / Coal
Calculated CO2 Value	0.00	
O2 Reference?	NA	%

Duct Characteristics

Type	Circular	
Depth/Dia	0.71	m
Width	-	m
Area	0.396	m^2
Port Depth	0	mm

Sampling Lines & Sample Points

	Line A						
Traverse Point		ΔP pt mmH_2O	ΔP pt Pa	Temp °C	Velocity (corrected for swirl) m	O_2 % Vol	Angle of Swirl °
1		9.0	88.6	56.2	9.43	15.1	30
2		11.6	113.3	56.2	10.66	15.1	30
3		8.3	81.0	56.2	7.97	15.1	40
4		7.8	76.4	56.2	7.74	15.1	40
5		7.4	72.2	56.2	8.51	15.1	30
6		7.4	72.3	56.2	8.52	15.1	30
7		7.3	72.0	56.2	8.50	15.1	30
8		8.0	78.7	56.2	8.89	15.1	30
9		5.4	53.1	56.2	6.46	15.1	40
10		6.3	61.6	56.2	6.95	15.1	40
11		11.0	107.9	56.2	10.41	15.1	30
12		9.2	90.3	56.2	9.52	15.1	30
Mean		7.8	80.6	56.2	8.63	15.1	33

	Line B						
Traverse Point	Distance into duct (m)	ΔP pt mmH_2O	ΔP pt Pa	Temp °C	Velocity m/s	O_2 % Vol	Angle of Swirl °
1	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-
Mean	-	-	-	-	-	-	
AVERAGE	-	7.8	76.9	56	8.36	-	

Pitot tube velocity constant, K_p		34.97		
Velocity pressure coefficient, C_p	0.83			
Mean Oxygen		15.1	Moisture Cointent Calculations	
Mean CO_2		4.20	RH, %	
Mean Md		29.28	Saturated Vapour Pressure. mmHg	
Moisture %	13.7	0.137		
Mean Ms		27.73		
Barometric Pressure, kPa	101.673	762.6		
Static Pressure, Pa	-40	-0.30		
Absolute Stack Pressure		762.3		
Angle of Swirl		33		
Lowest Gas Velocity,m/s		6.46		
Highest Gas Velocity, m/s		10.66		
Mean Velocity, m/s		8.63		
Duct Volumetric Flow Rates				
Moist, m^3/h		12,302		
Moist Standards, m^3/h		10,238		
Dry Standard, m^3/h		8,835		

SOURCE TESTING NZ

Appendix B Moisture Content, Particulate Mass and Odour Determinations

This Appendix contains 2 pages including cover.

Moisture Content Determinations

Sampling Run	Moisture Mass Collected (g)	Gas Volume Sampled (m^3)[1]	Stack Moisture Content (%)
PM Run 1	97.0	1.016	10.6
PM Run 2	78.4	0.733	11.7
PM Run 3	86.9	0.680	13.7

1. Corrected to 0 ºC, 101.3 kPa, dry gas basis

Particulate Mass Determinations

Sampling Run	Sample ID	Filter / Rinse Volume	Initial Weight (g)	Final Weight (g)	Mass (g)	Net Mass (g)	Total Mass (g)
PM Run 1	ST1031/04	ST1952	0.5951	0.6317	0.0366	0.0362	0.0540
	ST1031/05	100	104.8468	104.8649	0.0181	0.0178	
PM Run 2	ST1031/06	ST1953	0.5930	0.6408	0.0478	0.0474	0.0660
	ST1031/07	100	94.3777	94.3966	0.0189	0.0186	
PM Run 3	ST1031/08	ST1954	0.5874	0.6248	0.0374	0.0370	0.0518
	ST1031/09	100	82.4023	82.4174	0.0151	0.0148	
Filter Blank	ST1031/10	ST1955	0.5924	0.5928	0.0004		
Rinse Blank	ST1031/11	100	84.6825	84.6828	0.0003		

Particulate Concentration Determinations

Sampling Run	Sample ID	Odour Conc. (OU)	Dilution Ratio	Undiluted Odour Conc. (OU)
Run 1	ST1031/01	10,048	2.23	22,407
Run 2	ST1031/02	8,391	2.00	16,782
Run 3	ST1031/03	12,656	1.95	24,679

Appendix C Odour Laboratory Report

This Appendix contains 3 pages including cover

Watercare
Laboratory Services

Sensory Evaluation Unit

Olfactometry Results (Forced Choice)

Client: **Source Testing NZ Ltd**
Contact: **Mathew Newby**
Address: **39 Cedar St, Maungaraki**
Date Received: **2/03/2022**
Report Date: **9/03/2022**
Report Number: **rp 22016s**

- Odour concentration analysed in accordance with AS/NZS 4323.3:2001: "Determination of odour concentration by dynamic olfactometry" using Olfasense – TO-Evolution. Calibration set by Watercare in November 2021.
- Odour character analysed in accordance with Watercare Services Ltd: Method EM02.159 Section 4.6.

Panel Threshold for measurement (AS/NZS 4323.3:2001)[1]:

Panellist	Average Threshold (ppb)	Standard Deviation	Acceptable Range	Qualified
Panellist 1	36.4	1.85	Threshold range: 20-80ppb Standard Deviation: ≤ 2.3	Yes
Panellist 2	45.1	1.57		Yes
Panellist 3	33.8	1.59		Yes
Panellist 4	32.1	1.78		Yes

[1]Average taken from 20 individual threshold estimates (ITEs) for reference gas (n-butanol 60ppm, ID: 030000059098/1).

Environmental Conditions for measurement (AS/NZS 4323.3:2001 Section 9.6)[2]:

Temperature Range	Ventilation	Environment odourless and pleasant	Noise or light Interference
22.4 °C – 22.7 °C	50.80 – 68.99 m^3/hr/person	Yes	No

[2]Section 9.6 (AS/NZS 4323.3:2001) states temperature fluctuations during the measuring process shall be less than Minimum ventilation rate of 4.4m^3/ hour per person.

Actual Sampling Conditions:

Lab Reference	Description[3]	Temperature (°C)
220302-01	Odour Run - 1	N/A
220302-01	Odour Run - 2	N/A
220302-01	Odour Run - 3	N/A

[3]Data supplied by customer

Laboratory Services – Watercare Services Limited
52 Aintree Avenue, Airport Oaks, Mangere, Manukau 2022, New Zealand
PO Box 107028 Airport Oaks, Manukau 2154, New Zealand
Telephone +64 9 539 7600 Facsimile +64 9 539 7620
www.watercarelabs.co.nz

Odour Concentration (AS/NZS 4323.3:2001)[4]:

Sample Date & Time[5]		Analysis Date & Time		Description	Results (OU)	Lab. Reference	Sampling Method
1/03/2022	N/A	2/03/2022	13:04	Odour Run - 1	**10,048**	220302-01	Point source
1/03/2022	N/A	2/03/2022	12:33	Odour Run - 2	**8,391**	220302-02	Point source
1/03/2022	N/A	2/03/2022	12:47	Odour Run - 3	**12,656**	220302-03	Point source

[4] < LOD is < 21 OU, the lowest detectable odour concentration that can be determined with 95% statistical confidence.
[5] Data supplied by customer

Odour Character (Watercare Services Ltd method EM02.159, section 4.6):

Laboratory Reference	Description of Odour
220302-01	Strong – Chemical (gasoline-like)
220302-02	Strong – Chemical (gasoline-like)
220302-03	Strong – Chemical (gasoline-like)

Comments:

1. A minimum of four panellists were presented with three runs.
2. All samples retrospectively screened.
3. For Description of Odour, the original sample was presented to the panellists.
4. Pre-dilution was not required prior to analysis.
5. All samples were collected by STNZ.

Sara Abayaratne
Author

Trevor Everett
Peer Reviewer

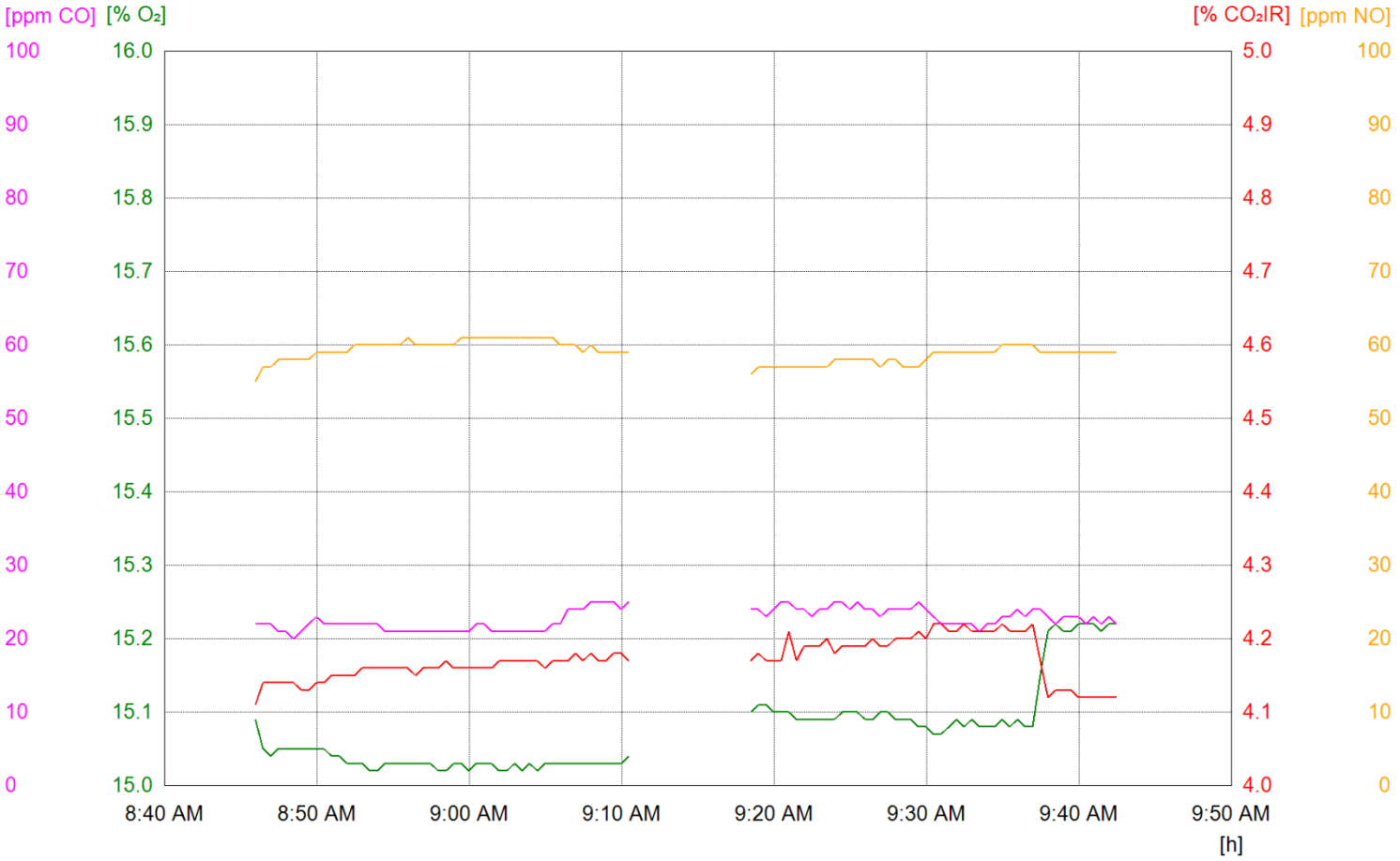
ACCREDITED
IANZ
TESTING LABORATORY

Laboratory Services – Watercare Services Limited
52 Aintree Avenue, Airport Oaks, Mangere, Manukau 2022, New Zealand
PO Box 107028 Airport Oaks, Manukau 2154, New Zealand
Telephone +64 9 539 7600 Facsimile +64 9 539 7620
www.watercarelabs.co.nz

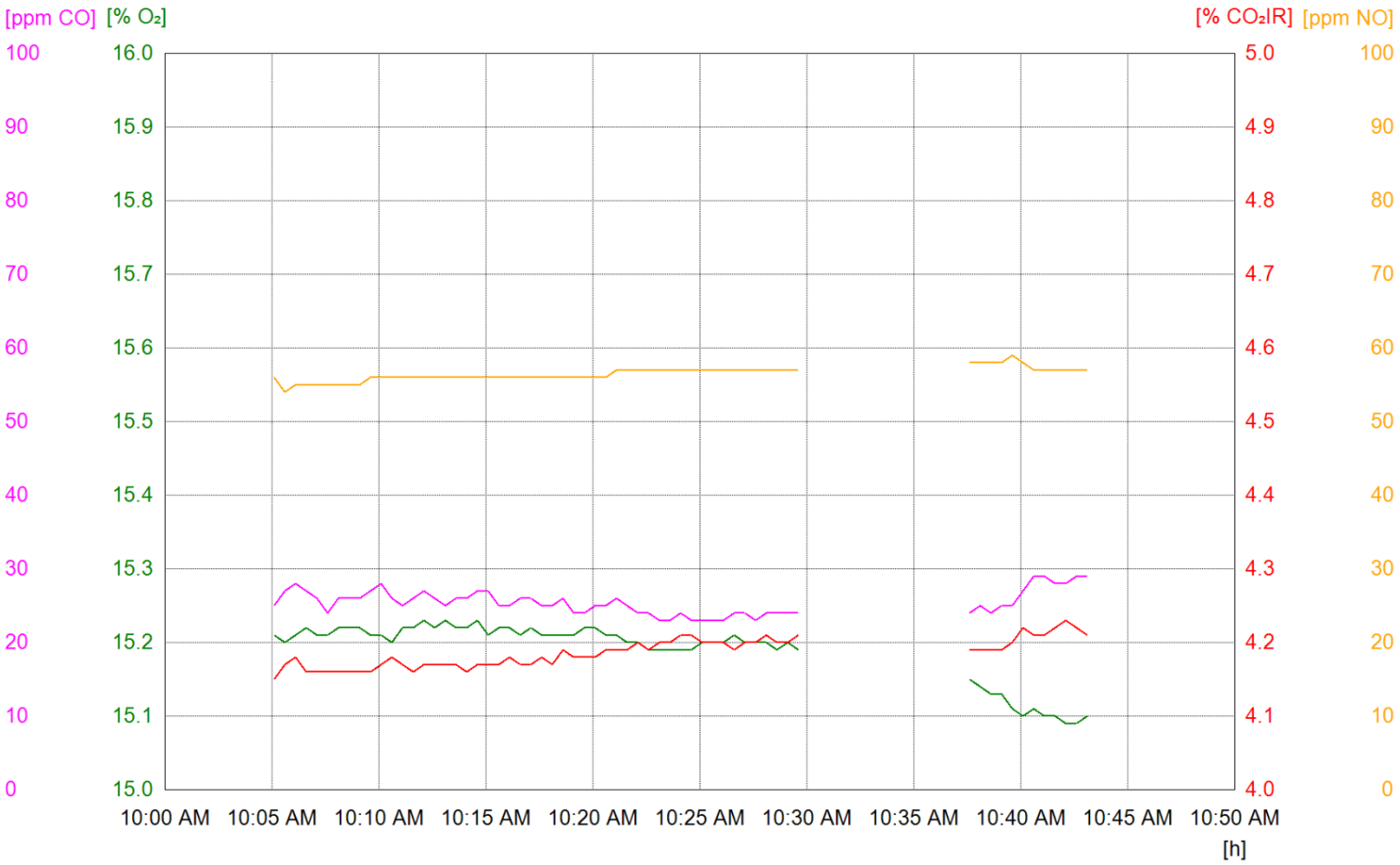
Appendix D Raw Testo Files

This Appendix contains 5 pages including cover.

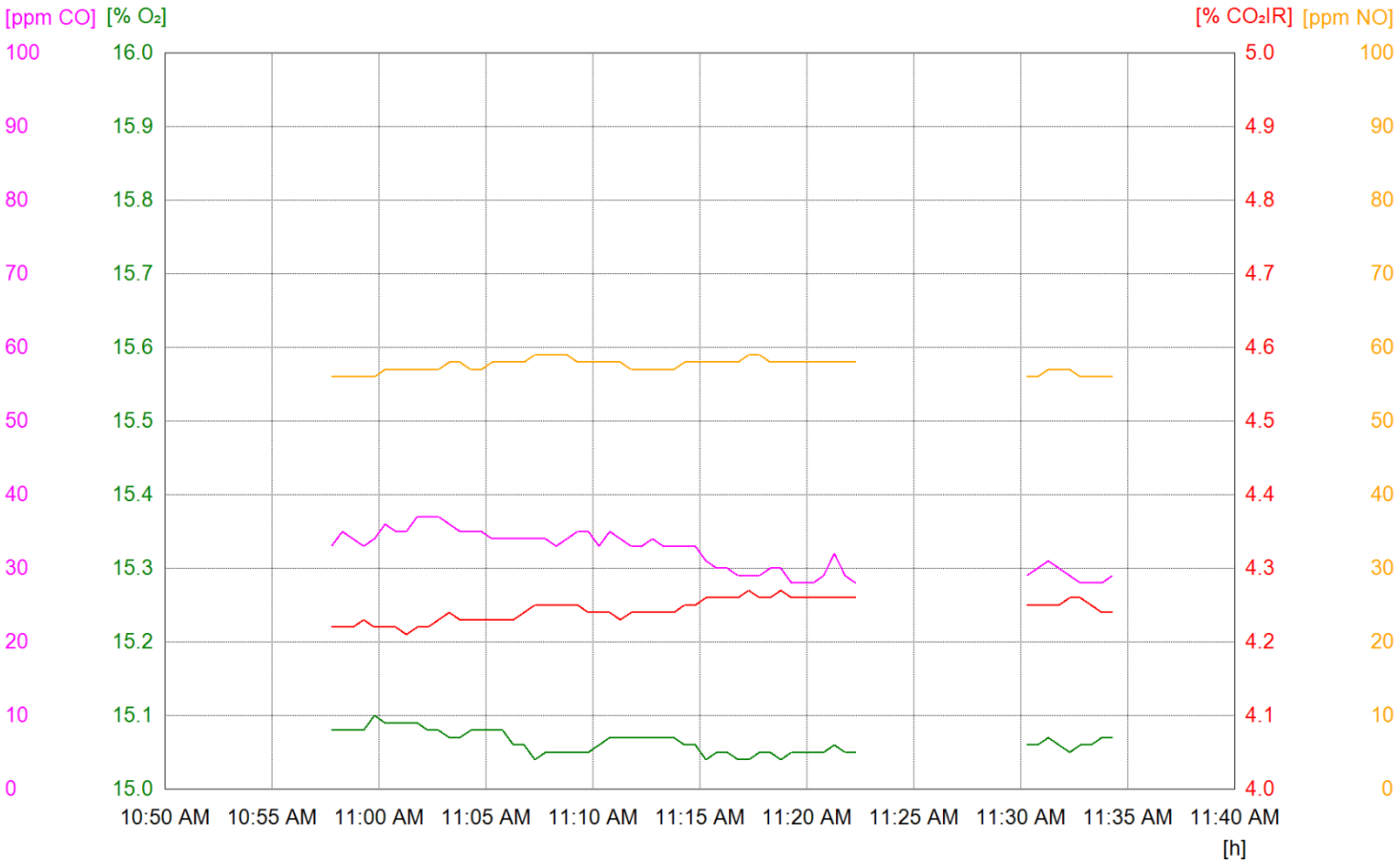
Higgins Tauranga Run 1 1 March 2022



Higgins Tauranga Run 2 1 March 2022



Higgins Tauranga Run 3 1 March 2022



Appendix C.1: Tangata Whenua Communications

From: Awhina August
Sent: Wednesday, 3 August 2022 4:52 PM
To: Nathan James
Cc: Simon Greening ; Whareroa Whānui
Subject: Re: Higgins Contractors-Reconsenting

Kia ora Simon,

Nathan will go on the site visit on behalf of us.
Nāku noa nā,

Awhina Ngātuere
Managing Director
August & August Ltd
021 143 7040

On 3/08/2022, at 4:04 PM, Nathan James <tekurioterangi11@gmail.com> wrote:
Kia Ora Simon,

I'll be attending the hui on Monday.

Ngā mihi
Nathan James
Ngati Kuku Hapu.
Sent from my iPhone

On 2/08/2022, at 3:12 PM, Simon Greening <Simon.Greening@pdp.co.nz> wrote:

Kia ora Awhina,

Just following up to see if you can make this date (8 August at 10.30am)? Just to let you know that Higgins Mātauranga Māori Coordinator is assisting now with this project too. See below.

Kia ora Simon

Just confirming I will be attending a tinana for our hui next week. As long as covid stays away at this point we are good.

Nga Mihi, Kia pai to ra
Val Panui
Mātauranga Māori Coordinator
Koro Ruapehu te maunga, Whanganui te awa, Aotea te waka,
Ngāti Rangi, Ngāti Haua, Ngāti Ruanui, Ngāti Tuwharetoa, me Ngāti Whatua whanui

Corporate Affairs - Fletcher Building
Mobile: +64 27 2908468

Regards,

Simon Greening | Services Leader – Environmental Planning

PATTLE DELAMORE PARTNERS LTD
South British House, Level 2, 35 Grey Street, Tauranga, 3110
PO Box 13 274, Tauranga, 3141
NEW ZEALAND

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Web - www.pdp.co.nz

From: Simon Greening
Sent: Monday, 25 July 2022 12:52 PM
To: Awhina Ngatuere <awhina.august@maoriworks.com>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Kia ora Awhina,

Have heard back from the Higgins team and the 8th of August works best. I suggest 10.30am if this works for you? If you could let me know at some point prior to the hui how many hapū members would like to attend, so Higgins can ensure they have enough space/catering etc. Appreciated.

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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From: Simon Greening
Sent: Monday, 25 July 2022 11:02 AM
To: Awhina Ngatuere <awhina.august@maoriworks.com>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Kia ora Awhina,

Thank you. I'll check with the team and get back to you as soon as I can.

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Awhina Ngatuere <awhina.august@maoriworks.com>
Sent: Sunday, 24 July 2022 6:27 PM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Kia ora Simon,

Can we please look at a later date please. Suggest finding a date week of **1 - 5 August or the following week 8 -12 August.**
There are some dates that don't work in these weeks for me as I am back at work, but if you can come back with a few dates please and I'll follow up with our committee to see who is available.

Thanks
Awhina

On Fri, Jul 22, 2022 at 2:59 PM Simon Greening <Simon.Greening@pdp.co.nz> wrote:
Kia ora Awhina,

Just following up to see whether these dates or later ones work for you?

Regards,

Simon Greening | Services Leader – Environmental Planning

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From: Simon Greening
Sent: Friday, 15 July 2022 2:19 PM
To: Awhina August <awhina.august@maoriworks.com>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Kia ora Awhina,

I hope you are well. Sorry for taking some time to respond, but I have been working through the air quality topics with Higgins to address those recommendations from the Ecocific Report which are addressed in the table below.

On this basis, we'd like to proceed with the visit to the Higgins site for key hapū members and have a discussion about the consent and next steps. Are you able to make a hui (site visit at Higgins) on either Mon 25 or Tues 26 July?

	Topic:	**PDP comment**
1	*To investigate and implement new alternatives to assess scrubber performance which can complement the 3 years emission report (e.g. ambient air testing, pressure differential, scrubber liquid solids content and scrubber liquid flow rate monitoring)*	The short term duration is intended to provide Higgins time to consider long-term options for the site.
2	*To add conditions in the proposed resource consent that will address new requirements from the Mount Maunganui airshed. These new requirements (e.g. amended emission rate and/or maximum production rate) should take in consideration business, cultural and environmental sustainability.*	Higgins is proposing to lower the consented rate from 2.5kg/hr to 1.5kg/hr.
3	*To list and provide guidelines in various management plans on the PPE available, when for example responding to environmental incidents.*	Higgins already doing this.
4	*To undertake an air emission report on all volatile compounds and implement measures as required by the finding (e.g. SO_2, NOx, CO, CO_2, PAH, VOC).*	Higgins has requested PDP prepare this information. Please see attached report. This demonstrates all trace contaminants are significantly less than relevant assessment criteria.
5	*To undertake air emission testing (e.g. particulate matter and gases) when the mixture for asphalt production is significantly modified*	It is recommended that the annual testing occurs while batches of asphalt represent worst case emissions.
6	*To implement ambient air quality program to assess the efficacy of remediation measures, fugitive emissions, compliance, health and safety, and support environmental sustainability*	Higgins propose to undertake some ambient monitoring on-site to capture variability in operating and meteorological conditions. This will occur onsite or at the site boundary to measure particulate matter using. Higgins consider this will be valuable information to contribute towards the understanding of air quality in the Mount Airshed and can share this information with you.
7	*To record odour daily at the site boundary and directly downwind –*	Higgins already do this and have just installed a weather station to monitor and record weather conditions. Third party odour observations will be undertaken soon to validate findings.
8	*To investigate the benefits to correlate control measures to weather conditions; for example increasing the use of water cart during strong wind -*	Higgins already doing this.
9	*To notify any environmental and human health incidents within 7 days of the discovery and supported by a report including the following information in this written description:*	Higgins already doing this.
	○ *the cause of the deviation;*	
	○ *the exact dates of the period of the deviation, if the deviation has been corrected;*	
	○ *whether or not the deviation has been corrected;*	

○ *the anticipated time by which the deviation is expected to be corrected, if not yet corrected; and*	
○ *steps taken or planned to reduce, eliminate, and prevent reoccurrence of the deviation -*	

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Awhina August <awhina.august@maoriworks.com>
Sent: Monday, 30 May 2022 6:59 AM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Kia Ora Simon
Apologies our team have been busy with preparations for environmental court hearings.
Can you suggest some dates in the next couple of weeks and I'll liaise with the team.

Has Higgins come back with responses to the Ecocific report?

Nāku noa nā,

Awhina Ngātuere
Managing Director
August & August Ltd
021 143 7040

On 26/05/2022, at 3:21 PM, Simon Greening <Simon.Greening@pdp.co.nz> wrote:

Kia ora Awhina,

Just following up to see if these dates worked for you and hapū members?

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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NEW ZEALAND

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Web - www.pdp.co.nz

From: Simon Greening
Sent: Thursday, 19 May 2022 4:06 PM
To: Awhina August <awhina.august@maoriworks.com>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Kia ora Awhina,

Sorry for the delay. Is 30 May (any time of day), or 31 May (afternoon) available for you to attend VC hui and hapu members to view site? There are no vaccine requirements now, and face masks will be optional.

Im just waiting for Gerry to send me an update on the actions from the Ecocific report.

Regards,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Simon Greening
Sent: Friday, 6 May 2022 2:55 PM
To: Awhina August <awhina.august@maoriworks.com>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Kia ora Awhina,

Congratulations firstly.

I have just spoken to Gerry from Higgins and he is going to send me an update and find some time slots, so will prob have this on Monday hopefully. Will let you know re site visit requirements too.

Regards,

Simon Greening | Services Leader – Environmental Planning

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Office - +64 7 985 6440
Web - www.pdp.co.nz

From: Awhina August <awhina.august@maoriworks.com>
Sent: Friday, 6 May 2022 2:13 PM

To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Kia Ora Simon,

I'm flexible in the next couple of weeks so perhaps you can come back with two dates for us? Can you send through an update on the actions Higgins have done in the Ecocific report prior to our meeting please?

My baby is 3 weeks old and so I will join the meeting online, however we would still ask if members of our team can do a site visit also. Can you confirm if Higgins still requires vaccine passes for visitors on-site please?
Nāku noa nā,

Awhina Ngātuere
Managing Director
August & August Ltd
021 143 7040

On 6/05/2022, at 1:57 PM, Simon Greening <Simon.Greening@pdp.co.nz> wrote:

Kia ora Nathan/Joel,

Just following up on the email below to see if we can find a hui time in the next few weeks?

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Simon Greening
Sent: Tuesday, 3 May 2022 8:32 AM
To: 'Awhina August' <awhina.august@maoriworks.com>
Cc: 'Nathan James' <tekurioterangi11@gmail.com>; 'Whareroa Whānui' <whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Kia ora all,

Following on from the meeting we had in March, Higgins has been working on some things that we talked about at that meeting. As discussed, we outlined that Higgins would respond to the matters raised in the Ecocific report and consider other relationship building options.

Joel, I think I heard Awhina say she was expecting shortly, and that you may be able to attend this hui? If you wouldn't mind letting me know if you or anyone else may be able to attend a hui in a couple of weeks' time (or other time that suits you).

Regards,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Simon Greening
Sent: Friday, 11 March 2022 9:15 AM
To: Awhina August <awhina.august@maoriworks.com>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Kia ora Awhina,

Thank you for your time yesterday and sharing your views. As Gerry said, Higgins would like to build this relationship.

As discussed, if you could provide some dates in a couple of weeks' time for a visit to the Higgins site, that would be appreciated.

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Simon Greening
Sent: Wednesday, 2 March 2022 9:25 AM
To: Awhina August <awhina.august@maoriworks.com>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Morena Awhina,

Thanks, will send an invite now.

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Awhina August <awhina.august@maoriworks.com>
Sent: Wednesday, 2 March 2022 8:55 AM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Morena,

Can we lock in the 10th please Simon.

Nāku noa nā,

Awhina Ngātuere
Managing Director
August & August Ltd
021 143 7040

On 1/03/2022, at 3:01 PM, Simon Greening <Simon.Greening@pdp.co.nz> wrote:

Kia ora Awhina,

Higgins would be available tomorrow after 2, otherwise, they have the 10th & 11th free. Just let me know which would suit. Cheers.

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Simon Greening
Sent: Friday, 25 February 2022 1:30 PM
To: Awhina Ngatuere <awhina.august@maoriworks.com>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Thanks Awhina. I've put those dates/times to Higgins.

Regards,

Simon Greening | Services Leader – Environmental Planning

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Office - +64 7 985 6440
Web - www.pdp.co.nz

From: Awhina Ngatuere <awhina.august@maoriworks.com>
Sent: Friday, 25 February 2022 1:26 PM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

OK I can do 2 March after 2pm or

1. 7 March, PM
2. 10 March, PM
3. 11 March, PM

Please confirm ASAP

On Fri, Feb 25, 2022 at 1:23 PM Simon Greening <Simon.Greening@pdp.co.nz> wrote:
Kia ora Awhina,

Thank you for following up. I spoke to Higgins yesterday about locking in a date for this, so I expect to hear back soon hopefully.

I think 28 Feb is too late now, so have asked them to look at (if this still suits you):

1. 2 Mar in the PM or
2. Anytime the week of 7 to 11 Mar in the PM.

Regards,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Awhina Ngatuere <awhina.august@maoriworks.com>
Sent: Friday, 25 February 2022 1:15 PM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Kia ora Simon,

Can you confirm which date they were able to do this meeting please. My calendar is filling up.

Also - it will need to be online as Nathan is self isolating and my household is too.

Awhina

On Thu, Feb 3, 2022 at 9:24 AM Simon Greening <Simon.Greening@pdp.co.nz> wrote:
Kia ora Awhina,

Just checking to see if we are able to find some time for this hui in the next few weeks?

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Simon Greening
Sent: Tuesday, 18 January 2022 9:34 AM
To: 'Awhina Ngatuere' <awhina.august@maoriworks.com>
Cc: 'Nathan James' <tekurioterangi11@gmail.com>; 'Whareroa Whānui' <whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Kia ora Awhina,

Happy NY to you and your team.
We'll have another go at organising this meeting. Are you available in the afternoon of 26th or 27th Jan, or anytime 2nd Feb?

Regards,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Simon Greening
Sent: Wednesday, 22 December 2021 9:04 AM
To: Awhina Ngatuere <awhina.august@maoriworks.com>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Thanks Awhina. I'll be in touch in the New Year so everyone can see what there calendars look like then. Hope you all have a nice break.

Regards,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Awhina Ngatuere <awhina.august@maoriworks.com>
Sent: Wednesday, 22 December 2021 9:02 AM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Kia ora Simon,
Great to hear you are all clear. Hope you're feeling better.

That would be great to wait until next year as we are super busy this week,

Thanks
Awhina

On Tue, Dec 21, 2021 at 2:55 PM Simon Greening <Simon.Greening@pdp.co.nz> wrote:
Kia ora Awhina,

Sorry it may be my turn to delay this now. I've had cold since the weekend (getting better today though), but am awaiting a Covid test (expected back today).

I can be in touch in the morning, but we may need to postpone til next year. I'll let you know first thing tomorrow.

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Simon Greening
Sent: Wednesday, 15 December 2021 12:46 PM
To: Awhina August <awhina.august@maoriworks.com>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui

<whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Kia ora Awhina,

We can do any time after 11am Wednesday next week if that's free for your team?

Regards,

Simon Greening | Services Leader – Environmental Planning

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Office - +64 7 985 6440
Web - www.pdp.co.nz

From: Simon Greening
Sent: Wednesday, 15 December 2021 10:05 AM
To: Awhina August <awhina.august@maoriworks.com>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Kia ora Awhina,

No worries. Is there any time between now and Wed next week that you could realistically make? If not, we'll have to push to next year. I asked Higgins for dates too.

Regards,

Simon Greening | Services Leader – Environmental Planning

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Office - +64 7 985 6440
Web - www.pdp.co.nz

From: Awhina August <awhina.august@maoriworks.com>
Sent: Wednesday, 15 December 2021 8:15 AM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Kia Ora Simon,
Apologies, my afternoon schedule is now full so we will need to find another time?

Can you ask Higgins to come back with a couple of dates

Nāku noa nā,

Awhina Ngātuere
Managing Director
August & August Ltd
021 143 7040

On 14/12/2021, at 6:42 AM, Simon Greening <Simon.Greening@pdp.co.nz> wrote:

Morena Awhina,

I'll send that time through to Higgins. Fingers crossed!

Regards,

Simon Greening | Services Leader – Environmental Planning

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Office - +64 7 985 6440
Web - www.pdp.co.nz

From: Awhina August <awhina.august@maoriworks.com>
Sent: Tuesday, 14 December 2021 6:41 AM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Morena,
I can make 2:30pm work?

Nāku noa nā,

Awhina Ngātuere
Managing Director
August & August Ltd
021 143 7040

On 13/12/2021, at 10:19 AM, Simon Greening <Simon.Greening@pdp.co.nz> wrote:

Kia ora Awhina,

Sorry, Seans calendar booked up in the morning. Can you so anytime from 2pm onwards on Wed?

Regards,

Simon Greening | Services Leader – Environmental Planning

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Office - +64 7 985 6440
Web - www.pdp.co.nz

From: Awhina Ngatuere <awhina.august@maoriworks.com>
Sent: Friday, 10 December 2021 11:38 AM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Kia ora Simon,
Yes i have locked this in.

Thanks
Awhina

On Wed, Dec 8, 2021 at 10:29 AM Simon Greening <Simon.Greening@pdp.co.nz> wrote:
Kia ora Awhina,

Higgins and I have next Wed (15th) available to meet. Does some time on this day (after 930am) suit your team?

Regards,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Awhina August <awhina.august@maoriworks.com>
Sent: Friday, 3 December 2021 4:21 PM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Great thanks Simon
Nāku noa nā,

Awhina Ngātuere
Managing Director
August & August Ltd
021 143 7040

On 3/12/2021, at 3:57 PM, Simon Greening <Simon.Greening@pdp.co.nz> wrote:

Kia ora Awhina,

As discussed, I'll try and find a slot in the week on 13-17 Dec so Sean (Higgins Area Manager) can attend too. Will come back to you with some times.

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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Office - +64 7 985 6440
Web - www.pdp.co.nz

From: Awhina August <awhina.august@maoriworks.com>
Sent: Friday, 3 December 2021 3:49 PM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Nathan James <tekurioterangi11@gmail.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Kia Ora,
Sorry I've been away in Taupō for work.

Monday 9:30am-10:30am works for me.

All good with you Nathan?
Nāku noa nā,

Awhina Ngātuere
Managing Director
August & August Ltd
021 143 7040

On 3/12/2021, at 9:02 AM, Simon Greening <Simon.Greening@pdp.co.nz> wrote:

Kia ora all,

Just checking on the availability for the meeting on Monday? We can choose another date if that suits better?

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Simon Greening
Sent: Monday, 29 November 2021 11:10 AM
To: Nathan James <tekurioterangi11@gmail.com>
Cc: Awhina Ngatuere <awhina.august@maoriworks.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Kia ora Nathan,

I've have put a placeholder in our diaries for between 9 and 12, so we're good to lock this in as soon as we hear from the committee.

Do you have a preference for meeting venue? Unfortunately our large meeting room here is booked, but happy to meet at a location that suits you? I have asked Higgins if their meeting room is available too (if needed).

Regards,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Nathan James <tekurioterangi11@gmail.com>
Sent: Monday, 29 November 2021 10:55 AM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Awhina Ngatuere <awhina.august@maoriworks.com>; Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Kia Ora Tatou

Keen to have a korero with Higgins. I'm fine with the 6th December but willing to work with the committee on finding a suitable date and time for all.

Nga mihi
Nathan James
Ngati Kuku.
Sent from my iPhone

On 24/11/2021, at 5:10 PM, Simon Greening <Simon.Greening@pdp.co.nz> wrote:

Kia ora Awhina,

Thank you for committing the time for this meeting. Does Mon the 6th Dec between 9am-12pm work for you?

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Awhina Ngatuere <awhina.august@maoriworks.com>
Sent: Wednesday, 24 November 2021 4:54 PM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Whareroa Whānui <whareroacollective@gmail.com>; Nathan James <tekurioterangi11@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Kia ora Simon,

We are busy this week, and I will be in Taupo from Sunday to Friday next week for professional development.

So we are looking at a date from 6 December onwards. Let us know if there are any particular days that suit you.

Awhina

On Wed, Nov 24, 2021 at 10:21 AM Simon Greening <Simon.Greening@pdp.co.nz> wrote:
Kia ora all,

I was just following up to see if you have availability in the next few weeks, or your earliest convenience to discuss this application?

Regards,

Simon Greening | Services Leader – Environmental Planning

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Office - +64 7 985 6440
Web - www.pdp.co.nz

From: Simon Greening
Sent: Wednesday, 17 November 2021 1:51 PM
To: Awhina Ngatuere <awhina.august@maoriworks.com>
Cc: Whareroa Whānui <whareroacollective@gmail.com>; Nathan James <tekurioterangi11@gmail.com>
Subject: RE: Higgins Contractors-Reconsenting

Kia ora Awhina,

Thank you for all those clarifications. No progress was made following the completion of the Ecocific report as this was right over the first Covid lockdown period, and Higgins had quite a change of staff over that time. I suggest this will be the starting point for the conversation now.

Perhaps if you could suggest some dates/times that work for yourselves over the next couple of weeks, that would be much appreciated. I'll organise our side for one of those times.

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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Web - www.pdp.co.nz

From: Awhina Ngatuere <awhina.august@maoriworks.com>
Sent: Wednesday, 17 November 2021 1:36 PM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Whareroa Whānui <whareroacollective@gmail.com>; Nathan James <tekurioterangi11@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Kia ora Simon,

Thanks for sourcing that information for me.

Chris is no longer on our Ngāti Kuku board and hasn't been since November 2020. For transparency, our board have a zero tolerance to further pollution in our tribal boundary. Due to industrial activity, as you are aware, we now have a designated polluted air shed. We have a lot going on with government and industry to reduce the pollution in the Whareroa Block (Mount industrial) zone.

Moving forward the key contacts for Ngāti Kuku and Whareroa Marae are:

1. Nathan James - tekurioterangi11@gmail.com
2. Awhina Ngatuere (myself) - on this email
3. Joel Ngatuere - whareroacollective@gmail.com

From reading the report, can you provide a progress report on the recommendations Ecocific has provided please.

If we can arrange a meeting for Ngāti Kuku and Whareroa Marae only (Ngāi Tukairangi can proceed with a meeting with you directly).

Nga mihi
Awhina

On Wed, Nov 17, 2021 at 11:30 AM Simon Greening <Simon.Greening@pdp.co.nz> wrote:

Kia ora Awhina,

I'm having to look through the records of the consultation that Higgins begun, so please bear with me, but I can see Higgins met with Hayden Henry and Chris Stokes (representing Ngati Kuku) on 15 Jan 2020 and 26 Feb 2020. I'm not sure what the arrangement was following this, but Hayden appears to have remained the point of contact for Higgins while an independent report was prepared for Ngāti Kuku and Ngāi Tukairangi (see attached). It would be appreciated if you could clarify how we should proceed regarding engagement with Ngāti Kuku and Ngāi Tukairangi. Hayden has requested a meeting going forward.

Regards,

Simon Greening | Services Leader – Environmental Planning

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From: Awhina Ngatuere <awhina.august@maoriworks.com>
Sent: Wednesday, 17 November 2021 10:48 AM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Whareroa Whānui <whareroacollective@gmail.com>
Subject: Re: Higgins Contractors-Reconsenting

Simon, Kia ora.

Who from Ngati Kuku have you engaged with?

Thanks
Awhina

On Wed, Nov 17, 2021 at 10:28 AM Simon Greening <Simon.Greening@pdp.co.nz> wrote:
Kia ora Joel,

Thank you for your quick response and acknowledge your comments. Just of note too, Higgins was engaging with Ngāti Kuku and Ngāi Tukairangi (Hayden Henry) and Ngai Te Rangi (Pia Bennett) and has recovered this engagement at this time as well.

Please see attached a copy of the application and AEE. Please note, since Higgins has since proposed a consent limit of 1.5kg/hr, the AEE presents a slight over-estimation since it was originally based on a higher rates, so effects will be slightly less than described.

I look forward to hearing from you in time.

Regards,

Simon Greening | Services Leader – Environmental Planning

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From: Whareroa Whānui <whareroacollective@gmail.com>
Sent: Wednesday, 17 November 2021 7:34 AM
To: Simon Greening <Simon.Greening@pdp.co.nz>
Cc: Awhina August <awhina.august@maoriworks.com>
Subject: Re: Higgins Contractors-Reconsenting

Kia ora Simon

Thank you for your email to touch base I have cc'd the Chair of Ngāti Kuku, Awhina, as the board are the primary lead for all issues throughout the Mount Industrial Zone and wider area.

However, while your operations are 1.4km from our location we both know that this does not stop the spread of particulate matter entering our marae and residential community. Furthermore, as Kaitiaki of the wider Mount Maunganui area, the marae does have concerns for impact to our wider community and their families. Which also includes members of our marae who live in these areas.

If you can send through an electronic and hard copy of consent application that would be appreciated.

11 Taiaho Place
Mount Maunganui
Tauranga, 3116

Nā

Joel Ngātuere
Whareroa Marae & Community
021 211 0334

On Tue, 16 Nov 2021 at 12:22 PM, Simon Greening <Simon.Greening@pdp.co.nz> wrote:
Kia ora Joel,

I hope this email finds well.

I am contacting you on behalf of Higgins Contractors Limited (HCL). HCL is applying for a replacement resource consent from BOPRC to discharge to air from their asphalt manufacturing plant at 90-92 Hewletts Road, Mt Maunganui. A resource consent application for this was lodged on 26 March 2020 and has been on hold pending information requirements.

BOPRC noted that given the issues being experienced within the Mount Airshed, that it is important to contact Whareroa Marae. As such, HCL is sending you this email to provide you with some project information and seek your feedback.

The asphalt plant has operated for over 20 years at the site without complaints and in compliance with current consent conditions. There a will be no increase in particulate emissions as a result of this continued operation of the plant, and HCL has agreed to lower their consented particulate rate from 2.5 kg/hr to 1.5 kg/hr (to align with historic discharges). The area most affected by the activity consists of those receptors in the industrial zoned area surrounding the site, however effects at

these locations are still considered less than minor. Whareroa Marae located approximately 1.4 km to the west-southwest of the site boundary. A term of 10 years is applied for to allow HCL to consider longer term options either at the site or elsewhere.

I would really appreciate getting your feedback by **14 December 2021** to understand whether Whareroa Marae is comfortable with the proposal or would like further information. If the latter, I am happy to provide this or meet with you at a time that suits if needed. If I haven't heard from you by **30 November 2021**, I will follow-up with a phone call.

I look forward to hearing from you. If you have any other questions, I would be happy to assist.

Ngā mihi,

Simon Greening | Services Leader – Environmental Planning

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meeting minutes

TITLE	Minutes – Ngati Kuku – Higgins Asphalt Plant Consenting		
DATE/TIME	10/03/2022: 14.00hrs	VENUE	Teams VC
ATTENDEES	Awhina Ngatuere (Ngati Kuku) Gerry Mclaughlan (Higgins), Chris Bender (Air Quality Expert on behalf of Higgins), Simon Greening (Planner on behalf of Higgins)		

- SG welcomed everyone to meeting.
- SG provided background to the application in that a new plant was proposed but this has been side-lined. Higgins now applying for a short term consent and has proffered to reduce the consent limit to align with historic output and ensure emissions don't rise.
- AN gave brief history of who she is and her connection with the land. Expressed that the cumulative effects on her people are unacceptable as a result of the industrial activities in the Mount. Asked GM about his environmental awareness in the area.
- GM described his understanding of the gazetted airshed and expressed that is a concern for everyone.
- AN queried about managed retreat in the area too, led by TCC/BOPRC/iwi. GM generally aware of work going on.
- AN noted that goal of this was probably a box ticking exercise, but was keen to understand Higgins longer term plans. GM noted this was not a box ticking exercise but the consent application is obviously the moment Higgins can use as a platform to start relationship with Hapū. GM noted Higgins are considering options for Asphalt plants across the region and that this is the purpose of the short term consent, but obviously couldn't elaborate or commit to anything now. GM noted the relationship is very important to Higgins moving forward.
- AN acknowledged this position.
- SG outlined the recommendations in the Ecocific report. Higgins will reflect on these recommendations and come back to AN formally where they can (or can't) implement these. AN agreed with this approach. CB noted that other contaminants (SO_2, NO_x, CO, CO_2, PAH, VOC) likely very low, however AN still wanted these investigated.

- AN noted this meeting was just to meet GM primarily and would like to move next time to discussing what Higgins is doing in regards to the recommendations and view the site, which GM welcomed.
- SG to arrange meeting time onsite subject to Covid implications. Higgins is a mandated site.

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meeting minutes

TITLE	Minutes – Ngati Kuku – Higgins Asphalt Plant Consenting		
DATE/TIME	23/08/2022: 10.30hrs	VENUE	Teams VC
ATTENDEES	Nathan James (Ngati Kuku) Val Panui, Brock Nash, Gerry Mclaughlan, Sam Cheah (Higgins), Simon Greening (Planner on behalf of Higgins)		

- VP opened the meeting with a karakia.
- Round table introductions.
- SG provided background to the application in that a new plant was proposed but this has been side-lined. Higgins now applying for a short-term consent and has responded to the nine recommendations in the Ecocific report, plus considered other relationship building options.
- NJ expressed that it is air quality that concerns Ngati Kuku most and desire to see improvements/reductions in emissions and that the ideal outcome in the Mount is no emissions. SG noted Higgins propose to cap emissions at historic rate until decision on future of the site, and other options can be pursued.
- NJ asked what environmental enhancement had occurred at the site since the plant was established.
- Collectively, Higgins responded that since 2016, Higgins has advanced a proposal to build a modern plant with a lot lower emissions. This had fallen through in 2020, however Higgins will be considering longer term options again. There are other wider improvements such as moving to low carbon vehicle fleet.
- SG tabled the list of relationship building options that could be considered by all-parties. NJ acknowledged many share similar characteristics with what others are trying to achieve in the Mount area as well. NJ will need to take back to the group to consider.
- VP queried about other ways Higgins could support Whareroa Marae, such as monitoring. Broad discussion about monitoring in the Mount, but noted Higgins has offered to undertake ambient air monitoring to understand effects at their end of the Mount.
- SG noted that other contaminants (SO_2, NO_x, CO, CO_2, PAH, VOC) are all very low as per PDP modelling which has been shared with Ngati Kuku.

- Higgins desire to build a relationship with Ngati Kuku moving forward and to include them in the ongoing conversation about what happens at the site. VP noted that she has been working on the Fletchers relationship strategy and it would be appreciated if the next hui could be held at Whareroa marae to present this and continue the kōrero with kaumatua. NJ supported this idea.
- SG noted that the s92 response must be submitted to BOPRC by the end of August. Everybody acknowledged that this did not mean the end of consultation. Higgins will report feedback learned from these hui and note consultation remains ongoing.
- NJ and Higgins thanked each other for the time for the hui.
- SG to arrange marae meeting time with NJ.

Appendix C.2: Tangata Whenua Communications

From: hayden henry <hayden.henry30@gmail.com>
Sent: Monday, 5 September 2022 4:21 pm
To: Simon Greening <Simon.Greening@pdp.co.nz>
Subject: Re: Ngai Tukairangi / Higgins

Kia Ora - I have read the minutes and are happy with those - as you expressed - higgins did some upgrades based on Ecocific recommendations and a bit more - regarding the term of Resource consent - I will agree to 5years and explore from their what direction Higgin takes and then we can review the duration of the terms

On Fri, Sep 2, 2022 at 3:53 PM Simon Greening <Simon.Greening@pdp.co.nz> wrote:
Kia ora Hayden,

Just following up on the email below. We need to respond to BOPRC, so any feedback on the minutes would be appreciated.

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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From: Simon Greening
Sent: Monday, 29 August 2022 2:55 pm
To: hayden henry <hayden.henry30@gmail.com>
Subject: RE: Ngai Tukairangi / Higgins

Kia ora Hayden,

Thank you again for your time the other day to meet with the Higgins team. As discussed, Higgins is required to reply to BOPRC to inform them of iwi consultation (amongst other things). Obviously the engagement with Ngati Tukairangi will be an ongoing journey, however, in respect of the hui/kōrero we have had to date, we will respond to BOPRC to inform them of our discussion points etc. Providing the minutes of those hui, will likely be the best way to fulfil that. As such, would you be able to review the meeting minutes to ensure they are a true and accurate reflection of what we discussed at the hui. Please add/amend as you require.

Happy to discuss.

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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meeting minutes

TITLE	Minutes – Ngai Tukairangi – Higgins Asphalt Plant Consenting		
DATE/TIME	30/11/2021: 13.00hrs	VENUE	PDP Office, Grey St, Tauranga CBD
ATTENDEES	Hayden Henry (Ngai Tukairangi), Julien Huteau (Air Quality Expert on behalf of Ngai Tukairangi), Sean Dowling (Higgins), Gerry Mclaughlan (Higgins), Chris Bender (Air Quality Expert on behalf of Higgins), Simon Greening (Planner on behalf of Higgins)		

- SG welcomed everyone to meeting. Hayden provided karakia.
- SG provided background to the application in that a new plant was proposed but this has been side-lined. Higgins now applying for a short term consent and has proffered to reduce the consent limit to align with historic output and ensure emissions don't rise.
- HH noted that Ngai Tukairangi focus isn't on the numbers. They understand the air shed is polluted and their focus is on who is contributing and what can be done to improve the situation.
- HH noted that a relationship is very important to Ngai Tukairangi and from this comes the basis for moving forward together.
- SG suggested there are a number of ways to formalise a relationship. Could be through a MOU, could be through conditions, or could be outside of formal agreements entirely. Higgins to consider how to foster this relationship.
- A site visit was suggested as a first step to show Ngai Tukairangi representatives what is happening onsite.
- JH mentioned the ability to monitor ambient air quality. Although difficulties exist with determining pollutant sources, this was something Higgins would consider.
- Other means on Higgins building a relationship with Ngai Tukairangi was discussed extending through employment opportunities etc. Higgins to consider these further means they could consider.
- It was agreed that Higgins would go away and consider those matters that Ngai Tukairangi raised and come back to Ngai Tukairangi in the near future to further the discussion.

- Hayden closed the meeting with a karakia and Higgins / PDP thanked Ngai Tukairangi for providing their time to the meeting.

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meeting minutes

TITLE	Minutes – Ngai Tukairangi – Higgins Asphalt Plant Consenting		
DATE/TIME	09/08/2022: 10.30hrs	VENUE	Teams VC
ATTENDEES	Hayden Henry (Ngai Tukairangi) Val Panui, Gerry Mclaughlan (Higgins), Simon Greening (Planner on behalf of Higgins)		

- HH opened the meeting with a karakia.
- VP introduced herself to HH.
- SG provided brief background on what Higgins had done since last hui responding to the nine recommendations in the Ecocific report, plus considered other relationship building options.
- HH reiterated that it is the relationship that is the most important aspect to Ngai Tukairangi. Must be genuine, must be heartfelt.
- VP gave HH an account of the mahi she has been working on for Fletcher to prepare a relationship strategy to empower local mana whenua and result in good outcomes for all involved.
- SG tabled the list of relationship building options that could be considered by all-parties. HH appreciated the effort Higgins had gone to and would continue to the kōrero in this space.
- HH noted that it would be appreciated if the next hui could be held at Whareroa marae to continue the kōrero with kaumatua and Ngati Kuku. Higgins supported this idea.
- SG noted that the s92 response must be submitted to BOPRC by the end of August. Everybody acknowledged that this did not mean the end of consultation. Higgins will report feedback learned from these hui and note consultation remains ongoing.
- HH and Higgins thanked each other for the time for the hui.
- SG to arrange marae meeting time with HH.

Appendix C.3: Tangata Whenua Communications

Simon Greening

From: Simon Greening
Sent: Thursday, 10 February 2022 12:34 pm
To: 'Pia Bennett'
Subject: RE: Higgins Contractors-New Project

Kia ora Pia,

I'm just following up on this email below and the text message on 18 Jan. If you wouldn't mind sending me an email or call to discuss this application. That would be appreciated.

Nga mihi,

Simon Greening | Services Leader – Environmental Planning

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From: Simon Greening
Sent: Tuesday, 16 November 2021 12:10 PM
To: Pia Bennett <pia@ngaiterangi.org.nz>
Subject: RE: Higgins Contractors-New Project

Kia ora Pia,

I hope this email finds well.

I am contacting you on behalf of Higgins Contractors Limited (HCL). HCL is applying for a replacement resource consent from BOPRC to discharge to air from their asphalt manufacturing plant at 90-92 Hewletts Road, Mt Maunganui. A resource consent application for this was lodged on 26 March 2020 and has been on hold pending information requirements.

I see from the email chain that Mike Hadden and Simon Pollard were in correspondence with you around November 2019 regarding this application. Mike and Simon P have since left HCL, and I am assisting HCL now with the consultation for the resource consent.
I'm not sure where the engagement was left when Simon P spoke to you, however, as an update, the HCL plans for a new asphalt plant onsite will now not be pursued at the current time, primarily due to land ownership issues. As a result of this, HCL now intend to apply to replace the air discharge consent at 90-92 Hewletts Road, Mt Maunganui for their existing plant for a short term duration of 10 years. This will allow them to consider longer term options either at the site or elsewhere.

This existing asphalt plant has operated for over 20 years at the site without complaints and in compliance with current consent conditions. There a will be no increase in particulate emissions as a result of this continued operation of the plant, and HCL has agreed to lower their consented particulate rate from 2.5 kg/hr to 1.5 kg/hr (to align with historic discharges).

I would really appreciate getting your feedback by **14 December 2021** to understand whether Ngāi Te Rangi is comfortable with the proposal or would like further information. If the latter, I am happy to provide this or meet with you at a time that suits if needed. If I haven't heard from you by **30 November 2021**, I will follow-up with a phone call.

I look forward to hearing from you. If you have any other questions, I would be happy to assist.

Ngā mihi

Regards,

Simon Greening | Services Leader – Environmental Planning

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From: Pia Bennett
Sent: Friday, 29 November 2019 4:16 PM
To: Simon Pollard (Higgins) ; Michael Haden (Higgins)
Subject: Re: Higgins Contractors-New Project

I might be early or late by maybe half an hour because I'm not clear on the end time for my earlier engagement which I think also includes lunch so don't go overboard with kai!

Nga Ture Imera
He mea muna te kōrero me ngā tāpiritanga i roto i tēnei īmera. E tika ana mō te kaiwhiwhi anake. Ki te mea e tukuna ki ā koe, ā, kāore e tika ana māhau me whakakore. Kia kaua e pupuri, kia kaua e kape. Paimārire

Get Outlook for iOS

Mai i: Simon Pollard (Higgins) <S.Pollard@higgins.co.nz>
Kua tukua: Friday, November 29, 2019 4:03:31 PM
Ki: Pia Bennett <pia@ngaiterangi.org.nz>; Michael Haden (Higgins) <M.Haden@higgins.co.nz>
Marau: RE: Higgins Contractors-New Project

Thanks very much Pia. I will have some food here for lunch!

Cheers

Simon

Simon Pollard
Area Manager - Middle North

Higgins *showing the way*

Higgins Contractors Limited

92 Hewletts Road
PO Box 4473
Mount Maunganui 3149

T: 07 574 4100
M: 027 411 1027
www.higgins.co.nz

Appendix C.4: Tangata Whenua Communications

Simon Greening

From: Simon Greening
Sent: Wednesday, 17 November 2021 9:52 am
To: Buddy Mikaere
Subject: RE: Higgins Contractors-New Project

Kia ora Buddy,

Thank you for your quick response. Your comments are appreciated.

Regards,

Simon Greening | Services Leader – Environmental Planning

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From: Buddy Mikaere
Sent: Tuesday, 16 November 2021 11:20 PM
To: Simon Greening
Subject: RE: Higgins Contractors-New Project

Kia ora Simon

Thank you for getting in touch on this matter. I had the opportunity earlier this evening to discuss this application with iwi colleagues. We find that what is being proposed aligns with the earlier consented application we looked at and approved. This time around we in fact commend the applicant for voluntarily committing to a lowered particulate discharge level.

That being the case we are happy for you to use the contents of this email to advance the application.

There will be a small charge to your client for this assessment.

Nga mihi

Buddy Mikaere

Buddy Mikaere Consultant
Ngati Pukenga Iwi ki Tauranga Trust
Environmental Unit
+6421384620
buddy@buddymikaere.com

From: Simon Greening <Simon.Greening@pdp.co.nz>
Sent: Tuesday, 16 November 2021 12:00 PM
To: Buddy Mikaere <buddy@buddymikaere.com>
Subject: RE: Higgins Contractors-New Project

Kia ora Buddy,

I hope this email finds well.

I am contacting you on behalf of Higgins Contractors Limited (HCL). HCL is applying for a replacement resource consent from BOPRC to discharge to air from their asphalt manufacturing plant at 90-92 Hewletts Road, Mt Maunganui. A resource consent application for this was lodged on 26 March 2020 and has been on hold pending information requirements.

I see from the email chain (below) that Simon Pollard was in correspondence with you around November 2019 regarding this application. Simon P has since left HCL, and I am assisting HCL now with the consultation for the resource consent.

As an update, the HCL plans for a new asphalt plant onsite will not be pursued at the current time, primarily due to land ownership issues. As a result of this, HCL now intend to apply to replace the air discharge consent at 90-92 Hewletts Road, Mt Maunganui for their existing plant for a short term duration of 10 years. This will allow them to consider longer term options either at the site or elsewhere.

I note Ngati Pūkenga concerns were largely around the stormwater discharges / air discharges. The stormwater discharges are obviously not part of the proposal any longer as these were associated with the new plant HCL intended to construct. The air discharges are now simply associated with the existing plant sought to operate for the next 10 years.

This existing asphalt plant has operated for over 20 years at the site without complaints and in compliance with current consent conditions. There a will be no increase in particulate emissions as a result of this continued operation of the plant, and HCL has agreed to lower their consented particulate rate from 2.5 kg/hr to 1.5 kg/hr (to align with historic discharges).

I would really appreciate getting your feedback by **14 December 2021** to understand whether Ngati Pūkenga is comfortable with the proposal or would like further information. If the latter, I am happy to provide this or meet with you at a time that suits if needed. If I haven't heard from you by **30 November 2021**, I will follow-up with a phone call.

I look forward to hearing from you. If you have any other questions, I would be happy to assist.

Ngā mihi,

Simon Greening | Services Leader – Environmental Planning