

Compliance Monitoring Report

Consent Holder Affco New Zealand Limited

Client Address PO Box 243
Wairoa 4160

Consent No DP070026Aa

Site Address Hunter Brown Street, Wairoa

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Consent Type Discharge Permit

Activity Description:

to discharge contaminants into the air from the operation of the company's meat processing operation at Wairoa, including the following processes:

- Products of combustion from a 15 MW coal fired boiler
- Fellmongery
- Effluent treatment plant
- Rendering plant
- General associated operations to those above.

16-Nov-10 Monitoring Report Sent

28-Jul-11 Monitoring Inspection

19-Apr-12 Monitoring Inspection

01-May-12 Monitoring Report Sent

Officer Barbara McKenzie

Officer Jim May

Officer Jim May

Officer Barbara McKenzie

2011-2012 Statement of Compliance and Overall Grades:

Grade Date 01-May-12

Environmental Grade Compliance

Technical Grade Compliance

Overall Comments:

Full compliance with the conditions has been achieved. Conditions 7 and 16 are under review.

Grade Date 02-Jul-12

Environmental Grade Compliance

Technical Grade Compliance

Overall Comments:

Full compliance with the conditions has been achieved. Condition 7 will be assessed when Council receives the next stack test report and Condition 16 will need to be changed if fleshings continue to be rendered.

Previous Statement of Compliance and Overall Grades:

Grade Date 11-Nov-10

Environmental Grade Compliance

Technical Grade Compliance

Overall Comments:

Full compliance with conditions has now been achieved.

Refer to back page for grading information

Condition No.	Type of Condition	Consent Condition and Compliance Assessment
1	Technical	The consent holder shall undertake all operations in accordance with any drawings, specifications, statements of intent and other information supplied as part of the application for this resource consent. In the event that there is a conflict between the information supplied with the application and any consent condition(s), the conditions(s) shall prevail.
	Compliance	11-Nov-10
	Compliance	01-May-12 Administration.
2	Environmental	The concentration of hydrogen sulphide shall not exceed 7 (g/m ³ , as a 1 hour average, in the ambient air at or beyond the boundary of the premises as a result of emissions from the consent holder's property.
	Not applicable	11-Nov-10 Monitoring to this level is not required until the Fellmongery is commissioned. Council has not received any complaints for hydrogen sulphide odours.
	Compliance	01-May-12 While Council has not tested the ambient air at this site, there have not been any complaints this season for hydrogen sulphide.
3	Environmental	There shall be no discharge of any objectionable particulate matter on any land or structure beyond the boundary of the site.
	Compliance	11-Nov-10 Council has not received any complaints for particulate discharged. The boiler was not operating during the site inspection.
	Compliance	01-May-12 The Council Officer did not observe any particulate in the discharge during the site visit and there have not been any complaints.
4	Environmental	There shall be no discharge of offensive or objectionable odours beyond the boundary of the site.
	Compliance	11-Nov-10 The biosolids bark filter and extraction system have been installed, the shed reclad.
	Compliance	01-May-12 The Council Officer did not detect any offensive or objectionable odours while on site and there have not been any odour complaints.
	Compliance	02-Jul-12 The Council Officer did not detect any odours that were either offensive or objectionable while on site 19 June 2012.
5	Environmental	Emissions of combustion products from the coal fired boiler shall be discharged through a chimney not less than 30 m high at a minimum efflux velocity of 10 m/s at full load. The discharge shall be vertically upwards and unimpeded.
	Compliance	11-Nov-10 Observed to be the case. The boiler was not operating during the site inspection.

Condition No.	Type of Condition	Consent Condition and Compliance Assessment
	Compliance	01-May-12 The chimney height and discharge velocity have not changed.
6	Environmental	The discharge to air from the coal fired boiler system shall not exceed a PM10 concentration of 200 milligrams per cubic metre of gas (expressed at 0(C and on a dry gas basis, standardised to 12% CO2), before discharging to the atmosphere, prior to 31 December 2010. If emission testing indicates levels in excess of this condition the consent holder shall, within two months, arrange for a repeated emission testing.
	Unable to be assessed	11-Nov-10 The latest test results have not been submitted yet.
	Compliance	01-May-12 Council has received the Air Discharge Stack Testing Report. The results confirm compliance with this requirement.
7	Environmental	By 31 December 2011 the discharge to air from the coal fired boiler system shall not exceed a PM10 concentration of 100 milligrams per cubic metre of gas (expressed at 0(C and on a dry gas basis, standardised to 12% CO2) before discharging to the atmosphere. If emission testing indicates levels in excess of this condition the consent holder shall, within two months, arrange for a repeated emission testing.
	Not applicable	11-Nov-10 This condition applies after 31 December 2011
	Not applicable	01-May-12 The consent holder has made an application to adjust the timing for this requirement. This condition will be assessed when the changes have been granted.
8	Technical	Emissions of PM10 shall be exempt from Conditions 6 and 7 above, for the 30 minutes following the start up of the boiler from cold, and during soot blowing, provided all practicable measures are taken to minimise the emission of smoke.
	Compliance	11-Nov-10
	Compliance	01-May-12 Observed to be the case.
9	Technical	By the 30th September 2010, the consent holder shall provide a report to the Council (Manager Consents) showing the options available to achieve compliance with Condition 7, and the preferred option. This may include a schedule for investigating whether NES exceedances are an issue arising from this discharge.
	Compliance	11-Nov-10 Council received the report 29 September 2010.
	Not applicable	01-May-12 This condition is now historical.
10	Environmental	If the drying of biosolids occurs, the biosolids drier shall be ventilated to the rendering plant biofilter detailed in Condition 12.

Condition No.	Type of Condition	Consent Condition and Compliance Assessment
	Not applicable	11-Nov-10 The consent holder is not drying the biosolids.
	Compliance	01-May-12 The foul air from this process is extracted to the biosolids biofilter.
11	Environmental	The coal fired boiler shall be operated: <ul style="list-style-type: none"> a) using coal with a sulphur content of not more than 0.5% by weight, and an ash content not more than 5% by weight. b) using biosolids(de-watered sludge), pre-dried to not more than 25% moisture in the coal fired boiler. c) by substituting not more than 20% of the coal fuel with dried biosolids. d) with biosolids sourced from the on-site effluent treatment plant only.
	Compliance	11-Nov-10 Results on site confirm compliance with this condition.
	Compliance	01-May-12 Coal records on site confirm that the sulphur and ash levels in the coal are below the requirements. At present the pre-dried biosolids are not used as a fuel in the boiler. Therefore Condition 11 subsections (b-d) are not applicable.
12	Environmental	The rendering plant shall at all times, and at all odour sources, be point source ventilated to a bio-filter and the following monitoring and maintenance practices shall take place to ensure that the system continues to effectively contain odour: <ul style="list-style-type: none"> a) Weekly monitoring and correction of the negative pressure on the suction side of the extraction fan. (Significant changes in this pressure are an indication that the system may require rebalancing, or that a blockage or leak may have developed). b) Daily inspection and correction of the system for water vapour/odour emissions. c) Daily inspection and correction of any raw material and product leaks that develop. Details of all inspections, completed actions and the corrections made, shall be recorded. Records shall be made available to Council Staff on request.
	Compliance	11-Nov-10 Observed to be the case. The plant was not operating during the site inspection.
	Compliance	01-May-12 Both the rendering plant and biosolids biofilters are checked and maintained as required by this condition.
13	Technical	By 31 May 2009 the consent holder shall submit a report from a suitably qualified person, for approval to the Council (Manager: Regulation), detailing the size and design of the biofilter for the rendering plant required by Condition 12.

Condition No.	Type of Condition	Consent Condition and Compliance Assessment
	Not applicable	11-Nov-10 This condition is now historical.
	Not applicable	01-May-12 This condition is now historical.
14	Environmental	Negative pressure shall be maintained at all times within the rendering plant to minimise fugitive emissions.
	Compliance	11-Nov-10 Observed to be the case when the plant was operating.
	Compliance	01-May-12 There is point source extraction from the process.
15	Technical	Prior to construction of the rendering plant commencing, the consent holder shall submit a report and associated plans from a suitably qualified person, for approval to the Council (Manager: Regulation), detailing how the rendering building will be designed to allow subsequent biofilter connection.
	Not applicable	11-Nov-10 This condition is now historical.
	Not applicable	01-May-12 This condition is now historical.
16	Environmental	Raw material to be processed in the rendering plant shall be only sourced from the consent holder's premises that are the subject of this consent.
	Compliance	11-Nov-10 Informed to be the case.
	Compliance	01-May-12 There is a sanctioned fleshings processing trial at the plant. If the trial is successful economically and environmentally, then the consent holder intends to apply to have this condition altered.
	Compliance	02-Jul-12 The fleshings trial has been completed. If this activity is to continue, this condition will need to be changed.
17	Technical	Within 16 months of the commencement of consent, if the biosolids belt press is still in operation, the biosolids building shall be fully contained and ventilated to a biofilter.
	Significant Non Compliance	01-Mar-09 The biofilter has not been installed by 1 March 2009.
	Compliance	09-Nov-10 The biosolids building has been reclad and a biofilter and extraction system installed.
	Not applicable	01-May-12 The biosolids biofilter has been installed. This condition is now historical.
18	Technical	Where a biofilter is required in accordance with Condition 17, the consent holder shall submit a report from a suitably qualified person, for approval to

Condition No.	Type of Condition	Consent Condition and Compliance Assessment
		the Council (Manager: Regulation), detailing the size and design of the biofilter for the biosolids building.
	Compliance	11-Nov-10 Council received this report
	Not applicable	01-May-12 This condition is now historical.
19	Technical	<p>The consent holder shall undertake emission testing of the coal fired boiler every six months until 2011, and annually thereafter. Emission testing shall be carried out when the coal fired boiler is running on mixed fuel, and when the coal fired boiler is running on coal only. The following test methods shall be used (or equivalent method to the reasonable satisfaction of the Council (Manager: Regulation), to determine the concentration of the following contaminants:</p> <ul style="list-style-type: none"> <input type="checkbox"/> NO2 - Electrochemical or USEPA Method 7 <input type="checkbox"/> PM10 – USEPA Method 201A <input type="checkbox"/> SO2 – Electrochemical or USEPA Method 6 <input type="checkbox"/> CO – Electrochemical or USEPA Method 3 <p>The results of these tests, and the ratio of biosolids:coal, shall be forwarded to the Council (Manager: Regulation) within one month of the tests being carried out.</p>
	Compliance	11-Nov-10 Report received.
	Compliance	01-May-12 Council has received this report.
		The tests required by this condition are conducted by CRL Energy Ltd.
20	Technical	<p>Annual testing shall be carried out to measure the concentration of hydrogen sulphide in the ambient air beyond the boundary of the premises. These tests shall be carried out by the Council, or by a suitably qualified person using test methods as authorised by the Council (Manager: Regulation). The consent holder shall meet the costs of this monitoring.</p> <p>Note: this monitoring will not be carried out until the Fellmongery is commissioned.</p>
	Not applicable	11-Nov-10 The monitoring required by this condition only applies when the Fellmongery has been commissioned.
	Not applicable	01-May-12 A fellmongery has not been commissioned yet.
21	Technical	<p>The consent holder shall prepare within 6 months of the commencement of this consent, a management plan that addresses the following:</p> <ul style="list-style-type: none"> a) Identification of all significant odour sources on site, the procedures in place to address each odour source, and procedures in place for any periods of malfunction. b) Operating procedures for the biofilters and any maintenance required to

Condition No.	Type of Condition	Consent Condition and Compliance Assessment
		be undertaken.
		c) The management plan shall require the development of a system which will record details of inspections, measurements and maintenance undertaken on any odour control system, any periods of malfunction, the reasons and the remedial action taken.
		d) The measures in place to ensure isolation and/or segregation of chemicals involved in the Fellmongery process (this part of the management plan is required prior to commissioning of the Fellmongery).
		The management plan and records shall be made available to the Hawke's Bay Regional Council on request.
	Compliance	11-Nov-10 The consent holder has completed (except part d) the Air management Plan as required.
	Not applicable	01-May-12 This condition is now historical.
22	Technical	The Consent Holder shall facilitate, in conjunction with the AFFCO Wairoa Odour Working Party, regular meetings at a frequency determined by the consent holder and the AFFCO Wairoa Odour Working Party, but not less than once in each calendar year. Minutes from these meeting shall be made available to the Council on request.
	Compliance	11-Nov-10 These meetings have been conducted. There appears to be a dwindling number of public attendees.
	Compliance	01-May-12 The consent holder has facilitated these meetings. The last meeting was poorly attended by the public.
23	Technical	The Consent holder shall record all complaints received. The record shall include: a) the date and time of the complaint, b) the nature of the complaint, c) the name, telephone number, and address of the complainant, d) weather information (an estimate of wind speed and direction) e) details of key operating parameters at the time of the complaint, f) corrective action taken. Complaints shall be reported to the Council as soon as practicable and the log of complaints shall be made available to the Council on request.
	Compliance	11-Nov-10 Complaints have been recorded and reported to Council as required.
	Compliance	01-May-12 No complaints have been received. However, the consent holder has a system in place to address any complaints received.

Grading Information

Each consent condition has been classified as either a Environmental or Technical condition.

Environmental conditions:

Environmental conditions set standards/performance limits for a resource consent, or, mitigates an environmental impact of exercising a resource consent.

Examples of environmental conditions are:

- Installation of up-gradient cut-off drains/ placement of disposal fields
- volume limits of discharges
- water take rates and maximum volumes
- discharge or receiving water contaminant limits

Technical conditions:

Technical conditions sets out technical requirements that allows a consent holder to demonstrate or measure that they meet the Environmental performance required by a resource consent, or help specify the activity authorised.

Examples of technical conditions are:

- sampling effluent/ recording discharge volumes / collating submitting data
- providing of reports/ plans/ designs specifications
- notifications, accreditation, authorities submissions for approval by ER Manager
- installation and maintenance of a water meter

You need to comply with all conditions regardless of whether it's a Environmental or Technical condition.



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

PARTICULATE EMISSION REPORT:

PM₁₀ and TOTAL SUSPENDED PARTICULATES (TSP)



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CRL Ref: 11-31304

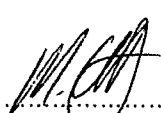
Consent Number: DP070026A


Title: PM₁₀ Particulate Emission Report
John Thompson Boiler

Client Name: Affco Walroa

Client Address: P.O.Box 243
Wairoa

Date Of Issue: 5th April 2011

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ISO 9001

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Introduction:

CRL Energy Ltd Air Quality Group was commissioned by AFFCO Wairoa to perform particulate testing on the John Thompson boiler. The purpose of the monitoring was to assess compliance of the boiler as per resource consent no. DP070026A.

The John Thompson boiler tested has been in commission by Easteel. The boiler's combustion controls have been fully automated. The plant's emissions exit via one emission source. For emission control the boiler is equipped with twin grits and fly ash hoppers.

Maurice Amott and Steven Gale of the CRL Hamilton branch carried out the tests on the 29th of March 2011.

Test Method:

The method employed was USEPA Method 201A – Determination of PM₁₀ Emissions (Constant Sampling Rate Procedure).

A sample of gas was withdrawn at a constant flow rate from the stack through a size-selected nozzle coupled with a PM₁₀ cyclone unit. The PM₁₀ cyclone operates by drawing air tangentially into a cylindrical body and causing the particles to be separated in size by centrifugal force. Particulate matter equal to or less than 10µm proceeds through the unit where it is finally collected onto a glass fibre filter, whereas particulate matter greater than 10µm is forced out onto the walls of the cyclone and retained in the cylindrical body. This cyclone unit was kept inside the stack during the test time period. Particulate mass is determined gravimetrically subsequent to the removal of uncombined water.

Determination of a suitable flow rate, nozzle size, and length of sampling was achieved using averaged data obtained from an initial assessment prior to sampling.

Percentage moisture content was also determined. Moisture was condensed and collected into Greenburg-Smith impingers. The impingers were weighed before and after testing.

The PM₁₀ result is expressed as mg/m³ on a dry gas basis and at STP (STP being 1 atm and 0 Deg C) and as a percentage of total particulate collected. The result can be corrected for oxygen or carbon dioxide depending on air discharge resource consent requirements.

Factors That May Influence The Test:

One significant limitation concerning USEPA Method 201A involves the moisture content of the flue gas; the gas cannot contain entrained water droplets. Additionally, an appropriate sampling time should be employed such that a ± 5% precision on total collected mass as determined by the precision and sensitivity of the measuring technique is achieved. This variable can be problematic on new untested stack emission sources where the technician does not know accurately the typical quantities of particulate emitted. Compounding this problem further is where the particulate concentration of the stationary stack is extremely low, in which case a very long sampling period would be required in order to achieve results with a precision of ± 5%.

Plant Operating Conditions:

The John Thompson boiler was running on 28mm to 50mm nugget coal, supplied by Solid Energy.

The average steam flow during the first test was approximately 8.5 T/hr and 8.7 T/Hr for the second test and 8.0 T/Hr for the third test.

Further detail is available from in Appendix 3 from the steam flow and O₂ chart.

Discussion and Conclusion:

On the 29th of March 2011 the average PM_{10} concentration of particulate matter from the John Thompson boiler stack was below the Air Discharge Consent limits for 31st of December 2003 but above the new consent limit of 100 mg/m^3 .

AFFCO Wairoa's Air Discharge Consent states that "The discharge to air from the coal fired boiler system shall not exceed a PM_{10} concentration of 200 milligrams per cubic metre of gas (expressed at 0°C and on a dry gas basis, standardised to 12 % CO_2) before discharging to the atmosphere, prior to 31 December 2010".

The PM_{10} concentration obtained for Test 1 was 149 mg/m^3 at STP (0°C and 1 atm) and 12% CO_2 and dry gas basis; which is above the new 100 mg/m^3 consent limit.

The calculated PM_{10} concentration obtained for Test 2 was 155 mg/m^3 at STP (0°C and 1 atm) and 12% CO_2 and dry gas basis; which is above the new 100 mg/m^3 consent limit.

The calculated PM_{10} concentration obtained for Test 3 was 135 mg/m^3 at STP (0°C and 1 atm) and 12% CO_2 and dry gas basis; which is above the new 100 mg/m^3 consent limit.


The average PM_{10} concentration obtained for AFFCO Wairoa's John Thompson boiler stack was 146 mg/m^3 at STP (0°C and 1 atm) and 12% CO_2 , which is above the new 100 mg/m^3 consent limit.

CRL Reference:	11-31304	Date of Test:	29/3/11	Company:	Affco Wairoa
Description of Plant Tested:					
Boiler:	John Thompson Boiler				
Firing system:	Perfect spreader				
Emission control:	Multi Cyclone				
Average steam load:	8.5 Tn/Hr				
Measurement Standard:	USEPA Method 201A – Determination of PM10 Emissions (Constant Sampling Rate Procedure). 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 17 – Determination of Particulate Matter Emissions from Stationary Sources				
Conditions at Sampling Plane:	See figures 1 & 2				
Conditions of Gas at Sample Point:	% Dry (vol.)	% Wet (mass)			
Oxygen content:	8.0	8.3 %			
Carbon dioxide content *:	11.7	16.7 %			
Carbon monoxide content (ppm dry):	53	0.00 %			
Nitrogen content #:	80.3	72.8 %			
Gas moisture content:	3.7	2.2 %			
Conditions of Sampling:					
Nozzle internal diameter:	7.61 mm				
Isokinicity:	82.6 %				
Sample time at each point:	4.89 min				
Total sample time:	60 min				
Gas meter reading start:	1551.961 m ³				
Gas meter reading stop:	1552.650 m ³				
Gas meter static-pressure:	-0.08 kPa				
Gas meter inlet temperature:	22 °C				
Dry gas volume sampled:	0.640 dsm ³				
Particulate matter collected:	155.3 mg				
Stack diameter/Duct dimensions:	0.960 m				
Sampling start time:	10:08				
Stack gas pressure:	102.12 kPa				
Average temperature:	189 °C				
Stack gas density:	0.791 kg/m ³				
Average gas velocity:	8.261 m/s				
Dry gas volumetric flow rate:	12,317 dsm ³ /hr				
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 Water, evaporating at clean ambient condition, drying in oven 105°C.				
Particulate separator:	Glass microfibre filter with size 47mm				
Leakage tests performed by:	MA – SG				
Results:					
% of PM₁₀ particulates:	60 %				
Concentration of PM₁₀ particulates @ 12.0% CO₂:	149 mg/dsm ³				
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 80 to 120%				



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CRL Reference:	11-31304	Date of Test:	29/3/11	Company:	Affco Wairoa
Description of Plant Tested:	Fuel analysis: (as received basis)				
Boiler:	John Thompson Boiler	Test:	2 pm10	Moisture	21.0 %
Firing system:	Perfect spreader			Ash	4.6 %
Emission control:	Multi Cyclone			Calorific Value	22.2 MJ/kg
Average steam load:	8.7 Tn/Hr			Type	Rotowaro
Measurement Standard:	USEPA Method 201A – Determination of PM10 Emissions (Constant Sampling Rate Procedure). 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 17 – Determination of Particulate Matter Emissions from Stationary Sources				
Conditions at Sampling Plane:	See figures 1 & 2				
Conditions of Gas at Sample Point:	% Dry (vol.)	% Wet (mass)	Stack diameter/Duct dimensions:		
Oxygen content:	7.6	7.9 %	Sampling start time: 11:50		
Carbon dioxide content *:	12.1	17.2 %	Stack gas pressure: 102.12 kPa		
Carbon monoxide content (ppm dry) :	37	0.00 %	Average temperature: 188 °C		
Nitrogen content #:	80.3	72.7 %	Stack gas density: 0.794 kg/m ³		
Gas moisture content:	3.7	2.2 %	Average gas velocity: 7.857 m/s		
			Dry gas volumetric flow rate: 11.730 dsm ³ /hr		
Conditions of Sampling:	Cumulative sampling				
Nozzle internal diameter:	7.605 mm	Suction nozzle type: Sharp-edged stainless steel nozzle			
Isokinicity:	87.6 %	Equipment arrangement: Water removal upstream of the gas meter			
Sample time at each point:	5.07 min	Particulate drying : Washing with Water, evaporating at clean ambient condition, drying in oven 105°C.			
Total sample time:	60 min	Particulate separator: Glass microfibre filter with size 47mm			
Gas meter reading start:	1552.663 m ³	Leakage tests performed by: MA - SG			
Gas meter reading stop:	1553.361 m ³	Results:			
Gas meter static-pressure:	-0.08 kPa	% of PM ₁₀ particulates: 80 %			
Gas meter inlet temperature:	23 °C	Concentration of PM ₁₀ particulates @ 12.0% CO ₂ : 155 mg/dsm ³			
Dry gas volume sampled:	0.645 dsm ³				
Particulate matter collected:	124.4 mg				
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 80 to 120%					
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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CRL Reference:	11-31304	Date of Test:	29/3/11	Company:	Affco Wairoa
Description of Plant Tested:	John Thompson Boiler	Test:	3 pm10	Fuel analysis:	(as received basis)
Firing system:	Perfect spreader			Moisture	21.0 %
Emission control:	Multi Cyclone			Ash	4.6 %
Average steam load:	8.0 Tn/Hr			Calorific Value	22.2 MJ/kg
Measurement Standard:	USEPA Method 201A – Determination of PM10 Emissions (Constant Sampling Rate Procedure). 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 17 – Determination of Particulate Matter Emissions from Stationary Sources				
Conditions at Sampling Plane:	Stack diameter/Duct dimensions: 0.960 m				
Conditions of Gas at Sample Point:	Sampling start time: 13:29				
Oxygen content:	% Dry (vol.)	% Wet (mass)	Stack gas pressure: 102.13 kPa		
Carbon dioxide content *:	6.7	6.9 %	Average temperature: 179 °C		
Carbon monoxide content (ppm dry):	12.9	18.3 %	Stack gas density: 0.811 kg/m ³		
Nitrogen content #:	21	0.00 %	Average gas velocity: 6.088 m/s		
Gas moisture content:	80.4	72.6 %	Dry gas volumetric flow rate: 9,261 dsm ³ /hr		
Conditions of Sampling:	Sampling Method: Cumulative sampling				
Nozzle internal diameter:	8.7 mm	Suction nozzle type: Sharp-edged stainless steel nozzle			
Isokinicity:	85.1 %	Equipment arrangement: Water removal upstream of the gas meter			
Sample time at each point:	4.93 min	Particulate drying : Washing with Water, evaporating at clean ambient condition, drying in oven 105°C.			
Total sample time:	60 min	Particulate separator: Glass microfibre filter with size 47mm			
Gas meter reading start:	1553.383 m ³	Leakage tests performed by: MA - SG			
Gas meter reading stop:	1554.082 m ³	Results:			
Gas meter static-pressure:	-0.07 kPa	% of PM ₁₀ particulates: 90 %			
Gas meter inlet temperature:	23 °C	Concentration of PM ₁₀ particulates @ 12.0% CO ₂ : 135 mg/dsm ³			
Dry gas volume sampled:	0.648 dsm ³				
Particulate matter collected:	103.9 mg				
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 80 to 120%				



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Summary Table

11-31304

	Test 1	Test 2	Test 3	Average	Units
Actual Concentration of total particulate at 12% CO ₂ :	250	192	150	197	mg/dsm ³
Concentration of PM ₁₀ particulates at 12% CO ₂ :	149	155	135	146	mg/dsm ³
PM ₁₀ %:	59.7	80.5	90.4	77	%

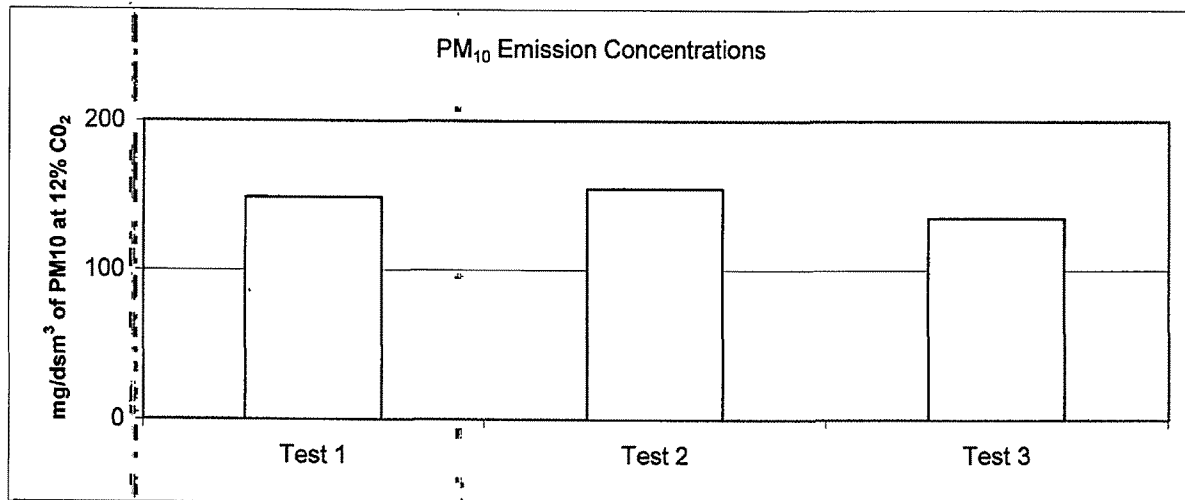


Figure 2: Sampling plane.

Shape Circular
Approximate diameters upstream from Interferences (after sampling point) ~9.0
Approximate diameters downstream from Interferences (before sampling point) ~6
This sampling point complies with the test method requirements
Inside diameter (ID) of stack (m) 1
Stack orientation Vertical
Angle of gas flow Laminar

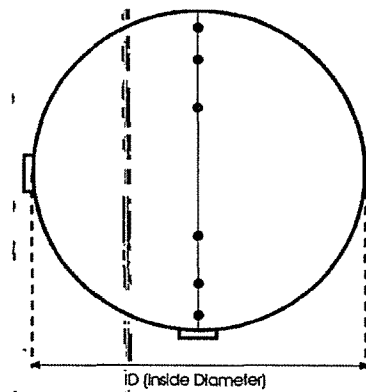
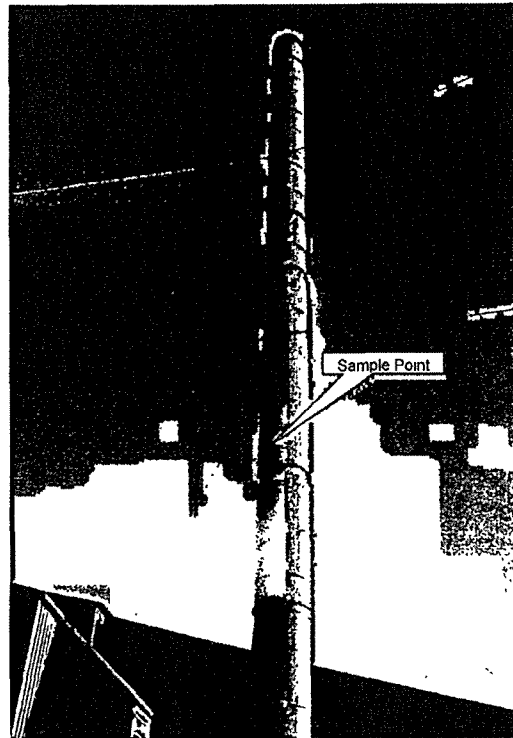


Figure 1: Sampling location

Stack has been changed but similar to old stack



PARTICULATE EMISSIONS TEST SHEET

Test: 1 pm10

CRL Ref:	11-31304		Site:	Affco Wairoa					
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	4.71	0.042	0.13	11.58	20.7	188.8	8.2	40	-46
2	9.60	0.140	0.14	11.58	21.1	188.3	8.8	52	-54
3	14.83	0.284	0.16	11.58	21.9	188.6	7.5	55	-60
4	20.05	0.676	0.16	11.58	22.3	188.3	8.4	59	-66
5	25.11	0.820	0.15	11.58	22.5	189.1	7.6	58	-70
6	30.00	0.918	0.14	11.58	22.6	189.3	7.7	56	-76
7	34.71	0.042	0.13	11.58	23.1	188.9	8.0	53	-82
8	39.60	0.140	0.14	11.58	23.4	189.3	7.3	53	-86
9	44.83	0.284	0.16	11.58	23.4	189.1	7.8	53	-88
10	50.05	0.676	0.16	11.58	23.3	188.7	8.1	50	-96
11	55.11	0.820	0.15	11.58	23.4	188.7	7.8	46	-100
12	60.00	0.918	0.14	11.58	23.7	190.0	7.8	44	-100
AVERAGES			0.1467	11.58	21.85	188.73	8.03	53.33	-62.00
Gas Meter START	1551.961				Test Time (min)	60			
					No. Traverse Points	12			
Gas Meter 1/2 Way	n/a				Static (WG)	-0.31			
Gas Meter STOP	1552.650				Nozzle ϕ (mm)	7.61			
Gas Meter Factor	0.995				Stack ϕ (m)	0.960			
Leakage Test By:	MA - SG				Duct (m)	d x w			
Pitot Constant	0.86				Filter No.	11-A27	Mass (g)	0.1077	
Plant Description	John Thompson Boiler								
Firing System	Perfect spreader				Emission Control	Multi Cyclone			
Average Steam Load	8.5 Tn/Hr				Impingers	START	STOP		
Date	29/3/11				No 1 (g)	501.0	503		
Start Time	10:08 a.m.				No 2 (g)	469.4	482.3		
End Time	11:08 a.m.				No 3 (g)	393.4	396		
Balance Check (+/-)					Silica (g)	813.6	815.7		
Moisture %	21	Ash %	4.6	CV (MJ/kg)	22.24	Type	Rotowaro		
Assumed Duct Moisture %				7	Atmospheric Pressure		102.20		
Leakage Test				Pre Start/Stop		1551.9606		1551.9606	
				Post Start/Stop		1552.6512		1552.6512	



Test: 2 pm10

[illegible]

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Test: 3 pm10



CRL
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John Thompson Boiler**CRL Report No:** 11-31304

Leak Test: Carried out before and after each test by creating a vacuum of 60 Kpa within the sampling train. A drop in vacuum pressure indicates a leak. Bubbles are also seen in the impingers. If the

Test 1**Particulate Matter Collected**

Filter start weight	0.1077	g
Beaker start weight	1.3094	g
Filter & beaker stop weight	1.5016	g
Filter Gain	0.0845	g
wash pm10 (beaker)	110.5408	g
wash pm10 (beaker with residue)	110.5490	g
pm10 wash Gain	0.0082	g
Nozzle and fittings (Total) wash (beaker)	123.1096	g
Nozzle and fittings (Total) wash (beaker with residue)	123.1795	g
Particulate matter collected	0.0228	g
Nozzle and fittings blank (beaker)	99.3950	g
Nozzle and fittings blank (beaker with residue)	99.4023	g
Blank Gain	0.0073	g

Test 2**Particulate Matter Collected**

Filter start weight	0.1075	g
Beaker start weight	1.3053	g
Filter & beaker stop weight	1.5001	g
Filter Gain	0.0873	g
wash pm10 (beaker)	94.2561	g
wash pm10 (beaker with residue)	94.2689	g
pm10 wash Gain	0.0128	g
Nozzle and fittings (Total) wash (beaker)	111.9787	g
Nozzle and fittings (Total) wash (beaker with residue)	112.0103	g
Particulate matter collected	0.0685	g
Nozzle and fittings blank (beaker)	99.3950	g
Nozzle and fittings blank (beaker with residue)	99.4023	g
Blank Gain	0.0073	g

Test 3**Particulate Matter Collected**

Filter start weight	0.1063	g
Beaker start weight	1.2979	g
Filter & beaker stop weight	1.4891	g
Filter Gain	0.0849	g
wash pm10 (beaker)	121.5746	g
wash pm10 (beaker with residue)	121.5836	g
pm10 wash Gain	0.0090	g
Nozzle and fittings (Total) wash (beaker)	106.0558	g
Nozzle and fittings (Total) wash (beaker with residue)	106.0731	g
Particulate matter collected	0.0766	g
Nozzle and fittings blank (beaker)	99.3950	g
Nozzle and fittings blank (beaker with residue)	99.4023	g
Blank Gain	0.0073	g