AFFCO IMLAY

ANNUAL AIR DISCHARGE MONITORING REPORT – 2018 / 2019

AFFCO IMLAY WANGANUI

AIR DISCHARGE PERMIT:-
ATH-2007010926.01

MONITORING REPORT

1 MAY 2018 TO 30 APRIL 2019

COMPILED BY:
RICKY GOWAN – AFFCO IMLAY COMPLIANCE MANAGER

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2.0 INTRODUCTION

AFFCO New Zealand Limited was granted an 'Air Discharge Permit' for a term expiring on the 1st of July 2025. The 'Air Discharge Permit' encompasses the following:-

ATH-2007010926.01:- Discharge permit to discharge odour to air (associated activities on site); and

ATH-2017201595.00:- Discharge Permit to discharge contaminates to air (Gas Fired Boiler).

Under Condition 35 the Permit Holder must prepare an Annual Report summarising performance in relation to the discharges allowed under the above resource consents. The Annual Report must be provided to the Regulatory Manager of MWRC by the 1st of June each year from the commencement of the consent.

3.0 EXECUTIVE SUMMARY

Site:	AFFCO Imlay	**Date:**	May 2019
Scope:	Air Discharge Annual Monitoring Report 2019		
Author:	Ricky Gowan		

This Report covers the period from the 1st of May 2018 to the 30th of April 2019 and summarises odour control monitoring results as required in accordance with Condition 35 of Air Discharge Permit ATH-2007010926.01 and ATH-2017201595.00.

4.0 CONSENT CONDITION 35 SUMMARY

a. An update of any actions undertaken in accordance with Condition 3:-

The Permit Holder must undertake and complete the schedule of works as detailed in the titled **AFFCO Imlay Mitigation Table** provided to MWRC on the 16 November 2017 and attached to these conditions as **Schedule 1**. A written update on the progress of these works shall be provided to MWRC within six months of the commencement of this consent and thereafter an update to the schedule shall be included in the Annual Report required under **Condition 35.**
In the updates the Permit Holder shall:

a. Indicate which works have been completed;
b. Indicate why particular works have not been completed in the stated time periods;
c. Provide new timeframes for implementation of works.

AFFCO IMLAY MITIGATION TABLE (as at 30.04.19). All Schedule 1 items plus items raised by Imlay Management and KupeTech in 2018 were completed (with the exception of a Lime Dosing system).

AFFCO IMLAY MITIGATION TABLE - SCHEDULE 1 ITEMS	
Extraction Ducts & Raw Material Bin	
Item	**Mitigation**
1	Clear main air extraction ducts in the wet and dry side buildings of deposited material and implement an annual programme of clean in place and inspection (NB: access hatches will need to be installed in the main ducts). Under take this action for wet-side, dry-side and Meal Dryer Exhaust Ducts leading up to the point they connect to their respective air cooling systems. Install an induced draft ventilation fan.
2	Install 10 mm capped access ports to enable manual duct vacuum measurement surveys of vacuums at connections to the Raw Material Bin, Pre-Cooker, Solids Press, Liquid Phase Tank, Decanter, Dry Side Duct (near the inlet air dust filter), the ground meal and raw meal bins and the two meal dryer exhausts (at location of exhaust dampers).
3	Increase the size of ducts connecting the blood decanter and pre-heater to the wet-side point source extraction system control to Ø250 mm.
4	Install a mechanical vacuum gauges (-200 to 0 Pa) on the internal raw material bin and another gauge in the dry side manifold (within 1 metre of the inlet air filter).
5	Install continuous vacuum transducers (- 500 to 0 Pa)* within the two meal dryer exhaust ducts and connect to the rendering SCADA system. Install one heat resistant mechanical vacuum gauge on the common exhaust air duct connecting the two meal dryer exhausts to the WHE. *NB: check with dryer supplier the appropriate vacuum gauge range for the meal dryers.
6	Check accuracy of the existing temperature and pressure transmitters that are installed on the inlet air ducts to the Main Biofilter and Dryer Biofilter and that report to the rendering SCADA system.
7	Install new temperature gauges and pressure gauges (0-2.5 kPa) adjacent to the pressure and temperature transmitters that are currently installed on both the Main and Dryer Biofilter inlet air ducts.
8	Install vacuum gauges (-2kPa - 0) on inlet ducts to the main and dryer biofilter fans.

Extraction Ducts & Raw Material Bin	
Item	**Mitigation**
9	Check accuracy and replace as necessary, existing temperature gauges and transmitters that are installed on evaporation and other air cooling equipment applied to the meal dryer exhausts and wet side concentrated sources air steams.
10	Check accuracy and replace as necessary all the manual temperature and pressure gauges that are installed within the Main Biofilter and Dryer exhaust air ducting system.
11	Install manual temperature gauge for measurement and display of the dry side air scrubbing tower water recirculating temperature.
12	Enclose the external raw material bin's discharge chamber and sump. Design and install an induced draft air extraction system that ventilates air from within the raw material bin, the enclosed bin discharge chamber and the inclined raw material screw conveyor. Extracted air is to be forced via the ventilation fan through a dedicated biofilter to be designed and located behind the external raw material bin.

Uncovered Biofilter	
Item	**Mitigation**
1	Repair damaged timber wall at south-east corner and check leachate drainage system is working effectively.
2	Install a pressure gauge (0-1 kPa) for visual display of media pressure drop on both sides of the biofilter bed (connection pressure side of gauges into the bed stone layer).
3	Install a new surface watering system for the main biofilter.
4	Having remediated the main biofilter bed, check the fan discharge flow rate and moderate (if necessary), to achieve a maximum air-flow to the main biofilter of approximately 30,000 m3/hr. The first recommended approach to achieve this is to adjust dampers of the dry-side concentrated sources manifold to restrict the total air extraction flow to be within the range of 5,000 to 7,000 m3/hr.
5	Repair pressure line connections to the terminus of four PVC laterals to enable auditing of bed pressure distribution.
6	Install two BSP fittings (50 mm minimum diameter) into the 1000 mm diameter concrete pipe for sampling at 90o (side and top of concrete duct). Install at a location that maximises the distance from the fan and down stream flow disturbances and achieves compliance with IS0 10780 Measurement of Velocity and Flow Rate.
7	Remediate bed media using existing soil media and additional bark and soil to meet bio-filter media composition specifications in Table 4 of the Golder Application document.

Covered Biofilter	
Item	**Mitigation**
1	Install a pressure gauge (0-1 kPa) for visual display of media pressure drop on one side of the biofilter bed (connection pressure side of gauge into the bed stone layer).
2	Remove existing malfunctioning temperature and pressure gauges currently installed on leachate drainage sump (these gauges are not required).
3	Double the current number of lateral connections that are installed along each side of the bio-filter's central air manifold duct. Run a continuous section of 150mm novaflow across the bed and have both ends connect to adjacent fittings along the main manifold.
4	Repair damaged storm water drainage system to ensure roof storm water does not flow into the bed
5	Up-grade existing surface watering system
6	Prepare a revised Odour Management Plan that includes recommended design and operational parameters and monitoring procedures.
7	Install two BSP fittings (25 mm minimum diameter) into the 300 mm diameter stainless steel duct at a location that also maximises the distance from the fan and down-stream bends in the duct that cause flow disturbances.
8	Ensure the central manifold is cleared of deposited solids.
9	Excavate the media including stone layer above laterals and check laterals for blockages and sealed connections to the central concrete manifold.
10	Install new stone layer (washed river gravel 20 – 40 mm) and bed media using new bark and new soil as per bio-filter media composition specification in the air consent.

Biofilter Lime Dosing System	
Item	**Mitigation**
1	Design a lime dosing system for the bed. The lime dosing system allows for up to a 2 wt.% lime solution to be injected via the water irrigation system. *NOTE:- Backpack spray system is in use however, a bulk spray option is currently being investigated.*

AFFCO IMLAY - COMPANY INITIATIVES	
1	Main concrete outlet pipe to main bio filter has dropped and fugitive odours are escaping. To be remediated.
2	2 x manhole covers - south side of Main Bio Filter - not sealed. Fugitive odours escaping. To be remediated
3	Main Bio Filter - North manholes - fugitive odours escaping - to be secured by back filling topsoil and compacting.
4	There is a need to secure odours within the wetside. Look at options of sealing off roof ventilation; the use of air freshner spray system; better extraction of blood odours; any other activities that might aid in odour reduction.

RESOURCE CONSENT REQUIREMENTS	
Wetside Air Extraction. Install ports at following locations	
1	Outside Raw Bin
2	Inside Raw Bin
3	Pre-Heater
4	Pre-Heater Discharge
5	Blood Decanter
6	Top of Drainer Conveyor
7	Discharge from drainer conveyor into Squeeze Press feed conveyor
8	Top of Squeeze Press feed conveyor
9	Connection to three tallow separator discharge chambers
10	Sub-manifold to Decanter and Separators
11	Drier feed conveyor
12	Decanter discharge conveyor
13	Top of Squeeze Press and entry Hopper
14	Liquid Phase Tanks
Dryside Air Extraction. Install ports at following locations	
1	Drier in-feed and out-feed conveyors
2	Dryside connection to open air
3	Unground Bin
4	Ground Bin
5	Dust Filter
6	**Condition 14:-** The permit Holder shall ensure that the pre-cooled inlet air to the main bio-filters shall be maintained at a temperature not exceeding 35 degrees celsius for 95% on the time. **Dave Dudley** to create a daily print- off record for Terry Te Weri to access via SCADA. This print-off record can be attached to the Daily Resource Consent Checksheet (Discussed 20.02.18 - Horizons / AFFCO Reps).

b. Summary of Bio-Filter Performance - Condition 16 and Condition 31

The back pressure within the inlet duct to each bio-filter shall be continuously recorded:-

The back pressure of both covered and uncovered bio-filters are continuously recorded via the SCADA system. **Outcome:-** All recorded results in the report review period were compliant.

Daily manual back-pressure checks, visual inspection for moisture content, leakage and odour discharge:-

Daily inspections are performed whenever production is in progress. The above inspections are logged daily within the **'Air Odour Resource Consent Monitoring Checksheet – RMF 008'**. Refer example below. All daily monitoring records are held on file in the Rendering Office. **Outcome:-** All recorded results in the report review period were compliant.

6. BIO FILTERS MONITORING (Conditions 15 & 16)

OUTSIDE RAW MATERIAL BIN BIO FILTER:- On a daily basis check to ensure there are no leaks in the extraction system

Time	(✓ applicable)	YES	NO
7:30	Leaks in extraction system	N/A.	

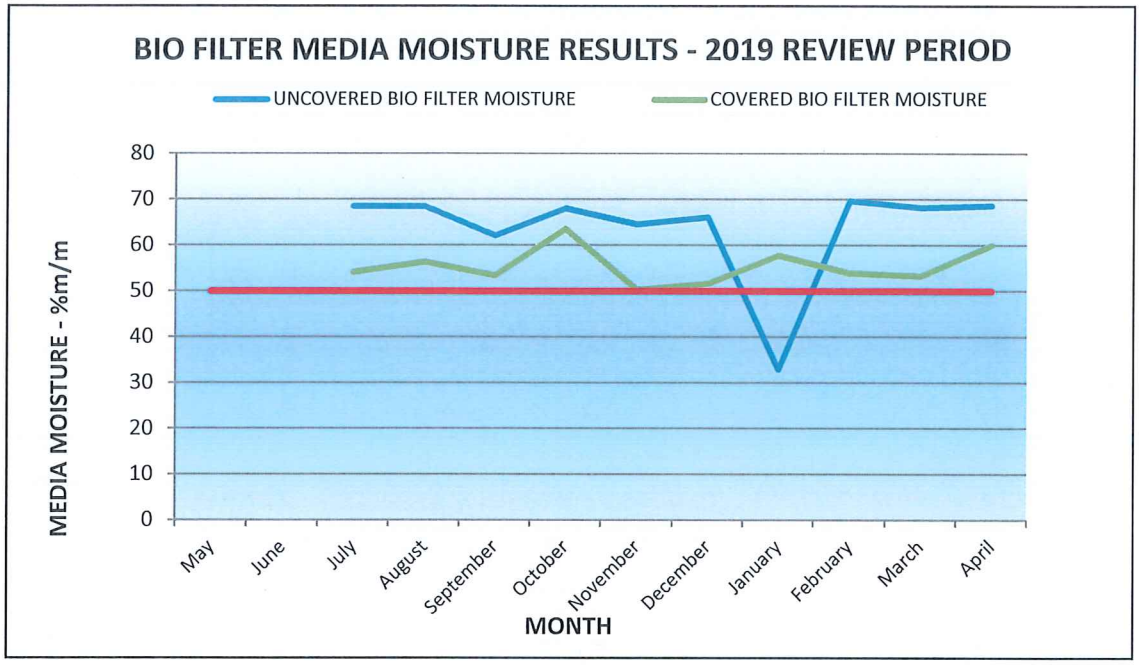
MAIN BIO FILTER (uncovered):- On a daily basis check the integrity of the Main Bio Filter.					
Ensure the static back pressure is being continuously recorded (view SCADA – HRP2)		YES	✓	NO	
Daily manual static back pressure check (Target <150mm/ug)		Actual Reading		O	
Manual check across the bed media (Target <50mm water gauge pressure)		Actual Reading		2mm	
Visual inspection for:-	Good moisture content	YES	✓	NO	
	Any Leaks	YES		NO	✓
	Any odour discharge	YES		NO	✓
	Weed free	YES	✓	NO	
Monthly Bio Filter depth check (Min of 700mm)		YES	✓	NO	

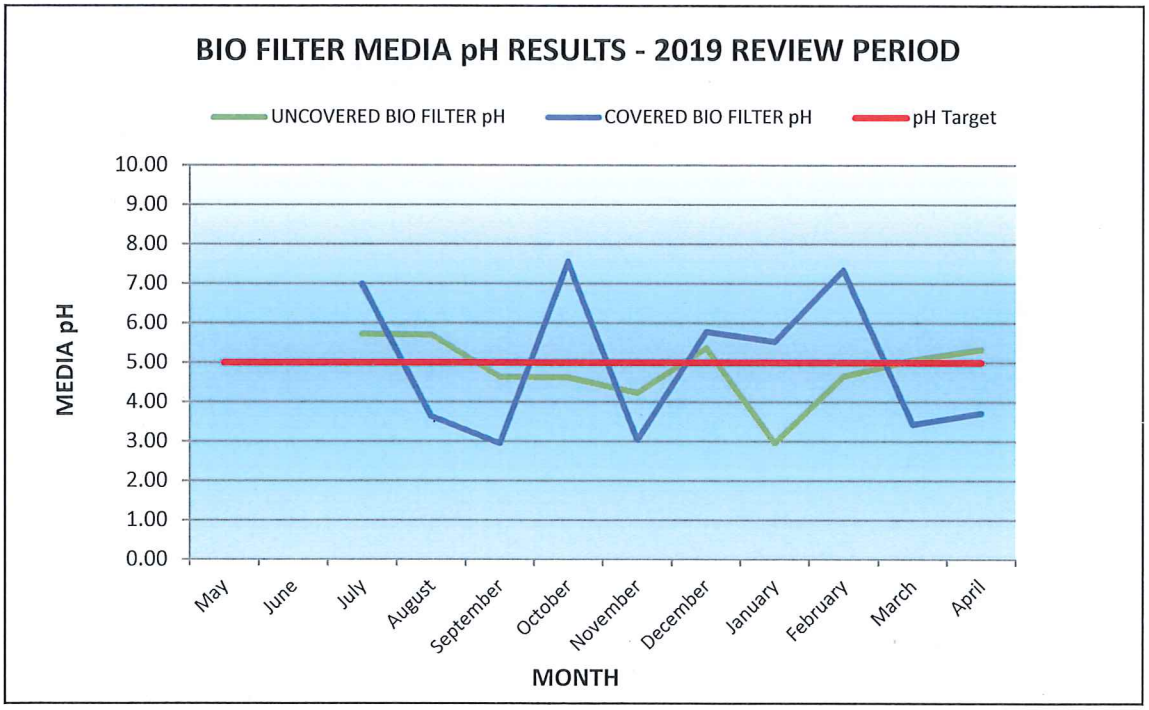
DRIER BIO FILTER (covered):- On a daily basis check the integrity of the Drier Bio Filter.					
Ensure the static back pressure is being continuously recorded (view SCADA – HRP1)		YES	✓	NO	
Daily manual static back pressure check (Target <150mm/ug)		Actual Reading		O	
Visual inspection for:-	Good moisture content	YES	✓	NO	
	Any Leaks	YES		NO	✓
	Any odour discharge	YES		NO	✓
	Weed free		✓		
Monthly Bio Filter depth check (Min of 600mm)		YES	✓	NO	

NON CONFORMANCES / CORRECTIVE ACTIONS:-

Moisture content and ph shall be monitored and recorded at least once a month from the commencement of this consent:-

Bio-Filter Moisture and pH Graphs for the report review period:-





Outcome:- pH levels obtained via Asurequality testing are very inconsistent. The results do not match that of KupeTech findings (Refer Appendix 3 – KupeTech Report). Further investigation required.

Monthly inspection and recording of bio-filter condition i.e. Weeds, compaction, pugging or fissures, commencing from the date of commencement of this permit;

The above inspections are performed daily. Refer page 8 for logged example.

Annual measurements of the bio-filter inlet flows combined with vacuum monitoring results for duct connections to equipment.

Refer Appendix 3 for KupeTech Annual Report for inlet flows and vacuum monitoring results.

Condition 31. The Permit Holder shall, annually prior to 30 March, undertake an annual audit of the rendering plant's odour control systems that considers the effectiveness of the extraction, cooling and biofilter system and its overall performance in regards to controlling odour emissions. The audit should utilise all monitoring data (manual and continuous, complaint records, any independent odour assessments) as well as include downwind odour assessments of the operational rendering plant and ancillary activities. The audit should assess the state of the odour extraction, cooling and biofilter system and taken appropriate measurements and sample for analysis required to confirm the status these systems against their design and required operating parameters. Any analysis of samples shall be undertaken by an appropriately qualified testing laboratory and sampling undertaken as specified in the OMP. Accepted methods shall be used for measurement of media properties that are certified by the Regulatory Manager of MWRC.

The audit shall be undertaken by person(s) who is independent, appropriately qualified and experienced in the operation and maintenance of air extraction, cooling and biofilter systems.

Refer Appendix 3 - KupeTech Annual Report

c. Copy of Log required by Condition 19

Visually check for any leaks of steamy odorous vapours from all enclosed process equipment and conveyors in rendering on a daily basis on days when the plant operates; and

Daily inspections are performed whenever production is in progress. The above inspections are logged daily within the **'Air Odour Resource Consent Monitoring Checksheet – RMF 008'**. Refer example below. All daily monitoring records are held on file in the Rendering Office.

AFFCO IMLAY — ISSUE DATE:- May 2018

AIR ODOUR RESOURCE CONSENT MONITORING CHECKSHEET

RMF 008 — Page 1 of 2

DATE:- 3/4/19 OPERATOR:- MIKE LENNIE SIGNATURE:-

1. WETSIDE ODOUR EXTRACTION MONITORING (Conditions 18a; 19a; 19c)

On a daily basis manually check vacuum pressures of 3 air extraction systems using a calibrated vacuum gauge (Target:- ≥100Pa):- **Monday:- 1:-** Outside Raw Material Bin; **2:-** Inside Raw Material Bin; **3:-** Pre-Heater; **Tuesday:- 4:-** Pre-Heater Discharge; **5:-** Blood Decanter; **6:-** Top of Drainer Conveyor; **Wednesday:- 7:-** Discharge from drainer conveyor into Squeeze Press feed conveyor; **8:-** Top of Squeeze Press feed conveyor; **9:-** Connection to three tallow separator discharge chambers; **Thursday:- 10:-** Sub-manifold to Decanter and Separators; **11:-** Drier feed conveyor; **12:-** Decanter discharge conveyor; **Friday:- 13:-** Top of Squeeze Press and entry Hopper; **14:-** Liquid Phase Tanks.

Air Extraction Location #	Time	Vac Result	Air Extraction Location #	Time	Vac Result
7	7:30	100	9	7:30	120
8	7:30	100			

On a daily basis check for leaks from extraction systems. Leaks found? (✓ applicable)	Yes		No	

2. DRYSIDE ODOUR EXTRACTION MONITORING (Conditions 18c; 19a; 19c)

On a weekly basis manually check vacuum pressures of 3 air extraction systems using a calibrated vacuum gauge (Target:- ≥100Pa)

Day	Air Extraction Location	Time	Vac Result	Day	Air Extraction Location	Time	Vac Result
Mon	Drier in-feed and out-feed conveyors			Thurs	Ground Bin		
Tues	Dryside connection to open air			Fri	Dust Filter		
Wed	Unground Bin	7:30	140				

On a daily basis check the Roto Disc Drier vacuum pressure via SCADA (HRP3 & HRP4):- 1mBa = 100Pa	HRP3	2 MB	HRP4	5
On a weekly basis check the vacuum gauge located on the common exhaust from Roto Disc Drier	Vacuum Reading			110

Advise the MWRC Consents Monitoring Team of any maintenance work which may result in odour release to the atmosphere at least twelve (12) hours prior to the works commencing; and

Keep a log of the above checks details in (a) and (b).

There have been no incidents of planned maintenance work reported to MWRC during the review period. Checks are logged on a daily basis. All daily monitoring records are held on file in the Rendering Office.

d. A copy of the process operating temperatures for the rendering and drying equipment log as required in Condition 20

The process operating temperatures for the rendering and drying equipment shall meet the following standards:

The rendering vessels shall be operated at the lowest temperature practicable, and in any event shall not be operated above 100°C; and

The meat and bone meal dryers shall be operated at the lowest temperature practicable, which is consistent with MAF (or any future replacement regulatory body with relevant functions) sterilisation requirements, and to prevent burning of meal. The temperature of the rendering vessels and dryers shall be continuously monitored and recorded. These records shall show the correct time and date. The records shall be made available to the Regulatory Manager of MWRC or of MWRC officers on request at any time. The records must also be supplied as part of the annual report required by Condition 35.

'Rendering' equipment, other than drying equipment, does not exceed 100^{0}C. Raw material is discharged into the Stord Bartz pre-heater (indirect steam heated cooker). The raw material is agitated and heated to a controlled discharge temperature set between 88^{0}C – 95^{0}C.

The Decanter Liquid Phase process will only activate when level and temperature limits are met – 1300mm and 95^{0}C respectively.

Dryer temperatures are validated to meet Non Heat Certification and Heat Certification Meat and Bone Meal. We are currently processing to Non Heat Certification Meat and Bone Meal standards which requires the dryers to be set at ≥123^{0}C. The dryers are programmed to stop discharging product if dryer temperatures fall below that set point of ≥123^{0}C. Dryer temperatures are monitored continuously via SCADA (history saved). Daily dryer temperature monitoring is performed by Rendering Staff and recorded onto the **'Imlay Rendering Shift Report – RMF 012'**.

ROTO DISC DRYER MONITORING RECORDS

HRS		°C	TIME	DISCHARGE STOP	DISCHARGE GO	PRE-HEATER °C	HRS		°C	TIME	DISCHARGE STOP	DISCHARGE GO	PRE-HEATER °C
0600	A						1800	A	124			✓	95°
	B							B	114		✓		
0900	A	74°		✓		29°	2100	A					
	B	18°		✓				B					
1200	A	58°		✓		25°	0000	A					
	B	68°		✓				B					
1500	A	102°		✓		100	0300	A					
	B	118°		✓				B					

e. A summary of any notifications made to MWRC in accordance with Condition 28;

The Complaints Register for 2018 / 2019 Review period can be found in Appendix 1 of this report.

f. A copy of any notes recorded during the annual meeting of the CLG under Condition 22;

The Permit Holder shall provide co-ordination and administrative support for the Community Liaison Group (CLG) including a dedicated contact point at the site, provision of a meeting point and overseeing any administration associated with the group. The general purpose of the CLG shall be for the Consent Holder to inform the CLG of:

The odour generating activities being undertaken within the Imlay site;

The current odour management processes and procedures being used for those activities; and

Any proposed alterations to those activities, processes or procedures.

A Community Liaison Group Meeting was held on the 27th of March 2019. Refer below for minutes from that meeting:-

COMMUNITY LIAISON GROUP MEETING – MARCH 2019	
Date of Meeting:	27.03.19
Present:	Dean Tucker (AFFCO Operations Manager); David Berry (Imlay Plant Manager); Ricky Gowan (Imlay Compliance Manager); Pita Kinaston (Horizons); Stephen Bryson; Lonia Sarniak; Barbara Allan; John & Auriel Lawson; Sharon Semple; Ruth Tidemann; Rhona Vickoce; Peter & Carol Henderson; Ngaire Francis; Tom & Valarie Duncan; Mr & Mrs Harris; Jason Todd.
Apologies :-	Graham Pearson; Lyn Pearson; Christine Kuzman; Mark & Sharon Corrigan; Carmel Jones.
ACTIONS AGREED:	
Subject	**Action**
Topics of Discussion and Agreed Actions	**Meeting Agenda:-** Tabled previous Meeting Minutes; Mitigation Table update; Odour Complaint Register for current monitoring period; Odour Complaint Trending; Contributing factors / opportunities for improvement. **Discussion Points:-** The CLG attendees were unanimous in their disappointment in AFFCO in relation to objectionable odours beyond the boundary fence. All agreed that the odours have been consistently worse this year compared to previous years. **Company Action Plan:-** 1. Ducting of outside raw bin (Target Date:- 29.03.19). 2. Capping of Rendering plant roof (Target Date:- 05.04.19). 3. Re-commissioning of air intake units (Target Date:- 05.04.19). 4. Installation of a blood processing system at AFFCO Manawatu (Target Date:- mid 2020) **Meeting Action Points:-** 1. Need to check odour phone message and change to make user friendly. 2. Follow-up on stand-alone bio filter for outside raw bin (engineers notes). 3. Publish 'Company Action Plan' in local newspapers. 4. Check affco website for ease of access. 5. Issue preventative maintenance plan for the rendering plant (minimise mechanical breakdowns). 6. Next CLG Meeting set for August 2019. Meeting closed 19:00. Thanks to all those who attended.

Meeting Action Points:-

The following action points have been completed:-

Ducting of outside raw bin:-

Capping of rendering building roof (completed 08.04.19)

Re-commissioning of air in-take fans (completed 08.04.19)

Message on Odour Phone has been changed to avoid confusion (completed 28.03.19)

Preventative Maintenance Plan:- The following will be actioned during the months of June / July:-

- Decanter/separator services.
- 1.10 conveyor replacement.
- 2.4 conveyor replacement.
- Hogger change out.
- Pre breaker change out.
- Pre breaker mounting frame replacement.
- Replace end of small internal raw bin.
- Pre heater bearing replacement.
- Service east side mill.
- Overhaul drier gearbox.
- Replace leaking Johnson joints.
- Re kit diaphragm pumps.
- Industrial painting of internal raw bin and conveyors.
- Plus other minor overhaul work as necessary.
- Planned lubrication and equipment overview (daily / weekly basis).

g. A summary of monthly odour surveys received and the outcome of any investigations and responses required by Condition 29;

29. The Permit Holder shall carry out monthly odour surveys around the boundary of the site, and shall record whether any odour attributable to AFFCO is discernible or not at each location. Monitoring shall occur when the rendering plant is fully operational. These boundary surveys shall be undertaken by the independent person identified in **Condition 7**. The methods and reporting shall be set out in the environmental management plan required by **Condition 4** that is certified by MWRC. The outcome of each monthly odour survey shall be recorded. The Permit Holder shall investigate the cause of any significant odour (intensity greater than two on the VDI 3940 intensity scale) detected during each survey, and implement any necessary remedial action within 48 hours of its detection. A record of each monthly odour survey and any remediation carried out shall be reported in the annual report required **by Condition 35**.

Monthly odour surveys are performed by an 'Independent person'. Amourguard has been contracted to provide that independent odour survey. There were no significant odour issues during those surveys.

Refer Appendix 2 for monthly surveys for the 2018 / 2019 review period.

h. Reporting undertaken as part of Condition 32 regarding the vacuum (pressure) at all enclosed equipment items;

32. The Permit Holder shall, annually **prior to 30 March**, measure and record the vacuum (pressure) at all enclosed equipment items that are extracted by the odour control systems as follows:

a. Pressure shall be measured in the head space of the equipment items that are targeted by the extraction systems. The measurements shall be undertaken by an independent appropriately qualified and experienced person following industry best practice for measurements of this type.

b. The Permit Holder shall prepare a report on the findings and critically analyse the results (including a comparison with historical data) and if required, make recommendations as to the adequacy of the extraction rates, whether pressures are sufficiently negative and whether additional sealing/enclosing of any rendering plant process area is needed to ensure adequate extraction and compliance with conditions of this consent.

This report must be submitted Regulatory Manager of MWRC as part of the annual reporting required by **Condition 35**.

Daily:-
Vacuum pressure checks of enclosed equipment is performed daily during processing. Records are logged onto **'Air Odour Resource Consent Monitoring Checksheet – RMF 008'**.

Annually:-
KupeTech perform annual pressure checks as per Condition 32. Findings from that annual review can be found in the Appendix 3 of this report. Included in that audit report is an 'Action List' for remedial actions required on extraction systems.

i. Records all instrument calibrations carried out on the rendering plant cooling and odour control equipment;

Fixed temperature probes located on plant cooling vessels are calibrated on a quarterly basis (in-house using a calibrated reference thermometer). Refer below to the latest calibration results.

AFFCO IMLAY
CAF 003b

HANDHELD / FIXED THERMOMETER CALIBRATION WORKSHEET

S:\Thermometer Calibration Records\2019\April 2019 - Handheld & Fixed.docx

ISSUE DATE: March 2003

Month: April 2019 **Next Calibration Date :-** July 2019 **Reference Thermometer:** Compliance, EBRO Model TFX 410 Serial No. 15145038

IN-HOUSE 3-MONTHLY THERMOMETER CALIBRATION CHECKS											
Serial / ID Number	Dept.	Description	Ice Point Reading	Ref. Therm.	Difference (+/-)	Steriliser Reading	Ref. Therm.	Difference (+/-)	Accept? (+/- 0.5°C)	Initial	Date of Calibration
HANDHELD THERMOMETERS											
Comp.	Laboratory	Delta Trak	0.1	0.0	-0.1	82.1	82.2	0.1	✓	CW	04/04
*IML 125	Slaughter	Delta Trak	1.3	0.0	-1.3	82.1	83.1	1.0	X / ✓	CW	04/04
IML 126	CR – Night Shift (QA)	Delta Trak	0.0	0.0	0.0	82.3	82.4	0.1	✓	CW	04/04
IML 127	CR – Day Shift (QA)	Delta Trak	-0.1	0.0	0.1	82.5	82.9	0.4	✓	CW	04/04
*IML 121A	CR-Day Shift (Ross)	Delta Trak	-0.9	-0.1	0.8	82.3	82.5	0.2	X / ✓	CW	04/04
*IML 106	Meat Movers	Delta Trak	0.6	0.0	-0.6	82.3	82.5	0.2	X / ✓	CW	04/04
*IML 109	Canteen	Delta Trak	0.1	0.0	-0.1	83.2	82.5	-0.7	X / ✓	CW	04/04
IML 66	Shift Engineers	Delta Trak	-0.1	0.0	0.1	82.2	82.6	0.4	✓	CW	04/04
IML 111	EQ Chiller	EBRO	0.0	0.0	0.0	-	-	-	✓	CW	04/04
IML 120A	Fancy Meats	Delta Trak	-0.1	0.0	0.1	82.1	82.5	0.4	✓	CW	04/04
IML 123	Rendering	Delta Trak	-	-	-	42.1	42.3	0.2	✓	CW	04/04
*Freezer	Cold Store	EBRO	-0.1	0.0	0.1				✓	CW	04/04

NOTES:-

*recalibrated 121A & 106.
*replaced 109 & 125.

FIXED PLANT THERMOMETERS											
Serial / ID Number	Dept.	Description	Ice Point Reading	Ref. Therm.	Difference (+/-)	Steriliser Reading	Ref. Therm.	Difference (+/-)	Accept? (+/- 2.0°C)	Initial	Date of Calibration
SLAUGHTER FLOOR											
115194/2	Viscera Table	N/A	N/A	N/A	N/A	86.0	86.1	0.1	✓	CW	05/04
107635	Brisket Cutter	N/A	N/A	N/A	N/A	90.0	90.5	0.5	✓	CW	05/04
304724	Hock Cutter	N/A	N/A	N/A	N/A	83.0	83.2	0.2	✓	CW	05/04
90639/18	Thumb Tool (West)	N/A	N/A	N/A	N/A	82.0	82.0	0	✓	CW	05/04
98422/25	Thumb Tool (East)	N/A	N/A	N/A	N/A	84.0	84.0	0	✓	CW	05/04
103061	Hot Water Wash	*Hot Water Wash currently not in use. Carcases washed using cold water.*									
RENDERING PLANT – (Handwash Water Temperature)											
301074	Dryer Condenser	42.1 / 42.3							✓	CW	05/04
300739	Odour Condensate	42.4 / 42.5							✓	CW	05/04
304724	Dryer Condensate	42.5 / 42.8							✓	CW	05/04
300739	Odour Condenser	42.8 / 43.3							✓	CW	05/04
E006481	Rendering	Yokogawa	N/A	N/A	N/A	42.4	42.6	0.2	✓	CW	05/04
301074	Dry-side Inlet Duct	42.5. / 42.9 HRT 1							✓	CW	05/04
301074	Dry-side Outlet Duct	42.7 / 43.0 HRT 2							✓	CW	05/04
304724	Westside Cooling Tower Outlet	43.5 / 43.9							✓	CW	05/04

NOTE:-

1. Fixed Plant thermometers are replaced if they require an adjustment which is greater than 2 deg C.
2. Fixed thermometers associated with the Rendering Department are to be calibrated in handwash water only.
3. All non conforming thermometers are to be replaced with new thermometers.

APPENDIX 1 –

Complaints Register and Trending

Complaints Register

N°	NAME	ADDRESS	DATE	TIME	COMMENTS	SUBSTANTIATED	UNSUBSTANTIATED
1	Peter Kinaston for Jeanette Richardson	61 Swiss Ave	26.05.18	11:00	Odour all morning, strong cooked meat smell and getting worse.		✓
2	Jeanette Richardson	61 Swiss Ave	05.06.18	17:00	Odour coming from Imlay		✓
3	Sharon Semple	34 Bignell Street	18.09.18	18:48	Odour complaint made via odour phone. No description of odour noted by Security Guard. (Te Kuiti Meats / Rangiuru Product)	✓	
4	Horizons (Complaint from Balgownie Ave resident)	Balgownie Ave	19.09.18	15:50	Odour coming from Imlay. Investigated by Armourguard and Plant Management. No odours detected beyond the boundary fence.		✓
5	Unknown - Wordsworth Street	Wordsworth Street	20.09.18	14:54	Odour coming from Imlay. Could not detect any odours at 15:08 however within the boundary near the Main Office there was a definite odour potentially caused from emptying of Rangiuru mixed offals into the outside raw bin.	✓	
6	Unknown - Balgownie Ave	Balgownie Ave	20.09.18	15:40	Cooking odour coming from Imlay.	✓	
7	Carol Henderson	53 Balgownie Ave	20.09.18	16:45	Odour described as a rotten smell gradually getting worse. Rated it a 5 / 6 out of 10.	✓	
8	Mrs Duncan	6 Wordsworth Street	21.09.18	17:29	Odour described as a meaty smell. Security guard - Dan Crawford - performed a FIDOL investigation at 17:38. The outcome of that investigation was "Did not detect any odour".		✓
9	Mr & Mrs Lawson	16a Bignell Street	19.10.18	11:34	Odour described the smell as a urine, sheep shit, offal, fat smell (like someone had opened the doors) which had been going off and on all morning.		✓
10	Sharon Semple	34 Bignell Street	01.11.18	16:45	Odour described the smell as a rotten meat /cooking smell. A 6 on the scale		✓

Appendix 1 - Odour Complaint Register and History

Nº	NAME	ADDRESS	DATE	TIME	COMMENTS	SUBSTANTIATED	UNSUBSTANTIATED
11	Mr & Mrs Lawson	16a Bignell Street	02.11.18	10:00	Odour described as a sheep shit, sheep urine, sheep fat smell.		✓
12	Horizons (Complaint from Balgownie Ave resident)	Balgownie Ave	19.11.18	14:45	Odour described as a rendering odour which had been going on for the past hour.		✓
13	Horizons (Complaint from Balgownie Ave resident)	Balgownie Ave	19.11.18	16:20	Odour described as a rendering odour.		✓
14	Mrs Lawson	16a Bignell Street	27.11.18	13:35	Mrs Lawson described the smell as the same bad smell as normal - a rendering, animal fat smell.	✓	
15	Mrs Lawson	16a Bignell Street	06.12.18	10:30	Odour described as a rendering odour.		✓
16	Horizons (Complaint from Heads Road / Abbott Street resident)	Heads Road / Abbott Street	11.12.18	12:45	Rotten meat smell that had been occurring for last 2 hours.	✓	
17	Stephen Bryson	7 Saunders Place	16.01.19	18:06	The smell from Imlay has been lingering for several hours.	✓	
18	Darren Kelly	186 Heads Road	16.01.19	21:48	Unpleasant smell - rendering maybe?	✓	
19	Anna Hayward	24 Balgownie Ave	17.01.19	11:45	Smell reported coming from Imlay. Has been all morning.	✓	
20	Horizons (Complaint from Balgownie Ave resident)	Balgownie Ave	17.01.19	14:00	Balgownie Ave resident rang Horizons - Dan Higgs - and lodge a complaint re odours coming from Imlay.		✓
21	Anna Hayward	24 Balgownie Ave	17.01.19	14:52	Smell reported coming from Imlay since lunchtime.		✓
22	Bennett Spencer	16 Balgownie Ave	18.01.19	19:54	Bone Meal smell - rated 3 out of 6		✓

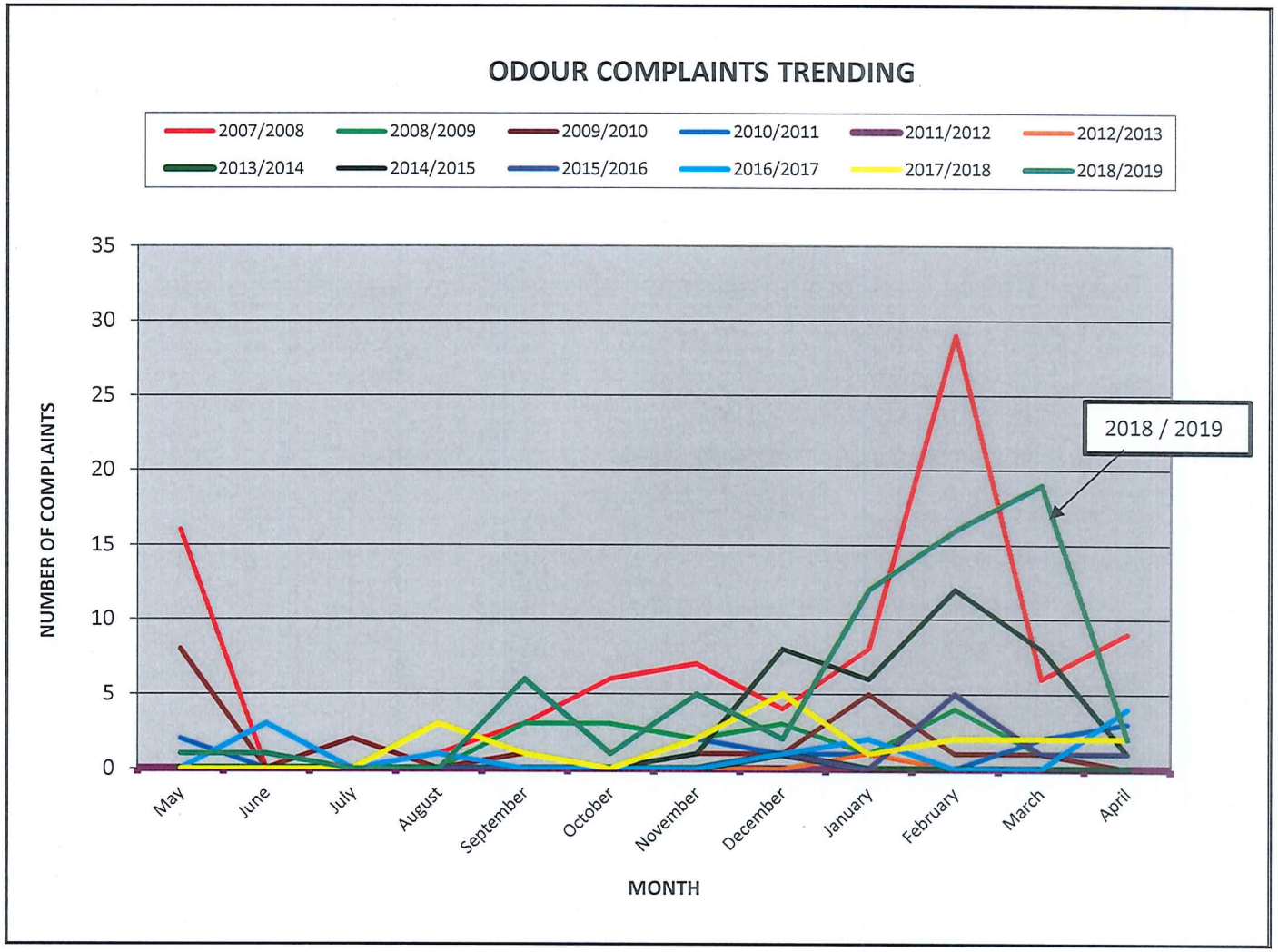
Nº	NAME	ADDRESS	DATE	TIME	COMMENTS	SUBSTANTIATED	UNSUBSTANTIATED
23	Fiona Hyder	41a Bignell Street	24.01.19	20:32	Smells like rotting cabbage / stagnant water	✓	
24	Sharlene Te Tui	Prince Street	24.01.19	20:51	Bloody stink and that's putting it lightly	✓	
25	Unknown	Gonville	24.01.19	20:57	Really bad smell coming from Imlay	✓	
26	Rachel Nixon	284 Heads Road	24.01.19	21:06	Really bad smell coming from Imlay	✓	
27	Graham Pettigrew	11 Kings Ave	29.01.19	12:15	Just wanted to report an odour. Graham was unsure where it originated from.	✓	
28	Maria Jones	40 Bignell Street	30.01.19	10:25	Really bad smell coming from Imlay. Smells like sewerage.		✓
29	Mr & Mrs Lawson	16a Bignell Street	08.02.19	18:48	Get rid of the stench we are putting up with		✓
30	Mr & Mrs Lawson	16a Bignell Street	11.02.19	12:05	Reported an odour	✓	
31	Debra Tunbridge	11 Balgownie Ave	11.02.19	20:05	Rendering smell. Meaty pungent odours	✓	
32	Horizons (Ross Bidlake)	Balgownie Ave	14.02.19	12:05	Odour complaint made through Horizons. No information given.	✓	
33	Unknown	Balgownie Ave	14.02.19	16:20	Really bad offal smell	✓	
34	Darren Kelly	186 Heads Road	16.02.19	11:08	Reported an odour		✓
35	Unknown (via Horizons)	Balgownie Ave	16.02.19	11:09	Reported an odour		✓
36	Unknown (via Horizons)	Balgownie Ave	16.02.19	11:24	Reported an odour		✓
37	Dean Holden	270 Heads Road	16.02.19	14:25	Reported an odour	✓	
38	Sharon Semple	34 Bignell Street	16.02.19	15:46	Reported an odour	✓	

Nº	NAME	ADDRESS	DATE	TIME	COMMENTS	SUBSTANTIATED	UNSUBSTANTIATED
39	Kieren Kennedy	29B Bignell Street	16.02.19	16:06	Reported an odour	✓	
40	Ronald Thomas	33A Bignell Street	16.02.19	16:39	Reported an odour	✓	
41	Sharon Corrigan	59 Bedford Ave	19.02.19	12:05	Reported an odour coming from Imlay	✓	
42	Colleen Withers	39 Balgownie Ave	19.02.19	12:21	Really bad smell. Rate it 6 to a 7	✓	
43	Sharon Corrigan	59 Bedford Ave	20.02.19	12:40	Reported an odour coming from Imlay		✓
44	Mrs Lawson	16a Bignell Street	21.02.19	15:00	Reported an odour coming from Imlay	✓	
45	Mrs Lawson	16a Bignell Street	01.03.19	12:35	Strong odour coming from Imlay. Really bad smell.	✓	
46	Mr Barnes	8 Balgownie Ave	07.03.19	14:30	Disgusting smell coming from Imlay. Has been for last 2 weeks.	✓	
47	Unknown (via Horizons)	Balgownie Ave	07.03.19	14:32	A number of odour complaints being lodged with Horizons.	✓	
48	Rex Trow	11a Kings Ave	08.03.19	10:30	Reported an odour. Investigated by Armourguard and Jonathon Opie.		✓
49	Unknown (via Dave Berry)	Heads Road - opp.Butcher shop	08.03.19	10:30	Reported an odour. Investigated by Jonathon Opie.		✓
50	Mr Lawson	16a Bignell Street	08.03.19	20:10	Reported an odour. Investigated by Armourguard.	✓	
51	Brent Cauldwell	18 Cauis Ave	09.03.19	13:16	Odour complaint.	✓	
52	John Smith	36 Bignell Street	09.03.19	20:39	Reported odour coming from Imlay.	✓	
53	Unknown (via Horizons)	Bignell Street	09.03.19	22:30	Reported an odour. Investigated by Armourguard.	✓	
54	Ron Thomas	33a Bignell Street	10.03.19	13:05	Rotten smell coming from Imlay	✓	

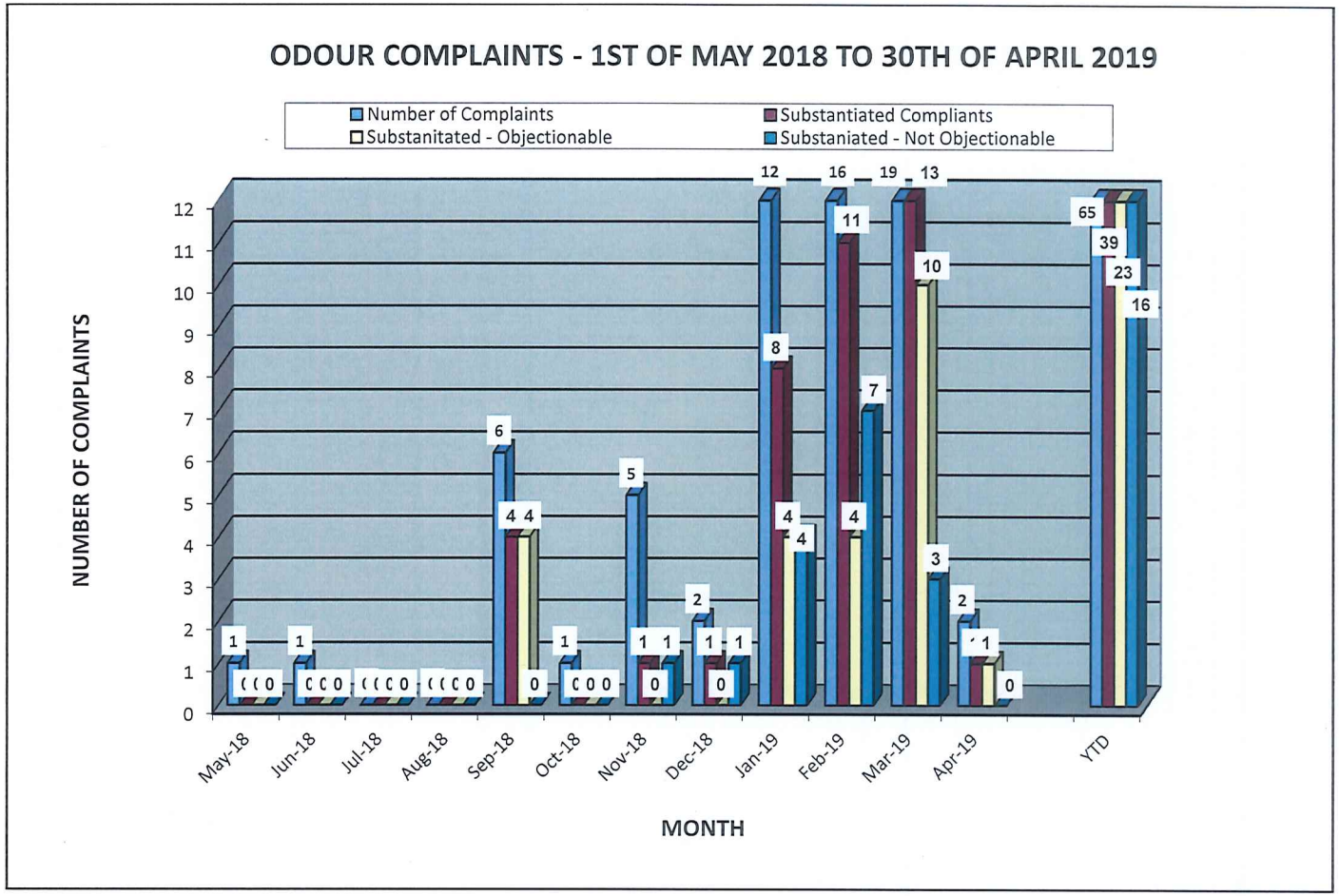
Appendix 1 - Odour Complaint Register and History

Nº	NAME	ADDRESS	DATE	TIME	COMMENTS	SUBSTANTIATED	UNSUBSTANTIATED
55	Sharon Semple	34 Bignell Street	10.03.19	15:25	Reported an odour. Investigated by Armourguard.	✓	
56	Christine Ivar	10 Prince Street	10.03.19	20:10	Reported an odour. Investigated by Armourguard. This was the strongest I have smelt.	✓	
57	Gemma Rangi	38 Bignell Street	11.03.19	14:52	Can smell a Rendering odour		✓
58	Mrs Lawson	16a Bignell Street	11.03.19	15:25	Terrible offal smell all over Gonville	✓	
59	G. Pearson	N/A	14.03.19	17:40	Offensive smell coming from Imlay	✓	
60	Unknown (via Horizons)	280 Heads Road	18.03.19	21:10	Offensive smell coming from Imlay - 5 out of 6 on scale		✓
61	Unknown (via Horizons)	280 Heads Road	19.03.19	20:50	Rotting meat smell		✓
62	Stephen Bryson	7 Saunders Place	20.03.19	17:24	Bad smell coming from Imlay	✓	
63	Jeanette Richardson (via Horizons)	61 Swiss Ave	21.03.19	11:50	Odour reported to Horizons		✓
64	Peter Firth	2 Beach Road	03.04.19	13:10	Odour reported to Imlay Plant Manager.		✓
65	Mr & Mrs Lawson	16a Bignell Street	03.04.19	13:48	Normal meat odour coming from Imlay	✓	

Odour Complaint Trending History to Date



Odour Complaint Outcomes



Odour Complaints by Surrounding Streets

APPENDIX 2 –

Monthly Survey Reports

AFFCO IMLAY — ISSUE DATE:- March 2018

ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001 — Page 1 of 2

DATE:- 19/4/19 — ASSESSORS NAME:- Kristi Tolhurst

REASON FOR INVESTIGATION:- (✓ applicable) — COMPLAINT [ ] — ODOUR SURVEY [✓]

INITIAL IMPRESSIONS:- — CHARACTER:-

TIME OF INITIAL IMPRESSION:- — GENERAL HEDONIC TONE:-

ODOUR INTENSITY:- — PLUME WIDTH (if known):-

START TIME:-

		Intensity	Character/notes
1st min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
2nd min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
3rd min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
4th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
5th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
6th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
7th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
8th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
9th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
10th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	

Scale of intensity

6	Extremely strong
5	Very strong
4	Strong
3	Distinct
2	Weak
1	Very weak
0	No odour

Weather Data (see over)

Wind direction:-

Wind velocity:-

Cloud cover:-

Temperature:-

General Hedonic Tone

-4	Extremely unpleasant
-3	
-2	
-1	
0	Neutral
1	
2	
3	
4	Extremely pleasant

Based on your assessment on this occasion, which of the following applies:-

- [✓] *I did not detect any odour*
- [ ] *I did detect odour and consider it would not be objectionable at any location for any duration or frequency*
- [ ] *I did detect odour and consider it would not be objectionable, UNLESS it became continuous*
- [ ] *I did detect odour and consider it would be objectionable if it occurred on a regular or frequent basis*
- [ ] *I did detect odour and consider it would be objectionable even if in periods of short duration*

FINAL CHECKLIST:-

- [ ] *Upwind assessment completed. If not, detail reason:-*
- [ ] *Aerial photo showing location of assessment attached*
- [ ] *Are there potential witness statements to obtain:- YES / NO*

REMARKS:-

AFFCO IMLAY — ISSUE DATE:- March 2019

ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMP 005 — Page 1 of 2

DATE:- 15-3-19 — ASSESSORS NAME:- Wayne Watson

REASON FOR INVESTIGATION:- (✓ applicable) — COMPLAINT [ ] — ODOUR SURVEY [✓]

INITIAL IMPRESSIONS:- — CHARACTER:-

TIME OF INITIAL IMPRESSION:- — GENERAL HEDONIC TONE:-

ODOUR INTENSITY:- — PLUME WIDTH (if known):-

START TIME:- 1330

		Intensity	Character/notes
1st min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
2nd min	0	1	
	10	1	
	20	1	
	30	1	
	40	1	
	50	1	
3rd min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
4th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
5th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	

		Intensity	Character/notes
6th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
7th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
8th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
9th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
10th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	

Scale of Intensity

6	Extremely strong
5	Very strong
4	Strong
3	Distinct
2	Weak
1	Very weak
0	No odour

Weather Data (see over)

Wind direction:-

Wind velocity:-

Cloud cover:-

Temperature:-

General Hedonic Tone

-4	Extremely unpleasant
-3	
-2	
-1	
0	Neutral
1	
2	
3	
4	Extremely pleasant

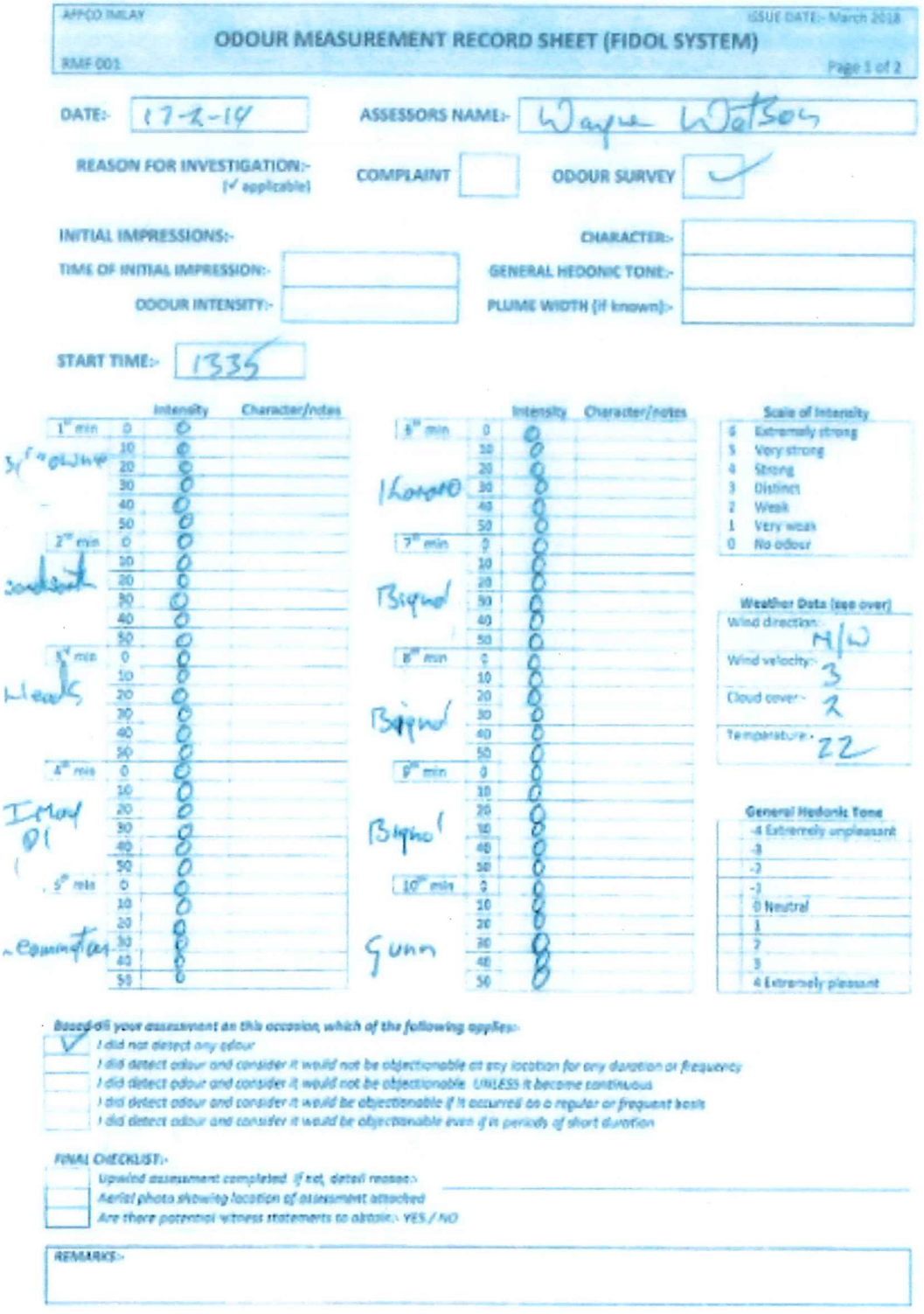
Based on your assessment on this occasion, which of the following applies:-

- [ ] I did not detect any odour
- [✓] I did detect odour and consider it would not be objectionable on any location for any duration or frequency
- [ ] I did detect odour and consider it would not be objectionable, UNLESS it became continuous
- [ ] I did detect odour and consider it would be objectionable if it occurred on a regular or frequent basis
- [ ] I did detect odour and consider it would be objectionable even if in periods of short duration

FINAL CHECKLIST:-

- [ ] Upwind assessment completed If not, detail reason:-
- [ ] Aerial photo showing location of assessment attached
- [ ] Are there potential witness statements to obtain:- YES / NO

REMARKS:-



AFFCO IMLAY — ISSUE DATE:- March 2018

ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001 — Page 1 of 2

DATE:- 17-2-19 — ASSESSORS NAME:- Wayne Watson

REASON FOR INVESTIGATION:- (✓ applicable) — COMPLAINT [ ] — ODOUR SURVEY [✓]

INITIAL IMPRESSIONS:-

TIME OF INITIAL IMPRESSION:-

ODOUR INTENSITY:-

CHARACTER:-

GENERAL HEDONIC TONE:-

PLUME WIDTH (if known):-

START TIME:- 1335

		Intensity	Character/notes
1st min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
2nd min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
3rd min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
4th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
5th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	

		Intensity	Character/notes
6th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
7th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
8th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
9th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
10th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	

Scale of Intensity

6	Extremely strong
5	Very strong
4	Strong
3	Distinct
2	Weak
1	Very weak
0	No odour

Weather Data (see over)

Wind direction:	N/W
Wind velocity:-	3
Cloud cover:-	2
Temperature:-	22

General Hedonic Tone

-4	Extremely unpleasant
-3	
-2	
-1	
0	Neutral
1	
2	
3	
4	Extremely pleasant

Based on your assessment on this occasion, which of the following applies:-

- [✓] I did not detect any odour
- [ ] I did detect odour and consider it would not be objectionable at any location for any duration or frequency
- [ ] I did detect odour and consider it would not be objectionable UNLESS it became continuous
- [ ] I did detect odour and consider it would be objectionable if it occurred on a regular or frequent basis
- [ ] I did detect odour and consider it would be objectionable even if in periods of short duration

FINAL CHECKLIST:-

- [ ] Upwind assessment completed If not, detail reason:-
- [ ] Aerial photo showing location of assessment attached
- [ ] Are there potential witness statements to obtain:- YES / NO

REMARKS:-

AFFCO IMLAY — ISSUE DATE: March 2018

ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001 — Page 1 of 2

DATE:- 15-1-19 ASSESSORS NAME:- Wayne Watson

REASON FOR INVESTIGATION:- (✓ applicable) COMPLAINT [ ] ODOUR SURVEY [✓]

INITIAL IMPRESSIONS:- CHARACTER:-

TIME OF INITIAL IMPRESSION:- GENERAL HEDONIC TONE:-

ODOUR INTENSITY:- 1120 PLUME WIDTH (if known):-

START TIME:-

		Intensity	Character/notes
1st min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
2nd min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
3rd min	0	0	
	10	0	
	20	0	
	30	0	
	40	1	
	50	0	
4th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
5th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	

		Intensity	Character/notes
6th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
7th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
8th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
9th min	0	1	Slight Fishy Smell
	10	1	
	20	1	
	30	0	
	40	0	
	50	0	
10th min	0		
	10		
	20		
	30		
	40		
	50		

Scale of Intensity

6	Extremely strong
5	Very strong
4	Strong
3	Distinct
2	Weak
1	Very weak
0	No odour

Weather Data (see over)

Wind direction:	N
Wind velocity:	4
Cloud cover:	4
Temperature:	17

General Hedonic Tone

-4	Extremely unpleasant
-3	
-2	
-1	
0	Neutral
1	
2	
3	
4	Extremely pleasant

Based on your assessment on this occasion, which of the following applies:-

- [ ] I did not detect any odour
- [✓] I did detect odour and consider it would not be objectionable at any location for any duration or frequency
- [ ] I did detect odour and consider it would not be objectionable UNLESS it became continuous
- [ ] I did detect odour and consider it would be objectionable if it occurred on a regular or frequent basis
- [ ] I did detect odour and consider it would be objectionable even if in periods of short duration

FINAL CHECKLIST:-

- [ ] Upwind assessment completed. If not, detail reason:-
- [ ] Aerial photo showing location of assessment attached
- [ ] Are there potential witness statements to obtain:- YES / NO

REMARKS:-

AFFCO IMLAY | ISSUE DATE: March 2018

ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

EMF 001 | Page 1 of 2

DATE:- 18-12-18 **ASSESSORS NAME:-** Wayne Watson

REASON FOR INVESTIGATION:- (✓ applicable) COMPLAINT [ ] ODOUR SURVEY [✓]

INITIAL IMPRESSIONS:-

TIME OF INITIAL IMPRESSION:-

ODOUR INTENSITY:-

CHARACTER:-

GENERAL HEDONIC TONE:-

PLUME WIDTH (if known):-

START TIME:- 1100

Location	Minute	Seconds	Intensity	Character/notes
Belgowrie Ave	1st min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Jacksworth	2nd min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Heads Rd	3rd min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Beach Rd	4th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
	5th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	

Location	Minute	Seconds	Intensity	Character/notes
Korotc	6th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Prince	7th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Bignell	8th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Bignell	9th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Swiss	10th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	

Scale of Intensity

6	Extremely strong
5	Very strong
4	Strong
3	Distinct
2	Weak
1	Very weak
0	No odour

Weather Data (see over)

Wind direction:- NW

Wind velocity:- 2

Cloud cover:- 2

Temperature:- 20

General Hedonic Tone

-4 Extremely unpleasant
-3
-2
-1
0 Neutral
1
2
3
4 Extremely pleasant

Based on your assessment on this occasion, which of the following applies:-

- [✓] *I did not detect any odour*
- [ ] *I did detect odour and consider it would not be objectionable at any location for any duration or frequency*
- [ ] *I did detect odour and consider it would not be objectionable UNLESS it became continuous*
- [ ] *I did detect odour and consider it would be objectionable if it occurred on a regular or frequent basis*
- [ ] *I did detect odour and consider it would be objectionable even if in periods of short duration*

FINAL CHECKLIST:-

- [ ] *Upwind assessment completed. If not, detail reason:-*
- [ ] *Aerial photo showing location of assessment attached*
- [ ] *Are there potential witness statements to obtain:- YES / NO*

REMARKS:-

AFFCO IMLAY — ISSUE DATE:- March 2018

ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001 — Page 1 of 2

DATE:- 14-11-18 **ASSESSORS NAME:-** Wayne Watson

REASON FOR INVESTIGATION:- (✓ applicable) COMPLAINT [ ] ODOUR SURVEY [✓]

INITIAL IMPRESSIONS:-

TIME OF INITIAL IMPRESSION:-		CHARACTER:-	
ODOUR INTENSITY:-		GENERAL HEDONIC TONE:-	
		PLUME WIDTH (if known):-	

START TIME:- 1030

Location	Minute	Sec	Intensity	Character/notes
Walgowine Rd	1st min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Woodworth St	2nd min	0	1	very slight
		10	1	
		20	·	Fatty smell
		30	1	
		40	1	
		50	1	
Heads Rd	3rd min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Imlay P	4th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Imlay Play	5th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	

Location	Minute	Sec	Intensity	Character/notes
Beaumaris Ave	6th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Karoro Rd	7th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Prince	8th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Bignell st	9th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Bedford ave	10th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	

Scale of Intensity

- 6 Extremely strong
- 5 Very strong
- 4 Strong
- 3 Distinct
- 2 Weak
- 1 Very weak
- 0 No odour

Weather Data (see over)

Wind direction:- Nil
Wind velocity:-
Cloud cover:- None
Temperature:- 22

General Hedonic Tone

- -4 Extremely unpleasant
- -3
- -2
- -1
- 0 Neutral
- 1
- 2
- 3
- 4 Extremely pleasant

Based on your assessment on this occasion, which of the following applies:-

- [ ] *I did not detect any odour*
- [✓] *I did detect odour and consider it would not be objectionable at any location for any duration or frequency*
- [ ] *I did detect odour and consider it would not be objectionable, UNLESS it became continuous*
- [ ] *I did detect odour and consider it would be objectionable if it occurred on a regular or frequent basis*
- [ ] *I did detect odour and consider it would be objectionable even if in periods of short duration*

FINAL CHECKLIST:-

- [ ] *Upwind assessment completed. If not, detail reason:-*
- [ ] *Aerial photo showing location of assessment attached*
- [ ] *Are there potential witness statements to obtain:- YES / NO*

REMARKS:- Very slight smell in Woodworth St.

AFFCO IMLAY | ISSUE DATE: March 2018

ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001 | Page 1 of 2

DATE:- 17-10-18 **ASSESSORS NAME:-** Wayne Watson

REASON FOR INVESTIGATION:- (✓ applicable) **COMPLAINT** [ ] **ODOUR SURVEY** [✓]

INITIAL IMPRESSIONS:-

TIME OF INITIAL IMPRESSION:-

ODOUR INTENSITY:-

CHARACTER:-

GENERAL HEDONIC TONE:-

PLUME WIDTH (if known):-

START TIME:- 1000

Minute	Sec	Location	Intensity	Character/notes
1st min	0	Salisbury Ave	1	
	10		1	Fatty
	20		1	smell
	30		1	very
	40		1	light
	50		1	
2nd min	0	Jackson St	0	
	10		0	
	20		0	
	30		0	
	40		0	
	50		0	
3rd min	0	Leeds Rd	0	
	10		0	
	20		0	
	30		0	
	40		0	
	50		0	
4th min	0	Imlay Place	0	
	10		0	
	20		0	
	30		0	
	40		0	
	50		0	
5th min	0	Beach Rd	0	
	10		0	
	20		0	
	30		0	
	40		0	
	50		0	

Minute	Sec	Location	Intensity	Character/notes
6th min	0	Karoro Rd	1	
	10		1	
	20		1	Rendering
	30		1	smell
	40		1	
	50		1	
7th min	0	Prince St	0	
	10		0	
	20		0	
	30		0	
	40		0	
	50		0	
8th min	0	Ingall St	0	
	10		0	
	20		0	
	30		0	
	40		0	
	50		0	
9th min	0	Kings Ave	0	
	10		0	
	20		0	
	30		0	
	40		0	
	50		0	
10th min	0	Balfour Ave		
	10			
	20			
	30			
	40			
	50			

Scale of Intensity

6	Extremely strong
5	Very strong
4	Strong
3	Distinct
2	Weak
1	Very weak
0	No odour

Weather Data (see over)

Wind direction:- N/E
Wind velocity:- Strong Breeze
Cloud cover:- Part Cloud cover
Temperature:- 15

General Hedonic Tone

	-4 Extremely unpleasant
	-3
	-2
	1
	0 Neutral
	1
	2
	3
	4 Extremely pleasant

Based on your assessment on this occasion which of the following applies:-

- [ ] *I did not detect any odour*
- [✓] *I did detect odour and consider it would not be objectionable at any location for any duration or frequency*
- [ ] *I did detect odour and consider it would not be objectionable UNLESS it became continuous*
- [ ] *I did detect odour and consider it would be objectionable if it occurred on a regular or frequent basis*
- [ ] *I did detect odour and consider it would be objectionable even if in periods of short duration*

FINAL CHECKLIST:-

- [ ] *Upwind assessment completed. (if not, detail reason:-* ____________
- [ ] *Aerial photo showing location of assessment attached*
- [ ] *Are there potential witness statements to obtain:- YES / NO*

REMARKS:-

AFFCO IMLAY | ISSUE DATE:- March 2018
RMF 001 | Page 1 of 2

ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

DATE:- 14-9-18 **ASSESSORS NAME:-** Wayne Watson

REASON FOR INVESTIGATION:- (✓ applicable) **COMPLAINT** [ ] **ODOUR SURVEY** [✓]

INITIAL IMPRESSIONS:-

TIME OF INITIAL IMPRESSION:-		CHARACTER:-	
ODOUR INTENSITY:-		GENERAL HEDONIC TONE:-	
		PLUME WIDTH (if known):-	

START TIME:- 1150

Location	Minute	Sec	Intensity	Character/notes
Bulgarine Ave	1st min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Lordsworth ST	2nd min	0	1	
		10	1	
		20	1	
		30	1	
		40	1	
		50	1	
Heads Rd	3rd min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Imlay Pl	4th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Leamington ST	5th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	

Location	Minute	Sec	Intensity	Character/notes
Beaumont Ave	6th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Kororo ST By Back Fence	7th min	0	3	
		10	2	
		20	2	
		30	3	
		40	2	
		50	2	
Prince ST	8th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Bignol ST	9th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	
Saunders Pl	10th min	0	0	
		10	0	
		20	0	
		30	0	
		40	0	
		50	0	

Scale of Intensity

6	Extremely strong
5	Very strong
4	Strong
3	Distinct
2	Weak
1	Very weak
0	No odour

Weather Data (see over)

Wind direction:- S/E
Wind velocity:- Light
Cloud cover:- Light
Temperature:- 16°

General Hedonic Tone

-4 Extremely unpleasant
-3
-2
-1
0 Neutral
1
2
3
4 Extremely pleasant

Based on your assessment on this occasion, which of the following applies:-

- [ ] *I did not detect any odour*
- [✓] *I did detect odour and consider it would not be objectionable at any location for any duration or frequency*
- [ ] *I did detect odour and consider it would not be objectionable. UNLESS it become continuous*
- [ ] *I did detect odour and consider it would be objectionable if it occurred on a regular or frequent basis*
- [ ] *I did detect odour and consider it would be objectionable even if in periods of short duration*

FINAL CHECKLIST:-

- [ ] *Upwind assessment completed. If not, detail reason:-*
- [ ] *Aerial photo showing location of assessment attached*
- [ ] *Are there potential witness statements to obtain:- YES / NO*

REMARKS:- Smell around By Rendering

AFFCO IMLAY — ISSUE DATE:- March 2018

ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001 — Page 1 of 2

DATE:- 14-8-19 — ASSESSORS NAME:- Wayne Watson

REASON FOR INVESTIGATION:- (✓ applicable) — COMPLAINT [ ] — ODOUR SURVEY [✓]

INITIAL IMPRESSIONS:- — CHARACTER:-

TIME OF INITIAL IMPRESSION:- 1340 — GENERAL HEDONIC TONE:-

ODOUR INTENSITY:- — PLUME WIDTH (if known):-

START TIME:- 1340

		Intensity	Character/notes
1st min	0	0	
	10	0	
	20	0	
Heard Rd	30	0	
	40	0	
	50	0	
2nd min	0	0	
	10	0	
Imlay	20	0	
Pl	30	0	
	40	0	
	50	0	
3rd min	0	0	
	10	0	
Cunningham	20	0	
St	30	0	
	40	0	
	50	0	
4th min	0	0	
	10	0	
	20	0	
Beamans	30	0	
	40	0	
	50	0	
5th min	0	0	
	10	0	
	20	0	
Kardoo	30	0	
St	40	0	
	50	0	

		Intensity	Character/notes
6th min	0	0	
	10	0	
	20	0	
Princep	30	0	
St	40	0	
	50	0	
7th min	0	0	
	10	0	
	20	0	
Abbott	30	0	
St	40	0	
	50	0	
8th min	0	0	
	10	0	
	20	0	
Bignal	30	0	
St	40	0	
	50	0	
9th min	0	0	
	10	0	
	20	0	
Saunder	30	0	
	40	0	
	50	0	
10th min	0	0	
	10	0	
	20	0	
Balgowan	30	0	
Ave	40	0	
	50	0	

Scale of Intensity

6	Extremely strong
5	Very strong
4	Strong
3	Distinct
2	Weak
1	Very weak
0	No odour

Weather Data (see over)

Wind direction:- N/A

Wind velocity:- N/A

Cloud cover:- light Rain Heavy cloud

Temperature:- 13

General Hedonic Tone

-4	Extremely unpleasant
-3	
-2	
-1	
0	Neutral
1	
2	
3	
4	Extremely pleasant

Based on your assessment on this occasion, which of the following applies:-

- [✓] *I did not detect any odour*
- [ ] *I did detect odour and consider it would not be objectionable at any location for any duration or frequency*
- [ ] *I did detect odour and consider it would not be objectionable. UNLESS it became continuous*
- [ ] *I did detect odour and consider it would be objectionable if it occurred on a regular or frequent basis*
- [ ] *I did detect odour and consider it would be objectionable even if in periods of short duration*

FINAL CHECKLIST:-

- [ ] *Upwind assessment completed. If not, detail reason:-*
- [ ] *Aerial photo showing location of assessment attached*
- [ ] *Are there potential witness statements to obtain:- YES / NO*

REMARKS:- Very Light Rain No Wind

AFFCO IMLAY — ISSUE DATE:- March 2018

ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001 — Page 1 of 2

DATE:- 3-7-19 — ASSESSORS NAME:- Wayne Watson

REASON FOR INVESTIGATION:- (✓ applicable) — COMPLAINT [ ] — ODOUR SURVEY [✓]

INITIAL IMPRESSIONS:- — CHARACTER:-

TIME OF INITIAL IMPRESSION:- 1122 — GENERAL HEDONIC TONE:-

ODOUR INTENSITY:- — PLUME WIDTH (if known):-

START TIME:- 1122

		Intensity	Character/notes
1st min	0	0	
	10	0	
	20	0	
	30	0	
Belgowan Ave	40	0	
	50	0	
2nd min	0	0	
	10	0	
Wardwell	20	0	
St	30	0	
	40	0	
	50	0	
3rd min	0	0	
	10	0	
	20	0	
Heads	30	0	
Rd	40	0	
	50	0	
4th min	0	0	
	10	0	
	20	0	
Prince	30	0	
St	40	0	
	50	0	
5th min	0	0	
	10	0	
	20	0	
Imlay	30	0	
Pl	40	0	
	50	0	

		Intensity	Character/notes
6th min	0	0	
	10	0	
	20	0	
Leamington	30	0	
St	40	0	
	50	0	
7th min	0	0	
	10	0	
Beaumont	20	0	
	30	0	
Ave	40	0	
	50	0	
8th min	0	0	
	10	0	
	20	0	
Lowe	30	0	
Rd	40	0	
	50	0	
9th min	0	0	
	10	0	
	20	0	
Swiss	30	0	
Ave	40	0	
	50	0	
10th min	0	0	
	10	0	
	20	0	
Abbott	30	0	
St	40	0	
	50	0	

Scale of Intensity

6	Extremely strong
5	Very strong
4	Strong
3	Distinct
2	Weak
1	Very weak
0	No odour

Weather Data (see over)

Wind direction:- N/A

Wind velocity:- not high!

Cloud cover:- 4+1

Temperature:- 11

General Hedonic Tone

-4	Extremely unpleasant
-3	
-2	
-1	
0	Neutral
1	
2	
3	
4	Extremely pleasant

Based on your assessment on this occasion, which of the following applies:-

- [✓] I did not detect any odour
- [ ] I did detect odour and consider it would not be objectionable at any location for any duration or frequency
- [ ] I did detect odour and consider it would not be objectionable UNLESS it became continuous
- [ ] I did detect odour and consider it would be objectionable if it occurred on a regular or frequent basis
- [ ] I did detect odour and consider it would be objectionable even if in periods of short duration

FINAL CHECKLIST:-

- [ ] Upwind assessment completed. If not, detail reason:-
- [ ] Aerial photo showing location of assessment attached
- [ ] Are there potential witness statements to obtain:- YES / NO

REMARKS:-

Monthly Report

AFFCO IMLAY — ISSUE DATE:- March 2018

ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001 — Page 1 of 2

DATE:- 31-5-19 — ASSESSORS NAME:- Wayne Watson

REASON FOR INVESTIGATION:- (✓ applicable) — COMPLAINT [ ] — ODOUR SURVEY [✓]

INITIAL IMPRESSIONS:- — CHARACTER:- slight smell around Back

TIME OF INITIAL IMPRESSION:- — GENERAL HEDONIC TONE:-

ODOUR INTENSITY:- 2 — PLUME WIDTH (if known):-

START TIME:- 1207

		Intensity	Character/notes
1st min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
2nd min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
3rd min	0	1	very slight smell.
	10	1	
	20	1	
	30	0	
	40	0	
	50	1	
4th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
5th min	0	2	Rendering plant
	10	2	
	20	2	
	30	2	
	40	2	
	50	2	
6th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
7th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
8th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
9th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	
10th min	0	0	
	10	0	
	20	0	
	30	0	
	40	0	
	50	0	

Scale of Intensity
6 Extremely strong
5 Very strong
4 Strong
3 Distinct
2 Weak
1 Very weak
0 No odour

Weather Data (see over)
Wind direction:- South ~~North~~
Wind velocity:- Very light
Cloud cover:- Light
Temperature:- Cool

General Hedonic Tone
-4 Extremely unpleasant
-3
-2
-1
0 Neutral
1
2
3
4 Extremely pleasant

Based on your assessment on this occasion, which of the following applies:-
[ ] I did not detect any odour
[✓] I did detect odour and consider it would not be objectionable at any location for any duration or frequency
[ ] I did detect odour and consider it would not be objectionable UNLESS it became continuous
[ ] I did detect odour and consider it would be objectionable if it occurred on a regular or frequent basis
[ ] I did detect odour and consider it would be objectionable even if in periods of short duration

FINAL CHECKLIST:-
[✓] Upwind assessment completed. If not, detail reason:-
[ ] Aerial photo showing location of assessment attached
[ ] Are there potential witness statements to obtain:- YES / NO

REMARKS:- Smell around Back of Plant From The Rendering plant

APPENDIX 3 –

KupeTech Annual Report

AFFCO Imlay Whanganui Rendering Plant

Audit of Odour Control Systems

AFFCO New Zealand Ltd

Reference: A235620

Revision: 0

2019-05-24

KupeTech

Document Control Record

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Document Control

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Client Contact	Ricky Gowan

Rev	Date	Rev Details	Author	Reviewer	Approver
0	24 May 2019		J Vickerman Mech Engineer	(Under Review)	
					J Vickerman Director

Approval			
Author signature		Approver signature	
Name	J Vickerman	Name	J Vickerman

Contents

Appendix

Imlay Rendering Plant Biofilter Systems Inspection

This report summarises results from inspection of the Rendering Plant odour extraction and biofilter systems at the Imlay meat works on 3 to 5 April 2019, 10 to 12 April 2019 and 15 to 16 May 2019.

1. Background

Under the recently renewed Resource Consent to AFFCO New Zealand Limited (AFFCO) for the discharge of contaminants into air there is a Condition 31 which says:

> *The Permit Holder shall, annually … undertake an annual audit of the rendering plant's odour control systems that considers the effectiveness of the extraction, cooling and biofilter system and its overall performance in regards to controlling odour emissions. The audit should utilise all monitoring data (manual and continuous, complaint records, any independent odour assessments) as well as include downwind odour assessments of the operational rendering plant and ancillary activities. The audit should assess the state of the odour extraction, cooling and biofilter system and taken appropriate measurements and sample for analysis required to confirm the status these systems against their design and required operating parameters. Any analysis of samples shall be undertaken by an appropriately qualified testing laboratory and sampling undertaken as specified in the OMP. Accepted methods shall be used for measurement of media properties that are certified by the Regulatory Manager of MWRC.*
>
> *The audit shall be undertaken by person(s) who is independent, appropriately qualified and experienced in the operation and maintenance of air extraction, cooling and biofilter systems.*

There is also a Consent Condition 32 which says:

> *The Permit Holder shall, annually … measure and record the vacuum (pressure) at all enclosed equipment items that are extracted by the odour control systems as follows:*
>
> a. *Pressure shall be measured in the head space of the equipment items that are targeted by the extraction systems. The measurements shall be undertaken by an independent appropriately qualified and experienced person following industry best practice for measurements of this type.*
>
> b. *The Permit Holder shall prepare a report on the findings and critically analyse the results (including a comparison with historical data) and if required, make recommendations as to the adequacy of the extraction rates, whether pressures are sufficiently negative and whether additional sealing/enclosing of any rendering plant process area is needed to ensure adequate extraction and compliance with conditions of this consent.*

This report presents the results of investigation, inspection and measurement carried out to meet the above objectives.

The Resource Consent also has a Condition 10 which says:

> *If directed in writing by MWRC following one or more validated offensive or objectionable odour complaints, the Permit Holder must commission a report by an appropriately qualified independent person, to review the efficacy of odour management at the Site, including but not limited to:*
>
> a. *The point source extraction;*
>
> b. *The biofilter system;*
>
> c. *The need to fully enclose the raw materials receipt area;*

d. *The need to operate the ltrp [low temperature rendering plant] building under negative pressure;*

e. *The need to place covers on the slaughterhouse offal bins; and*

f. *The need to have a cover on the skip collecting solids removed by the contrashear.*

Direction under Condition 10 was received by AFFCO. A report dated 3 May 2019 has already been provided to MWRC based on what was found from site investigation on 3 - 5 April 2019 and 10 - 12 April 2019. Some content in that report is included in this report. Some of the content in this report differs from what is in the Condition 10 report due to remedial action taken by AFFCO in the interim and also as a result of additional testing and clarification that has occurred since.

2. Recent Inspections

The last inspection and report at Imlay prior to 3 April 2019 was on 27 April 2018.

3. Figures and Tables in the Appendix

Figure 1 provides a schematic of the wet side point source extractions.

Figure 2 provides a schematic of the dry area point source extractions. Numbers in balloons have been given for identification of the point source in this report.

Figure 3 provides a schematic of the outside dry side, wet side and drier air extraction systems feeding the biofilters. Typical air flows in m^3/h, static pressures in Pascals (Pa) and temperatures in °C are given in a few locations. Tags for some instruments in the SCADA system are also given for reporting reference.

Fig 4a provides a key for symbols used in Figs 1 to 3 and locations of uncovered biofilter static pressure test ports.

Fig 4b provides a diagram showing the static test port locations on the uncovered biofilter.

Table 1 in the Appendix summarises the measured data for the Drier to Covered Biofilter in Fig 3.

Table 2 in the Appendix summarises measured data for the Wet Side to Uncovered Biofilter in Fig 3.

Table 3 in the Appendix summarises the point source extraction measurements.

Table 4 in the Appendix provides an overview of historical measured data since 2012 for comparison. Note the 2019 biofilter airflow measuring instrument and locations have changed to be compliant with ISO 10780 but testing so far has indicated only minor difference between new and old and less than annual variations.

Table 5 provides a list of issues found for improvement or corrective action.

4. System Description

With reference to Figure 1:

a) Air in the factory Wet Side is drawn into air extraction ducting at locations where process equipment is known to emit odour. Sufficient air extraction at these locations prevents odour transfer to the working environment. The point source extraction system (PSES) is widely accepted as an energy efficient effective method for containing fugitive odours and providing a safe working environment in a low temperature rendering plant (LTRP). Numbers in balloons refer to vacuum measurement locations used with the AFFCO Air Odour Resource Consent Monitoring Checksheet (RMF 008).

b) Air is also extracted from drier feed conveyor head space and the drier discharge conveyor headspace on the Dry Side, except that drier discharge conveyor extraction duct is currently disconnected.

With reference to Figure 2:

c) Factory air on the Dry Side is extracted at what has been called the "Dust Filter" but is merely a coarse screen covering flow control louvres at the intake. The extraction duct also collects head space air from the Ground and Unground Meal Bins along the way before entering the scrubber outside.

d) Vapour from the driers is conveyed in a separate line to the trash vessel outside. Although the extracted vapours are at slightly less than atmospheric pressure they are often slightly superheated above 100°C.

With reference to Figure 3:

e) Dry Side air passes through a spray tower (Dryside Air Scrubber in Fig 3) to a common induced draught fan 14.1 (was also known as ID1) which discharges into the uncovered biofilter. The primary function of the spray tower is to remove dust particles and protect the biofilter from clogging. Cooling and humidification are other benefits. Air extraction from the outside raw material bin (point source 1) and feed conveyor is also combined with the inflow to the scrubber.

f) Wet Side air and vapour is cooled in the Wet Process heat exchangers HX1, HX2 and HX3 and some water is removed. The Wet Side gas then passes to the common 14.1 fan which discharges into the uncovered biofilter.

g) Drier gas and vapour passes through the Drier Trash Vessel which removes entrained water and trash, then to a stickwater waste heat evaporator where heat from the drier gas transfers to the stickwater. The cooled Drier gases and non-condensable gases from the evaporator vacuum pump then pass through two heat exchangers (Gardiner HX and Potter HX) which further cool the gas and vapour and remove condensed water from the gas stream. At the time of the April inspection only one drier was operating and the evaporator was not being used to concentrate stickwater. After cooling and water removal the Drier gas passes to fan 9.3 (formerly known as ID2) and then discharges to the covered biofilter. Previously it had been understood that pressure in the evaporator non-condensable gas discharge duct was limited to -100 to -200 Pa by an orifice plate having been inserted in the duct to moderate the vacuum. This has not yet been verified but it was noted that the two valves beside the evaporator column shown in Fig 3 were partially closed – this will have a similar effect.

h) Water in the Dry Process Scrubber (previously called the Dry Process heat exchanger) is recirculated by a pump (14.2) with a small make up water flow.

5. Process Measurements

The biofilter gas and vapour systems temperatures and gas velocities were measured by calibrated thermocouple and ISO10780 compliant pitot tube by removing plugs and inserting instruments at:

- Two new 32 NB measurement ports located 33m downstream from fan 9.3.
- The gas ductwork inlet to the Dry Process scrubber at a temperature gauge port adjacent instrument HRT1.
- The gas outlet ductwork from Wet Process Heat Exchangers HX1, HX2 and HX3, prior to the connection with ductwork from the Dry Process scrubber and prior to the 14.1 fan.
- The gas outlet duct from the 14.1 fan at two new 50 NB ports 13m downstream of the fan.

- Static pressure measurements made at five locations around the uncovered biofilter distributor ducting ends as shown in Fig 4b.
- Temperature and pH measurement of the biofilter media in samples taken from the quadrants at 200 mm depth.

6. Comments on Flowrates, Pressure and Temperatures

Tables 1 and 2 show the results of flowrate and temperature measurements taken on five days in April and May 2019 which were characterised by mild temperatures, moderate north-west and fresh to strong south and west winds.

From the data in Tables 1 and 2:

6.1 Covered Biofilter Airflow

The air flow to the covered biofilter was 630 - 760 m^3/h or 0.7 – 0.9 tonnes/hour (tph) in the four measurements up to 12/04/19. There was an operating issue at this time which when remedied resulted in a flow of 1000 – 1080 m^3/h or 1.2 tph for the last two measurements.

The higher measured flow was 35 – 60% of what had been recorded in previous years. The low earlier measured flows were too low resulting in drier puffing. Prior to the 2015 inspection the stickwater evaporator was installed to use available waste heat from the driers exhaust gas stream. To aid performance of the evaporation plant, the air flow to the covered biofilter was halved. It was understood that this had been achieved by insertion of an orifice plate upstream of fan 9.3 but this has not been verified. During the current inspection it was noted that two manual butterfly valves in the downstream divided drier air lines beside the evaporator column were partially closed, which could account for reduced airflow, but this alone is not seen to be the sole cause for reduced flow. The fan 9.3 must have been replaced prior to the 2018 inspection with one having a lower pressure rise characteristic having regard to inlet static pressures, but again this did not appear to be the cause. When the evaporator is not being used to concentrate the stickwater it is easy to overlook the evaporator circulation pump and vacuum pump not being activated. It is believed that without the stickwater circulation through the evaporator tubes, the greatly reduced removal of heat from the drier air left air with a high specific volume and hence high gas velocity at restrictions such as the valves which resulted in choked flow. Once the stickwater circulation in the evaporator was activated puffing at the drier ceased immediately.

In the inspection on 15 – 16 May both driers were operating normally with no sign of puffing even though the vacuum at point 33 was only 22 to 27 Pa. A drier airflow of around 1000 m^3/h going to the covered biofilter does not appear to cause any issue providing the evaporator is operating. This flow is less than the 3600m^3/h referred to in Table 4 of the Air Discharge Consent application but no disadvantage is seen in a reduced biofilter loading.

For an independent check on the airflow, a micro airflow measuring turbine was inserted into both flow measuring ports, covering most of the duct. This indicated a flow of 1200 m^3/h.

6.2 Uncovered Biofilter Airflow

The air flow to the uncovered biofilter was 32,0000 - 35,000 m^3/h or 37 – 41 tph and was based on measurements made on three different days at new measuring ports 13 m downstream of fan 14.1. Each flow measurement required a total of ten dynamic pressure measurements and ten static pressure measurements, made in two radial directions at right angles to each other, with a pitot tube, all compliant with ISO 10780.

The measured flow is around 80% of that found previously. Explanation for the difference appears mainly due to change in test method – the previous flow measuring port used was closer to fan 14.1; only one radial direction could be sampled; there was significant variation in velocity across the duct; and a different averaging method is now used.

From Figure 2 and Table 2 it can be seen that a total flow of around 33,000 m^3/h is made up of 14,300 m^3/h wet side vapour and 23,000 m^3/h dry side gas (38 tph made up of 15 tph of Wet Side vapour and 27 tph of Dry Side Gas). The Wet Side vapour flow is similar to what it has been in the past as also was the Dry Side Gas. The mass of Dry Side gas + Wet Side gas should equal the mass of air going to the biofilter but variations in flow and limitations of measuring port locations rarely result in perfect balance.

The measured air flow into the scrubber in Table 2 with test sheet reference 19014 of 27,075 m^3/h is noted. The test was repeated and although the pressure figures at particular insertion depths did differ the averaged result was the same. The high flow is out of character with historic values except one. Three things that may have contributed to a high result are 1) the additional flow from the outside raw material bin, conveyor well and feed conveyor; 2) the open west door to the meal hall in combination with the strong west wind; and 3) the gas flow measurement having to be made at the inlet bend to the scrubber and in only one radial direction (the only available port). With reference to Figs 2 and 3, it is noted that the scrubber inflow is made up of air from the dust filter, the two meal bins and air from the outside raw material bin, feed conveyor and well. The outside raw material bin air flow was not part of former air flows. Around 10,000 m^3/h has been measured at the dust filter (limited by poor access). Hence the implication is that the two meal bin extractions and the outside raw material feed bin flows account for 13,000 m^3/h which seems too high.

An elevated platform providing access for measurement through two 20 BSP plugged sockets at right angles in each duct (dry side air duct and raw material bin duct) upstream of the tee junction would significantly assist good flow measurement. The significance of these flows is not so much in what they do but in the potential for reduction to make extraction air available somewhere else that needs it.

The measured total measured airflow to the biofilter is around the 32,000 m^3/h guideline of Table 4 in the Air Discharge Consent application.

It is also noted that at the time of first airflow measurement, a significant leak was found downstream of the fan 14.1 where the stainless steel duct joins the concrete pipe. Temporary measures were taken to plug the gap but a permanent full circumferential skirt secured by tensioned bands is needed to withstand the vibration from the fan. Early detection of any leak in the lines between fans 14.1 / 9.3 and the biofilters is an important primary step in odour control.

6.3 Covered Biofilter Media

It is noted part of Consent condition 31 says "*Any analysis of samples shall be undertaken by an appropriately qualified testing laboratory and sampling undertaken as specified in the OMP. Accepted methods shall be used for measurement of media properties that are certified by the Regulatory Manager of MWRC.*" As part of the AFFCO OMP samples have been taken on a monthly basis and tested in an appropriately qualified testing laboratory. AFFCO have reported on this. As an independent check the media moisture test results given in Tables 1 and 2 are the results of our own lab testing. The media moisture content of all testing is consistent. The pH testing is not and further investigation is needed to account for the difference.

Looking at the AFFCO qualified lab test results it is noted that there is significant variation from month to month with some very low pH results. In our experience pH changes in a biofilter bed occur very slowly and the monthly rise and fall pattern seen in the results is most unusual. Very low pH values can be found down at the base of beds but not normally higher up in the top 2/3 layer.

For the independent pH testing five bed samples were taken from the uncovered biofilter and four for the covered biofilter, all at 200 mm depth (in the top 2/3 layer). From these samples, 10g sub-samples were taken and mixed with 50g demin water, stirred for 60s and allowed to settle. pH of clarified water was measured after 3h settling. This is the method commonly used for biofilter media. Other methods exist for different purposes and give a lower pH. Consistent results were obtained for

all samples taken and were found to be in the range of 5.5 to 6.0. With the bark bed having been replaced last year this is around what would be expected.

No issue is seen with pH in both biofilter beds and addition of lime should not be pursued on the basis of the monthly pH test results. Further investigation is needed into sampling method and test method in order to understand the significant monthly variation in the formal results.

If very low pH did exist, it would be preferable to check the microbial density in the media first before taking any corrective action.

The moisture content of the bark media in the covered biofilter at 200mm below the surface in each quadrant was found to be between 54 and 65% w/w (wet basis). This is within the guidelines of Table 4 of the Consent Application. The air loading on the biofilter of 12 m^3/h of air per m^3 of media is below the Table 4 guideline maximum of 35 m^3/h of air per m^3 for soil-bark beds.

This loading is based on a media depth of 0.45m which was difficult to determine due to an indistinct base. It is noted that the recommended depth from the Consent application was that it be increased to the original design value of 0.6m. From the downwind odour checks it is believed that some odour is breaking through the covered biofilter despite the low loading. Adding a further 150 to 200mm of bark- 10% soil to the present bed is recommended.

Temperatures in the bed at 200mm depth ranged between 20 and 23°C. Examination of the SCADA record for temperature transmitter HRT3 for the past year revealed a brief peak of 45°C on 4 Feb 2019 at 1824h. The next highest peak was 42°C on 15 Feb 2019 then one at 37°C on 11 May 2019. These short term peaks in air temperature at the inlet to the covered biofilter are the maximums for the year. The actual temperature of the bed itself will have been below this. The HRT3 temperature displayed on the SCADA HMI was consistent with measured temperature but with several past peaks having come close to the biofilter temperature limit, it is essential to ensure HRT3 (and HRT14) is accurate on an ongoing basis.

To measure pressure drop through the bed a sensing port was reinstalled in the sump wall at the end of the biofilter. The measured pressure drop was 6 Pa which is very low but not unexpected from the low flow and relatively new bed. In the SCADA system, pressure transmitter HRP1 is located about 48 m from the biofilter but even with the added downstream pressure loss, the instrument will only display 0 or 1 mbar which is somewhere in the range 0 to 100 Pa. Bed back pressure of 6 Pa is well below the guideline maximum of 500 Pa.

Apart from insufficient bed depth seen in relation to slight breakthrough of meal odour, the covered biofilter is within its design and operating parameters.

6.4 Uncovered Biofilter Media

As with the covered biofilter AFFCO has had bed samples tested on a monthly basis for moisture and pH. In independent check testing, the moisture content measurements in the uncovered biofilter ranged from 60 to 70% moisture w/w wet basis. These were mostly slightly above the 50 to 65% guideline but no issue is seen.

Temperatures measured in the bed ranged from 30°C to 34°C indicating acceptably uniform distribution and within the consent guidelines. Examination of the SCADA system temperature transmitter HRT14 data shows that air going to the biofilter builds up to a daily peak. Over the past year a maximum of 51°C was reached on 28 Dec 2018, 22 Mar 2019, 8 Apr 2019 and 14 May 2019. The 45°C maximum guideline was exceeded on 2 days in May, 4 days in April, 2 days in March, 1 in February and 1 in December. It is believed that the biofilter will not have been affected by these peaks but there is a narrow margin. It is essential that good calibration of HRT14 is maintained. From the annual records it is noted that the temperature of the air from the Wet Side heat exchangers HX1 to HX3 is higher than it has been. The reason for this is likely increased heat extraction from the point sources.

The biofilter loading at 50 - 55 m^3/h of air per m^3 of media is above the recommended guideline of 35 m^3/h of air per m^3 of media in the Consent application. This is based on a measured bed depth of 0.5m but in a couple of tests a depth of only 0.44 m to the stone was found. Further core sampling is needed to confirm the present depth. It is also noted that in the coming season biannual testing of the media for microbial density, mass-size distribution, organic carbon : nitrogen ratio, and core sampling to determine depth will be due. Preferably this should be done well ahead of the next annual audit.

Although the biofilter surface looks to be the same height as before, the depth needs to be accurately measured as it greatly influences the bed loading rate. It is noted that the guideline depth was 0.5m graded bark/soil over 0.2m coarse bark and that this would reduce the loading to the recommended guideline. Having pointed this out, it is noted that odour from the main biofilter has not been sensed at any time during the testing. Further opinion and discussion on this is sought because significant cost is associated with increased depth and the permit holder would hardly be pleased if no benefit resulted.

As above, the media pH in quadrant samples and centre from 200mm depth (in the top 2/3 layer) were found to range between 5.5 and 6.0 (they were marginally less acid than the covered biofilter media) and are within the guidelines. As above further investigation into sampling method and test method at the qualified lab is required.

The air static pressure at the new test point downstream of the 14.1 fan has increased around 30% to 300 Pa from last year but is well below earlier years. This is related to the renewed biofilter media. Bed pressure drop at the five biofilter manometers (identified in Fig 4b) ranged from 6 to 34 Pa. This appears to be slightly less than a year ago but it likely related to having a better instrument to measure the low pressure.

7. Point Source Extraction System (PSES)

The point source extraction system (PSES) is widely accepted as an energy efficient effective method for containing fugitive odours and providing a safe working environment in a low temperature rendering plant (LTRP). Complementary to the PSES is cooling of the extracted air, then passage through the main biofilter to remove odour prior to discharge to atmosphere.

As in section 6.2 above, with reference to Table 2, the total airflow going to the main biofilter was found to be around 33,000 m^3/h. Table 3 of the Resource Consent application listed concentrated odour sources in the LTRP (other than the drier vapour) with recommended design extraction air flows for each. The total of the point source design flows was 17,450 m^3/h. Although the new total measured flow is down a little on what was assumed for the Consent application the first key point, as in the consent application, is that the design extraction flow recommended for effective containment of odours is half the measured total flow. The second key point is that in practice, the optimal actual operating rate for each point source extraction is determined by the minimum required to contain the process emission and this should be well below the recommended design flow. Too much air extracted is unnecessary energy lost but also material being processed can be carried into the ducting such as fine solids, volatile organics and including tallow which can eventually block the ducting.

One obvious test for whether process emissions are being contained is whether any steamy discharges can be seen around equipment handling hot matter. Another is whether there is vacuum in the extraction ducting headspace close to connection with the equipment.

In relation to the new consent conditions a useful guideline was advanced for indicating that the PSES was likely to be working effectively if a minimum vacuum of 100 Pa g was maintained at ducting connections to equipment. Hence AFFCO developed the Air Odour Resource Consent Monitoring Checksheet RMF 008 where in Section 1 fourteen wetside odour extraction monitoring points were adopted for achieving a target of ≥ 100 Pa vacuum in order to comply with Consent Conditions 18a; 19a; 19c. Similarly in Section 2 for five Dry Side monitoring points. Fig 1 illustrates the location of the

wetside points and includes two dry side points because they are connected to the wetside extraction duct. Fig 2 illustrates the dryside monitoring points – note the 30 series numbers do not exist on the RMF008 checksheet but have been provided for easy identification of the points in this report.

Some boxes on the checksheets are filled in daily and others only on a particular day of the week. A review of the daily RMF 008 check sheets shows there has been a consistent level of compliance in relation to recording extraction pressures, temperatures and some other key items. While recording of pressures has been diligent, issues are seen around what is being recorded and whether an accurate indication of the extraction is being conveyed.

Vacuum at the AFFCO monitoring points for this report were measured using a calibrated Kane differential pressure meter, model 3500-1. The results are given in Table 3 in the Appendix.

The following issues are seen in relation to efficacy and monitoring of the point source extraction:

a) **Vacuum Test Gauge:** A Dwyer Magnehelic differential pressure gauge has been used by AFFCO for the Checksheet recording. The reading on that gauge is extremely orientation sensitive. The normal position for reading is with the diaphragm vertical but this gave a reading significantly different to the calibrated verifying meter. An accurate reading was obtained with the gauge horizontal but all the recorded readings cannot be relied on. It is recommended that AFFCO purchase a Kane 3500-1 differential pressure meter which is more accurate, reliable and easier read for the vacuum measurements.

b) **Location of Test Ports:** Some of the test ports were located downstream of flow adjusting slide valves (Ports 5, 6, 7, 8, and Ground Meal Bin (west)). There is a significant difference in reading between upstream and downstream of a slide valve. If the valve was closed with no air flow a good vacuum reading would still be obtained on the extracting duct side of the slide valve. Monitoring ports should be located upstream (the equipment being monitored side) of slide valves that could be altered at any time. Prior to the 15 May testing AFFCO had already taken steps to modify these. The results in Table 3 have used these new ports where available.

c) **Blocked Ports:** Some ports were blocked when first tested in April. Those readily accessible were easily cleared. A few ports in an inaccessible duct location had an extension line to provide access but of these ports 5 and 6 were blocked and not able to be cleared. These two ports were two of the new ports provided by AFFCO since April so vacuum measurements are now provided.

d) **Preheater:** It is noted that in the Consent application there was a recommendation (4.5.4.2) "that duct connections to the pre-heater and the blood decanter should be enlarged to enable the recommended design flows" and that the preheater air extraction duct has been increased from 100 to 250 mm diameter recently. In the same paragraph it was also recommended that [the duct extraction leg to the equipment] have an air flow control valve (butterfly valve) in the leg. The modified ducting to the preheater does not have any valve in it. Measured air temperature in the leg was 68 – 70 °C. The 250 mm diameter new leg has greater air extraction capacity than that needed and it appears unnecessary heat and organic volatiles are being drawn into the extraction system. While the old leg was undersized a valve is needed in the leg to be able to reduce the extraction to just above what is needed to contain emissions under all processing conditions.

   This is an issue that is not straightforward. Good air extraction from the preheater is essential because of the high odour producing potential. There is more extraction than needed which is good for odour control but with it comes the extraction of heat which ultimately downstream

of the wet process heat exchangers HX1 to 3, is getting too hot as biofilter air temperature rises during the processing day.

The air extracted from the preheater at port 3 appears to be drawn through a long feed conveyor headspace extending all the way back to the hogger so this total effect needs to be considered with any adjustment. The inside raw material bin has low vacuum (4 Pa with hatch closed) and there is only around a third of the recommended extraction. It is noted that the Load-in Screw from the Breaker to the inside Raw Material Bin has no vacuum in the headspace.

When ripe raw material is being processed unpleasant odour is frequently sensed in the area of the metal detector belt, breaker and sump. The existing extraction ducting at two locations could be extended to remove some of this at least. One location is extension of ducting near the tee above port 3 over to the Load-in Screw and/or increase the duct size to the raw material bin – this should enhance vacuum in the inside Raw Material bin and the Load-in Screw but also have the benefit of 1) providing more air to cool the hot preheater extracted air, 2) reduce the hot air flow slightly due to reduced vacuum at the tee, and 3) remove some of the hot humid air that builds up above the raw material bin in summer. Hence rather than installation of a butterfly valve in the preheater leg, valve adjustment in raw material bin and/or Load-in Screw branches may be able to provide the adjustment needed. For the processing area over by the sump, an extended extraction line from the manifold upstream of the Liquid Phase Tanks branch also has potential to extract further air. Note there is hot air and high vacuum in the Liquid Phase tanks extraction duct which could also be moderated by additional cooler air.

e) **Drainer Conveyor to Squeeze Press Conveyor:** It is noted that parts of these conveyors have open screen covers, likely there to give visibility for quick detection of blockage and to provide safety guarding. Extraction is good at the preheater discharge screen and at the base of the drainer conveyor screen, drawn by the pre-heater discharge duct (4). There is no air movement in the drainer conveyor headspace downstream of the screen but the extraction vacuum is good at the drainer conveyor discharge to the Squeeze Press feed conveyor so no issue is seen here.

f) **Blood Decanter:** Significant steamy discharge occurs from under the blood decanter where the conveyor is. There is good extraction vacuum in the larger 150mm diameter leg but inadequate headspace in the conveyor to draw the vapour from the decanter along to the duct. Another leg of 76mm dairy tube has been added to collect vapour at the east end of the conveyor but this is too small for the vapour flow. It is not known whether the conveyor design was deliberate for particular blood properties or under designed. Either a larger conveyor or a larger extraction duct to the conveyor east side appears needed.

g) **Dryside Hall Air Extraction Intake:** The screen on the intake at the top west side of the ground meal bin needs regular cleaning to achieve a good airflow to provide a safe working environment. (See note 9 in Table 3). Walkway beside the intake needs extension underneath the intake to enable easier cleaning of the screen. The louvre mechanism needs maintenance so the shutters can be closed while the screen is being cleaned to prevent dislodged solids being drawn into the ducting. Once cleaned the louvre needs to be set and positively held in an established operating position.

h) **Dryside sub-manifold:** This extracts air from the dry side drier feed conveyors and the drier discharge conveyor except that the discharge conveyor duct has been disconnected and is drawing in clean air from the drier hall. This may have been because the air intake in (g) above was barely functioning. The air flow into the open disconnected duct was measured to

be 600 m^3/h. Input of this into an analysis of the piping sub-manifold indicates extraction from the head of the drier feed conveyor to be 560 m^3/h, which is above the recommended flow but the drier discharge conveyor extraction rate is below what was recommended for it (1500 less 400 m^3/h). This does not mean the flow is insufficient to prevent emissions from the drier discharge conveyor as outlined above.

If the duct was disconnected to provide access to the discharge conveyor to clear blockage, the extraction duct should be reconfigured to draw from the discharge conveyor further up the incline towards the unground meal bin. However this duct should not be connected to the wet side extraction ducting – it should join the dry side air extraction duct above. There is no benefit from drawing in clean air from the dry area to add to the wet side extraction flow.

A question arises as to whether the drier discharge duct should have air extracted from it, like the meal bins, if the meal vibrating screen is open to the hall atmosphere. The best answer is that all should be enclosed and connected to the extraction system to limit transfer of meal dust into the air.

i) **Liquid Phase Tanks:** These have vacuum in the measuring port 14 on the east leg of 278 Pa at a measured temperature of 57°C. This indicates that the flowrate in the duct could be as much as six times the recommended flow of 300m^3/h depending on how well the tank lids are sealing. There is a need to get more flow measuring ports in the extraction ducting to confirm what is happening on the decanter and separator centrifuge side.

j) **Decanter Discharge Conveyor:** Static pressure at measuring port 12 was 198 Pa indicating the flow was about 75% above the recommended flow of 800 m^3/h. This provides extraction through to over halfway up the inclined drier feed conveyor in the dry area even with a couple of warped and bent hatch covers.

k) **Drier Feed Conveyor:** The vacuum was measured through a corroded slot in the conveyor head space beside the extraction duct take off. Air extracted mostly is drawn in from the cross-conveyor between driers and the re-processing conveyor also feeding the cross-conveyor. Although the measured vacuum is 50 Pa the extraction is considered adequate. Reducing the area of the corroded slot would assist the vacuum but a 16 mm diameter hole retained is useful for flow measurement in the conveyor head space.

l) **Dry Area Sub-Manifold to Wet Area and Unground Meal Bin branches to Dry Side Main Air Duct:** Analysis of the sub-manifold and ducting through to the wet process heat exchangers has given a pressure drop that can't be explained without further investigation - the pressure drop measured at the top of the wet-process exchangers is greater what is expected. It is possible there is a build-up of solids or some other restriction in the ducting somewhere. The branches from the Unground Meal Bin to the main duct also have a lower than expected flow and should be checked for build-up of solids.

m) **Flow Measuring Ports:** Additional flow measuring ports in extraction branches would greatly assist knowing where all of the extraction air is coming from. With the whole picture it is then much easier to adjust the balance for better odour control. A plugged 20 BSP socket on the duct wall is ideal, but even an M16 tapped hole in the duct wall sealed with a short stainless steel bolt or polymer plug is adequate for flow measurement. It would not matter with these whether they were upstream or downstream of a slide valve because they would be used to measure flow. It would also be useful to have an platform (accessible by caged ladder) where the three wet side ducts pass through the north wall, for divided flow measurement but it is acknowledged the area is so congested with pipes, inside and out, a suitable location is not obvious.

In summary:

- the Imlay LTRP is achieving effective point source extraction.
- Apart from the blood decanter and sump / breaker area point source extraction is adequate.
- In a few cases the extraction is too much resulting in excessive heat being removed.
- A coherent whole picture of where existing extraction flows are coming from needs to be fully understood before changing too many things at once.

In the Imlay Odour Management Plan along with recorded data and the Consent Monitoring Checksheet RMF008, the desire to be fully compliant is evident. As part of that, the point source monitoring target of ≥100Pa vacuum was adopted to ensure compliance. Although there is an issue with the vacuum monitoring instrument it appears that the actual vacuums achieved have been mostly satisfactory and in some cases too high. At some extraction points it is not possible to achieve the target due to the piping and inlet configuration but effective extraction is still being achieved.

The key thing to focus on, with full operator participation, is eliminating any uncaptured odours in the air as they can be progressively identified (deal with the worst first) by getting them into the extraction system and to learn what the optimal actual operating rate is for each point source extraction, as determined by the minimum extraction flow required to contain the process emission. That is, not too little, not too much and of course requires means to adjust the flow into the extraction system. The Imlay plant is a long way down the road of effective odour capture and the task gets harder once all obvious ones are dealt with. There should be a surplus of extraction air available and the balance not needed for the optimal extraction can be drawn in at locations where the working environment in the building can be best enhanced. If the latter is not needed the flow to the biofilter can be restricted which will be of benefit in reducing the biofilter loading.

8. Independent downwind odour assessment

On 3 April 2019 at 2:50 pm the wind was moderate south and mostly steady in the range 2 - 6 m/s. Ambient temperature was 16 - 17 °C with clear sky. Moving along Heads Road, downwind of the rendering plant, no distinctive rendering plant related odour was able to be sensed.

At 3:50 pm a downwind traverse was made along a path through the grass on the north side of the biofilters, reservoir and raw material reception bin. (Path coordinates N -39.95089, E 175.02269 to N -39.95122, E 175.02441; site investigation sheet A190403).

Starting from the site road at the west to around 7m across the back of the main biofilter a distinct to strong odour of effluent from the below grade primary wastewater settling channels (Save-Alls) was evident. This had strong ovine faecal /urine notes along with an unpleasant possibly dimethyl amine component (not ammonia nor mercaptan - three subsequent attempts were made on later days to identify the minor component but it was absent – another person with me on the first day had thought it to be sulphide but it was not what I had sensed). An assessment on Intensity and Hedonic tone rated the wastewater odour on the traverse at I = 3 to 4, and H = -3. Further investigation of the source confirmed that there was some back swirl from the steady wind into the depression where the effluent settling channels were which then mixed with the airflow above. It was with some surprise that the solids in the bin from the contrashear had a very weak fresh clean odour which was not unpleasant – the surprise being that all the effluent was believed to be passing through the contrashear and it seemed incongruous that odour from the liquid could be so different to that of the separated solids. The unpleasant odour was evident in the mixing well sump near the contrashear and the effluent in the channels further west.

Moving across behind the main biofilter, there was a zone about 25m wide where there was no plant related odour evident - only that typical of fresh breeze blowing over the river and exposed mud banks. For the last 4m behind the main biofilter, across to a line between the covered biofilter and

water reservoir, dry meal odour was recognized (I = 3; H = -2). It seemed a large portion of this was coming off the back of the LTRP building, from higher up beyond the covered biofilter but the covered biofilter was also believed to be making some contribution.

The meal odour zone distinctly changed to a less intense wet area cooked odour with further movement behind the reservoir. (I = 3; H = -1). This seemed to be coming off the north side of the building like the meal odour, but the odour ceased before reaching the north-east corner of the water reservoir. There would have been around 15m of the LTRP building north side to go, on a path parallel to the traverse path, where the odour ran out – the south wind was being deflected a bit to the north-west over the reservoir by the building.

A significant leak downstream of the main biofilter fan was later found and temporarily plugged but this was believed to only account for part of the wet area cooked odour sensed.

The raw material reception bin was further east of where the wet-side odour ended. While making the odour assessment a large load of raw material was dumped in the bin while the cover was retracted but the material was fresh and no odour associated with it could be detected back on the lawn. Inside the door at the top of the conveyor well beside the raw material bin, the odour was intense (I = 5; H = -3) but this odour was not evident outside the door.

A further odour assessment was carried out on 15 May 2019 at 2:50pm. The wind was fresh from the west and varying in the range 6 – 15 m/s. Ambient temperature was 15 – 16 °C and mostly cloudy. Walking along the fence line and downwind of the plant on the east side, no distinctive rendering plant related odour was able to be sensed except for between the covered biofilter and the pond where distinct meal odour was noted. This seemed to dissipate rapidly as it could not be picked up on the east side of the pond. What was surprising was that the west door to the meal hall was open the whole time due to the need to transfer meal for reprocessing from a shipping container outside yet no meal odour could be picked up on the east side and by the fence.

9. Operation of the LTRP under negative pressure:

When the wind is from the south or south-west every effort needs to be made to close every opening on the south side because pressure from wind gusts easily elevates the pressure inside the Wet Area to above what the system can do to keep it negative. Under these conditions any odour inside the Wet Area easily flows out through openings and doors on the north side.

Over several days with different wind conditions differential pressure was measured between outside the building and work space inside.

On 4 April when the wind was light (around 2 m/s SW) with all doors closed, there was a consistent 2 Pa vacuum inside in the wet area relative to outside on both the north and south sides of the building. In the dry area there was a 0 to 1 Pa vacuum.

On 5 April, late afternoon, there was a strong south wind (around 12 m/s). This created a 10 to 38 Pa positive pressure on the building south side outside relative to the inside wet area, but on the building north side, the pressure in the wet area inside was 8 to 17 Pa above the pressure outside. In the dry area, the pressure inside was 1 to 8 Pa positive (on average 3 to 4 Pa) relative to the pressure outside on the north side.

On 12 April, mid-morning, there was another strong south wind (around 11 m/s). At the top of the dry area steps to the lunch room the air pressure outside was 36 to 67 Pa above the inside dry room pressure. On the north side, there was a 4 Pa vacuum average inside with variation between 2 Pa positive and 10 Pa vacuum. At the dry area west roller door, the dry area was between 6 Pa positive

and 4 Pa vacuum, slightly positive on average. A significant difference to what was measured on 5 April was that the dry area air intake screen to the biofilter above the ground meal bin had been cleaned. There is a small radial fan (400 mm square opening) in the wall on the south side near the top of the dry area steps – although the fan was not operating, 1900 m^3/h of air was flowing in from outside.

Also at this time high pressure cleaning was being done in the wet area which required one door to be open on the south side. While this was being done the pressure inside the wet area was 38 to 44 Pa positive relative to the pressure outside on the north side of the building.

On 11 April, after the air intake above the ground meal bin had been cleaned, two of the radial fans in the north wall beside the drier were operating. The flow in from the west one was measured at 10,000 m^3/h. Similarly in the wet area it was noted that fans in the north wall were often operating pushing air into the building.

When fans push air into the building from outside to the extent that the air inside is at positive pressure relative to outside, air inside will inevitably exfiltrate outside through many cracks, crevices and other openings that the LTRP building has. In contrast if there were no openings in the building, the vacuum from the biofilter fan would increase until there was no flow to the biofilter at all, but the lack of openings in an older building somewhere is rarely a problem. If the point source extraction was working well with optimum adjustment, the exfiltration of building air would not matter, but the current setup still needs adjustment and modification.

What is currently needed is a twofold approach: one focusing on improving the point source extraction; and the other doing all that is practically possible to achieve negative pressure (vacuum) in the workspace. When the point source extraction is proven to be working well then the need for the negative pressure can be relaxed.

The power of wind coming across the river is a massive challenge to the existing extraction system to not be affected by it. Further it is this wind that has given the odour complaints downwind. The wind pattern will not have changed over the years, but the way the plant has been operated could have changed a little – the biggest change is likely to have been in public perception of what is acceptable odour.

The measured differential pressure above shows that the greatest positive pressure in the interior workspace relative to the air outside on the building north side is associated with wind from the south and south-west. The more positive the pressure is inside, the higher the potential is for any odour not collected by the point source extraction system to flow out through any opening in the north wall or roof beyond the ridge. In recognition of this and the pressures measured, there should be an immediate objective to eliminate openings in the building wall on the south side and roof. This is easy for fan openings (unless the fan is there for worker safety in emergency) but not so easy for the two larger doors which provide needed access to the wet area. The loading bay for the meal is not an issue as the discharge conveyor is easily sealed from the drier hall.

It is unfortunate that the only access to the wet area for forklifts, bins and equipment has to be through a door on the south side. Consideration should be given to having a quick opening door to minimise exposure to the high wind pressure. An ideal would be to have quick opening flexible doors providing an airlock between the two which is long enough to accommodate a forklift or any other vehicle needing to enter the wet area – these work well in a dairy factory with forklifts (where the driver controls the door without leaving their seat). One exterior door facing east at a right angle to the two current doors on the south side enclosed in an airlock arrangement would work well except for its impracticability – truck access for the meal loading bay is needed and the main transformer for the rendering plant is located right between the two south side access doors. It appears that a single

quick opening door is the best option for now. If this is not an acceptable option then the alternative is to not use the south doors when the wind is in the south quarter.

There are openings in the north wall of the wet area, for example where ducting and pipes penetrate the wall but the effect of these is minor compared to what openings on the south side do.

With the knowledge of what is occurring with wind pressure, in the April odour assessment above the dried meal odour that was sensed along with the lesser wet side odour is likely to have been north side building exfiltration arising from wind infiltration on the south side. At the time of the odour assessment the blocked filter in the dry area and drier puffing it is likely strong meal odour had built up in the dry area airspace which eventually found its way out.

On 15 May 2019 with the fresh west wind and the west roller door to the meal hall open, air in the dry side was 6 to 16 Pa negative relative to air on the building north side; but that dry side air pressure was 13 to 35 Pa positive relative to outside air on the building south side. It is likely that some odour was getting out, but the whole plant seemed to be running much better than it was during the April testing and no odour could be sensed on the east side of the plant and along the fence.

In relation to vacuum measurement for the point source extraction monitoring it is recommended that a different pressure meter is purchased – one that is also capable of measuring differential pressure between inside and outside. With monitoring experience it will readily become clear what actions will help and hinder the maintenance of negative pressure in the processing areas.

10. SCADA Issues

The SCADA logged consent related data for the past year has been reviewed. Daily logged temperature peaks in air going to the biofilters has already been commented on above.

At first sight in April some displayed data appeared wrong such as when the outlet water temperature from the wet side heat exchangers was cooler than the water going in yet the wetside air was hotter than the water. When this was checked again in May the displayed data was as expected and temperatures found to be correct.

Another temperature that initially looked wrong was the temperature of drier vapours going to the trash vessel displayed as 104°C on temperature transmitter 7.3-3 but independent measurement of the temperature gave the same result hence although air will be present with water vapour, the vapour can be superheated giving the occasional result seen.

There are some errors in the SCADA display. These are itemised in the Table 5 list in the Appendix.

11. Action Points

A summary of action points for consideration arising out of the audit are given in Table 5 in the Appendix.

12. Conclusions

12.1 AFFCO has a comprehensive monitoring Checksheet as part of its odour management plan which has been followed but limitations of the instrument used for vacuum monitoring has resulted in an unreliable record for the PSES.

12.2 A target of ≥ 100 Pa vacuum for all point source air extractions, while a good guide, has disguised the need for enquiry into what the optimal actual operating extraction is for each point source extraction as determined by the minimum extraction flow required to contain the

process emission. Hence some extractions such as the Liquid Phase tanks and preheater are removing too much heat and approaching the temperature limits for the biofilter.

12.3 Further plugged airflow measuring ports are needed in the point source air extraction ducts to enable an easily measured vacuum monitoring action to be related to actual air flowrate in the duct. Also in some big ducts better located flow measuring ports are needed to get better flow measurements such as dryside and outside raw material bin air flows to the scrubber.

12.4 Overall, apart from the blood decanter and breaker-sump area on the Wet Side, the PSES is working well. On the Dry Side, active circulation of stickwater in the evaporator is needed to extract sufficient heat from the drier vapours, to obtain good vapour extraction from the driers. If this does not occur many other problems are created.

12.5 Both biofilters appear to have less than the recommended depth of media. Even so an odour issue due to this in the main biofilter has not been established. With the covered biofilter some drier-meal odour break through is apparent and increased media depth is recommended.

12.6 With a good balanced PSES it is assumed doors can be opened with odour contained. Not so. When wind is south or south-west, wind pressure peaks on the south side of the LTRP cause significant positive pressure effects inside the plant. All openings on the south side should be kept closed as much as practicable under such conditions. Monitoring of the wind pressure effects should be learned by some operators in order to understand cause and effect.

13. Independent person qualification and experience:

John Vickerman has a NZ Certificate in Mechanical Engineering and is Registered Engineering Associate No. 3980 under the Engineering Associates Registration Act 1961. Study through to the 3rd Professional year for a Bachelor of Engineering was made in Chemical and Materials Engineering at Auckland University in the late 1960's. Process engineering work experience began at that time in the pulp mill at Kinleith and then in the Department of Scientific and Industrial Research Chemical Engineering section. Around 1999 to 2004 operating and design experience was gained in fish rendering at NZ Fish Products. Since then he has worked under contract to Process Developments in Lower Hutt, which later merged with Connell Wagner which later became Aurecon NZ Ltd. This latter work has included investigation, design and monitoring of odour control systems in fish rendering, meat rendering, mushroom growing media composting and municipal green waste composting. In one case before the Environment Court, through work with Connell Wagner, John Vickerman was asked to provide details of odour control system design for scrutiny by other parties. Process Developments, Connell Wagner and Aurecon were contracted to do monitoring at AFFCO Imlay, in which John has done the monitoring work for around 10 years. There was a recent change in Aurecon policy (driven from Australia) preventing the AFFCO work continuing however John has continued to do the work through Kupe Technologies Ltd. John still does work for Aurecon NZ as a Senior Mechanical Engineer.

Appendix

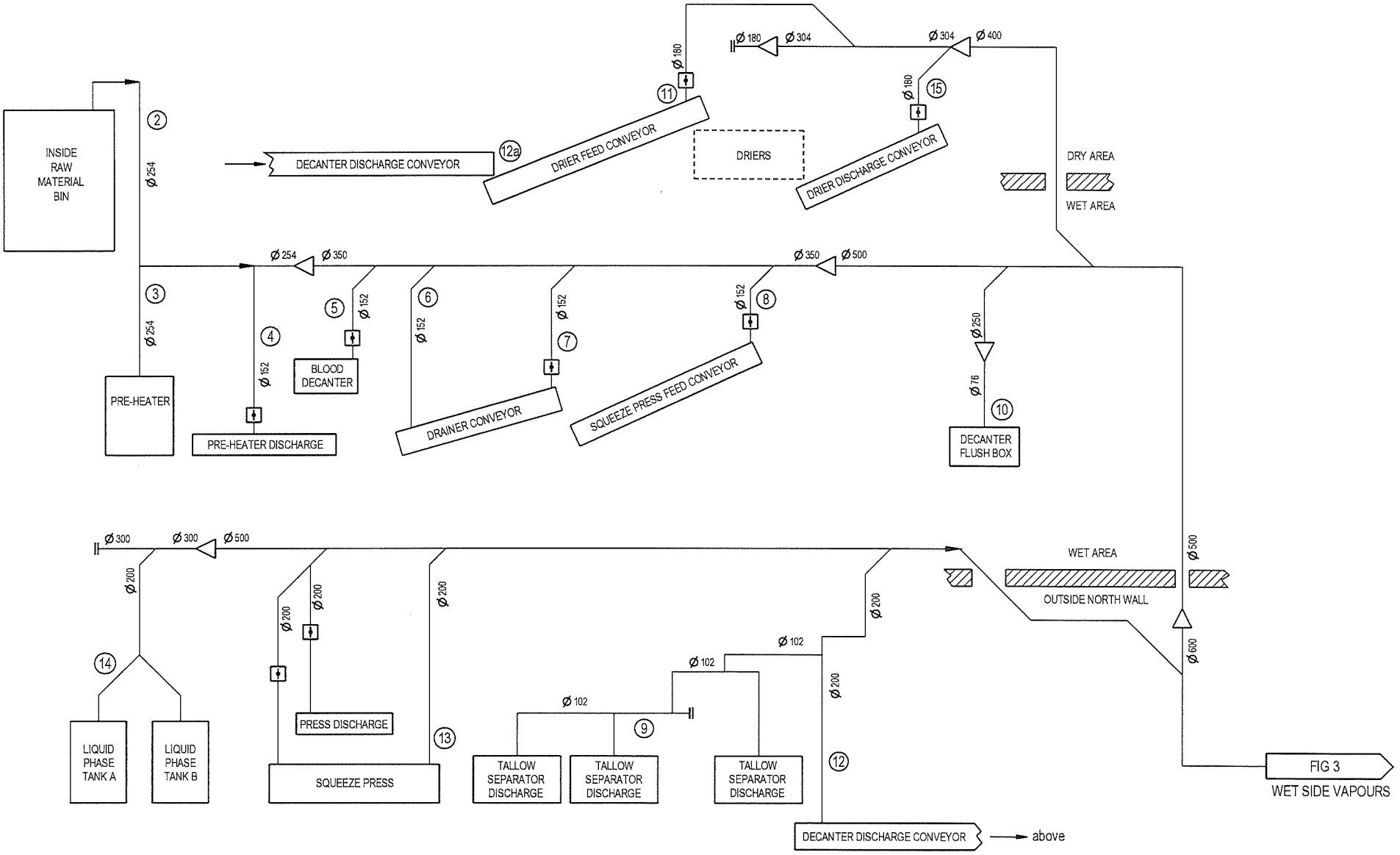

Fig 1. Wet Area Point Source Extractions at AFFCO Imlay Plant April 2019

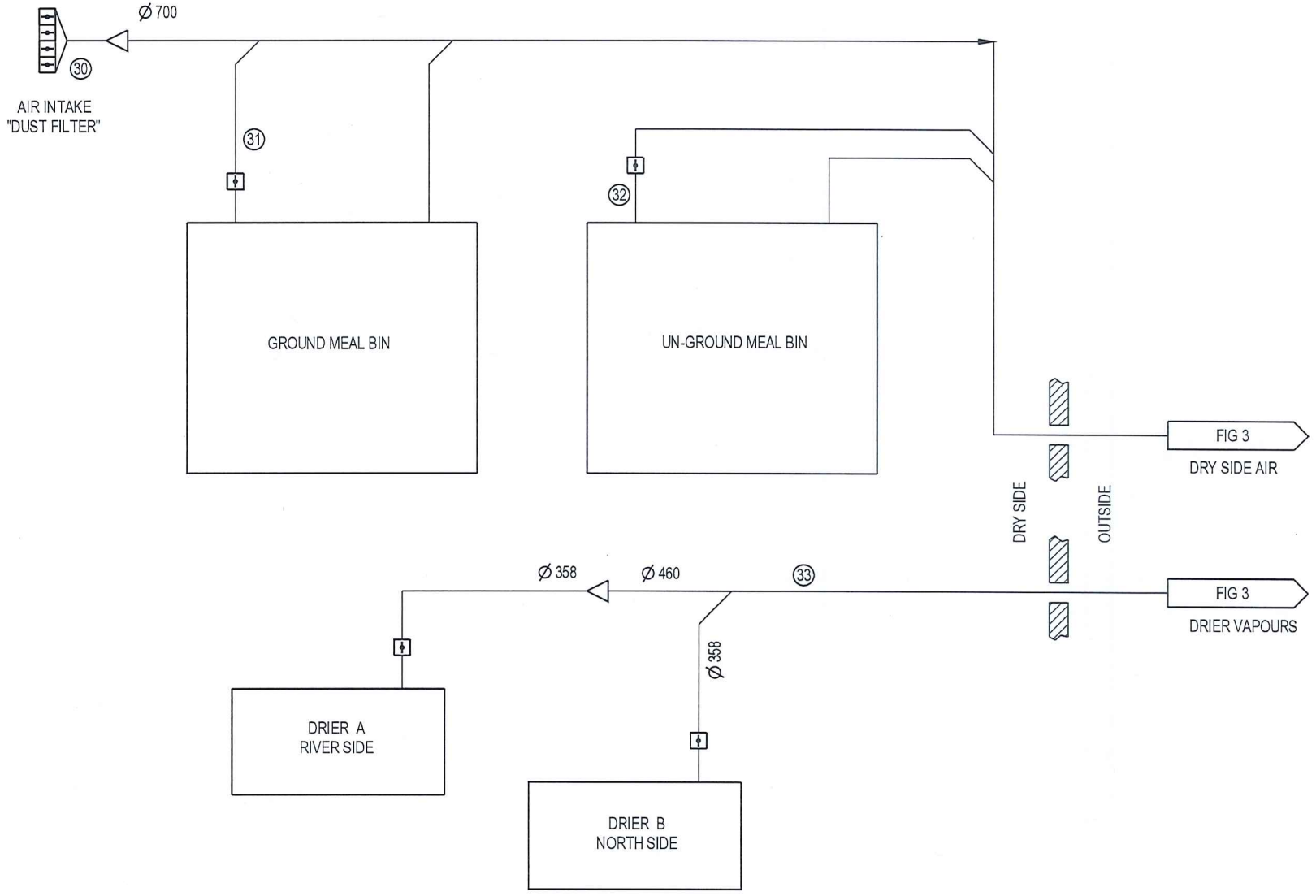

Fig 2. Dry Area Point Source Extractions at AFFCO Imlay Plant April 2019

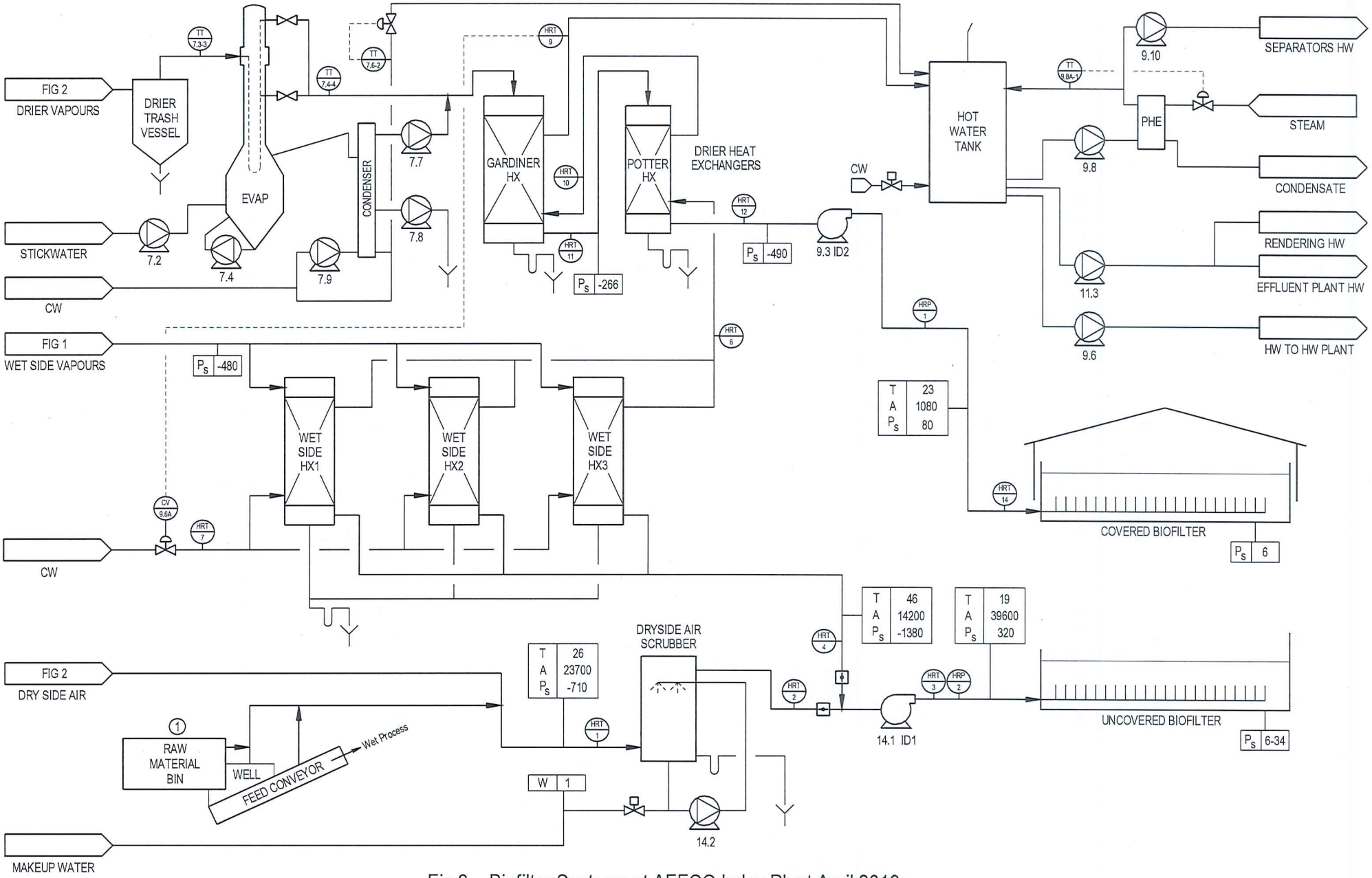

Fig 3. Biofilter Systems at AFFCO Imlay Plant April 2019

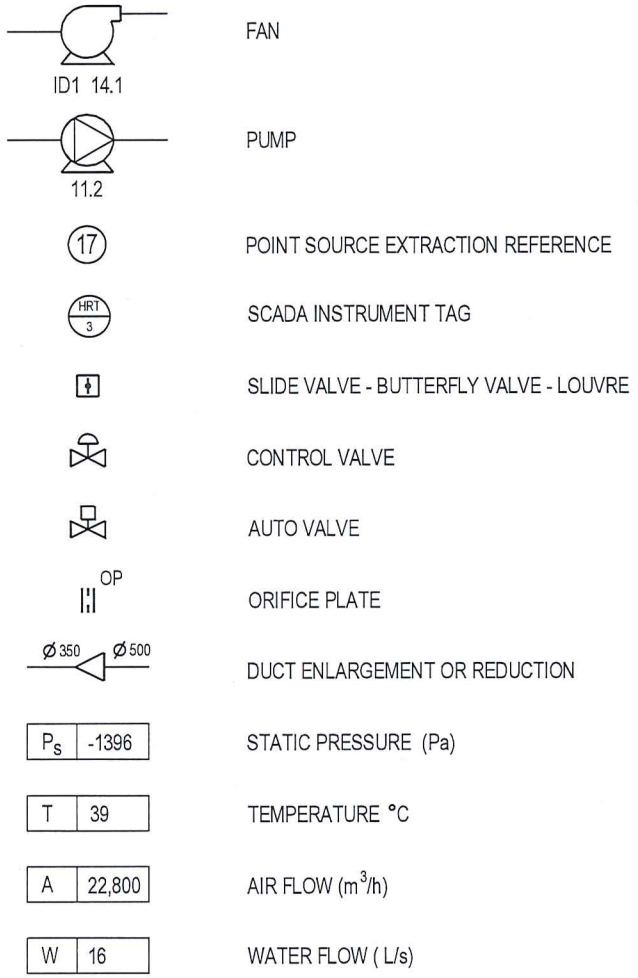

Fig 4a. Key to Symbols used in Figures 1 to 3

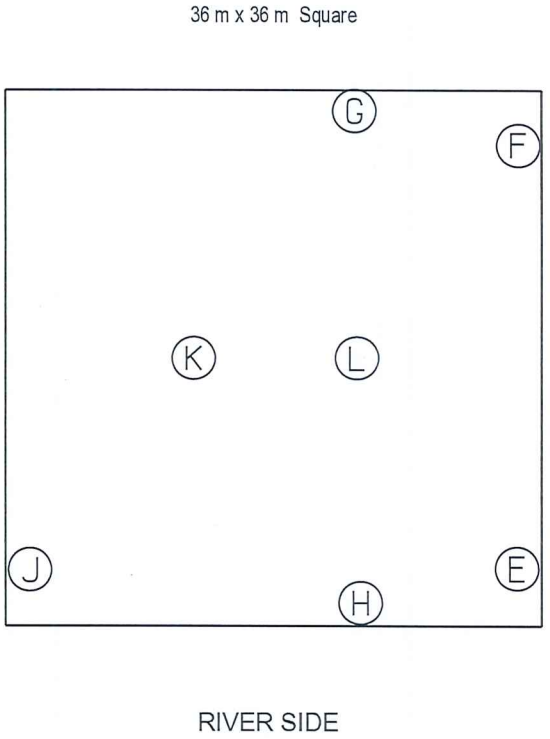

Fig 4b. Uncovered Biofilter Test Port Locations

Table 1: AFFCO Imlay - Covered Biofilter

Performance Assessment	4-Apr-19	11-Apr-19	12-Apr-19	15-May-19
A Ambient Conditions				
On site temperatures (open air)	16 to 18 °C	16 to 19 °C	15 to 16 °C	15 to 16 °C
Humidity (site open air)	56 to 58 %RH	72 to 80 %RH	66 to 70 %RH	80 to 85 %RH
Atmospheric pressure	102.3 to 102.0 kPa	100.7 kPa	101.0 kPa	101.2 kPa
Wind	Light SW	Moderate N	Fresh S	Fresh W
	2 to 3 m/s	4 to 7 m/s	6 to 11 m/s	6 to 10 m/s
Occasional wind gust	5 m/s	10 m/s	16 m/s	15 m/s

B Measured Air Flow to Covered Biofilter (at new 32NB measuring ports and according to ISO 10780)

Test Sheet Ref		Duct Diameter mm	Static Head Pa	Dynamic Head pitot Pa	Air °C	Manometer Water °C	Barometric Pressure kPa	Pitot Coefficient	Duct Moist Air Density kg/m³	Air Velocity m/s	Air Flow m³/h	Air Flow kg/s	Air Flow tph
19011	5/04/19	302	39	4.2	19.6	17	102.1	0.99	1.21	2.6	671	0.22	0.8
19013	10/04/19	302	35	5.2	23.7	18	100.7	0.99	1.17	2.9	757	0.25	0.9
19013	10/04/19	302	22	3.9	20.4	19	100.7	0.99	1.18	2.5	652	0.21	0.8
19013	10/04/19	302	22	3.6	20.3	18	100.7	0.99	1.19	2.4	626	0.21	0.7
19015	12/04/19	302	65	9.2	17.3	16	101.0	0.99	1.20	3.9	994	0.33	1.2
19017	15/05/19	302	79	10.3	34.3	15	101.2	0.99	1.12	4.2	1,081	0.34	1.2

Note: 15/05/19 measurement was with both driers operating and improved evaporator operation

C Covered Biofilter Characteristics

Length	14.8 m
Width	13.0 m
Min media depth	0.45 m
Media bed area	192 m^2
Media volume	87 m^3

Media Moisture Analysis %w/w (wet basis)

NW	59.7	63.7 NE
SW	65.5	54.4 SE
	River Side	

Media Temperature °C at 200 mm depth

NW	22.7	22.6 NE
	22.6	
SW	21.8	20.4 SE
	River Side	

Media pH

NW	5.5 - 6.0	5.5 - 6.0	NE
SW	5.5 - 6.0	5.5 - 6.0	SE

D Biofilter Loading 12 m^3/h air per m^3 media

E Duct Static Pressure

9.3 (ID2) Fan Inlet static head	-1050 Pa on 3/04/19	-490 Pa on 15/05/19
9.3 (ID2) Fan Outlet static head	80 Pa	
Biofilter end manhole static head	6 Pa	

Table 2: AFFCO Imlay - Uncovered Biofilter

Performance Assessment	4-Apr-19		10-Apr-19		11-Apr-19		15-May-19	
A Ambient Conditions								
On site temperatures (open air)	16 to 18	°C	18 to 19	°C	16 to 19	°C	15 to 16	°C
Humidity (site open air)	56 to 58	%RH	86 to 87	%RH	72 to 80	%RH	80 to 85	%RH
Atmospheric pressure	102.3 to 102.0	kPa	101.5	kPa	100.7	kPa	101.2	kPa
Wind	Light SW		Moderate W		Moderate N		Fresh W	
	2 to 3	m/s	5 to 7	m/s	4 to 7	m/s	6 to 10	m/s
Occasional wind gust	5	m/s	10	m/s	10	m/s	15	m/s

B Measured Air Flow to Uncovered Biofilter (At new 50NB measuring ports 13m downstream of fan 14.1 and according to ISO 10780)

Test Sheet Ref		Duct Diameter mm	Static Head Pa	Dynamic Head pitot Pa	Air °C	Manometer Water °C	Barometric Pressure kPa	Pitot Coefficient	Duct Moist Air Density kg/m³	Air Velocity m/s	Air Flow m³/h	Air Flow kg/s	Air Flow tph
19010	4/04/19	898	324	120	34.6	17	102.2	0.99	1.13	14.2	32,445	10.22	36.8
19012	10/04/19	898	345	139	35.6	19	101.5	0.99	1.17	15.4	35,092	11.36	40.9
19014	15/05/19	898	293	118	27.4	15	101.2	0.99	1.16	14.0	31,955	10.27	37.0

C Uncovered Biofilter Characteristics

Length	36.0	m
Width	35.7	m
Min media depth	0.5	m
Media bed area	1285	m^2
Media volume	643	m^3

Media Moisture Analysis

%w/w (wet basis)

NW	67.5		66.0 NE
		60.5	
SW	70.0		67.7 SE

River Side

Media Temperature

°C at 200 mm depth

NW	32.6	30.8	32.8	NE
	34.4	34.3	33.5	
SW	33.7	34.0	33.8	SE

River Side

Media pH

NW	5.5 - 6.0		5.5 - 6.0	NE
		5.5 - 6.0		
SW	5.5 - 6.0		5.5 - 6.0	SE

Samples for moisture and pH analysis taken 5/04/19 1040h

D Biofilter Loading 50 to 55 m^3/h air per m^3 media

Table 2 continued: AFFCO Imlay - Uncovered Biofilter

E Measured Air flow from Wet Process Heat Exchangers

Test Sheet Ref	Duct Size W x H mm		Static Head Pa	Dynamic Head pitot Pa	Air °C	Manometer Water °C	Barometric Pressure kPa	Pitot Coefficient	Duct Moist Air Density kg/m^3	Air Velocity m/s	Air Flow m^3/h	Air Flow kg/s	Air Flow tph
19010	645	790	-1620	35	48.1	17	102.2	0.99	1.06	7.9	14,542	4.29	15.4
19012	645	790	-1396	33	49.4	19	101.5	0.99	1.05	7.7	14,182	4.13	14.9
19014	645	790	-1381	34	40.8	15	101.2	0.99	1.09	7.8	14,222	4.31	15.5

F Measured Air Flow into Dry Gas Scrubber

Test Sheet Ref		Duct Diameter mm	Static Head Pa	Dynamic Head pitot Pa	Air °C	Manometer Water °C	Barometric Pressure kPa	Pitot Coefficient	Duct Moist Air Density kg/m^3	Air Velocity m/s	Air Flow m^3/h	Air Flow kg/s	Air Flow tph
19010	4/04/19	702	-1075	123	30.3	17	102.2	0.99	1.06	14.4	20,070	5.92	21.3
19012	10/04/19	702	-753	180	26.6	19	101.5	0.99	1.17	17.4	24,176	7.86	28.3
19014	15/05/19	702	-710	229	21.6	15	101.2	0.99	1.19	19.4	27,075	8.91	32.1

Note: Clogged screen (filter) on air intake from dry area was cleaned on 11/04/19 - hence the later increased air flow to scrubber

E Duct Static Pressure

	Pa
ID1 Fan Inlet static head	-1400 to -1620
ID1 Fan Outlet static head	290 to 325
Biofilter H branch end static head	6
Biofilter J branch end static head	11
Biofilter G branch end static head	15
Biofilter F branch end static head	15
Biofilter E branch end static head	34

Table 3: AFFCO Imlay - Point Source Extraction Measurements

Port	Location	Vacuum (Pa)
1	Outside raw material bin	2Pa 1700 m3/h (Note 1)
2	Inside raw material bin	53 (Note 2)
3	Pre-heater	140
4	Pre-heater discharge	135
5	Blood decanter	179 (156 below slide valve)
6	Drainer conveyor (top)	14 (new below slide valve)
7	Drainer conveyor to Squeeze Press conveyor	157 (27 below slide valve)
8	Squeeze press feed conveyor (top)	110
9	Tallow separator discharge chambers 3x	77
10	Decanter and separators sub manifold	4.5 m/s (Note 10)
11	Drier feed conveyor	42 to 55 (Note 3)
12	Decanter discharge conveyor	198 and 7 to 12 (Note 4)
13	Squeeze press and entry hopper (top)	22
14	Liquid phase tanks	278 (Note 5)
15	Drier meal discharge conveyor duct	38 to 45 (Note 6)
30	Unground meal bin	2 (Note 7)
31	Ground meal bin	25 (Note 8)
32	Dust filter	56 (Note 9)
33	Drier Vapour Duct	22 to 27 Pa (both Driers working)

NOTES:

1 New extraction duct to scrubber inlet. Airflow around 1700m3/h into bin. Air extraction from conveyor well 300 m^3/h. Extraction duct (DN175) to feed conveyor headspace also added but no provision yet for flow or pressure measurement. Installation of measurement port in extraction duct upstream of inlet into dryside air duct by scrubber recommended.

2 With bin hatch closed vacuum in bin is 4Pa. When bin hatch is open inward airflow in is 0.67m/s and 330 m^3/h.

3 Measured in the conveyor headspace at connection to the ducting. This extraction duct also draws air from the feed cross-conveyor. Both driers are now operating and there is headspace for air to be extracted from the south end. Air flow in conveyor headspace 3.5 m/s but none of this is being drawn up from decanter conveyor discharge location.

4 Was not able to clarify where the recorded data monitoring point 12 was located, hence vacuum was measured in the headspace of the decanter discharge conveyor where it discharges into the elevating drier feed conveyor. The vacuum at the west end increases along the conveyor east towards the extraction duct.

5 Measuring port in leg from one tank. Temperature of extracted air 56°C.

6 176mm (7") diameter extraction duct from drier discharge conveyor disconnected and reoriented drawing in clean air from the drier hall. Measured flow into this duct was 500 m3/h. When the dryside intake was clogged earlier the flow was 600 m^3/h.

7 Unground meal bin had a monitoring port below the extraction duct slide valve. Bin headspace vacuum low because part of the heavy fabric cover was not covering the entire bin top.

8 Ground meal bin had same fabric cover as unground meal bin. Vacuum in west extraction duct was 24Pa which corresponded to 6Pa vacuum in the bin headspace.

9 Drier hall "dust filter" is an enlarged air intake with a louvre damper and coarse screen over the intake. Louvre mechanism appears seized wide open and the coarse screen was almost completely blocked with built up meal dust. Monitoring port behind the louvre had an initial vacuum of 315Pa with 4,100 m3/h air being drawn in. After scraping meal off the screen the vacuum dropped to 55Pa and the air extraction rose to 10,000 m3/h. This change occurred after April flow measurements to the main biofilter. By 15 May meal build up resulted in 72 Pa vacuum at screen and an extraction flow of 9400 m3/h. Screen should be cleaned fortnightly.

10 Port location 10 existed before the new decanter centrifuges were installed. In the absence of no replacement port air velocity into extraction duct at back of the flush screen box was measured as vacuum in the decanter lines could not be measured. The air extraction is considered adequate for the flush box.

Table 4: AFFCO Imlay - Rendering Plant Historical Air Extraction Data

	2012	May-13	Dec-13	2015	2016	2018	2019
Drier Vapours							
Fan 9.3 (ID2) inlet static pressure (Pa)	-2795	-2236	-1971	-3923	-3864	-569	-490
Fan 9.3 (ID2) outlet static pressure (Pa)	1206	1373	1334	127	226	108	80
Fan 9.3 (ID2) outlet air temperature (°C)	22	26	26	23	20	16	23
Covered Biofilter inlet total pressure (Pa)	579	951	824	78	59	NP	6
Flow to Covered Biofilter (m^3/h)	3,800	3,000	3,100	1,600	2,400	1700	1080
Mass flow to Covered Biofilter (tonnes/h)	4.5	3.5	3.6	1.9	2.9	2.1	1.2
Biofilter Loading (m^3/h air per m^3 media)	40	35	33	19	28	20	12
Non-Drier Vapours							
Dry Side Air							
Scrubber Inlet Static Pressure (Pa)	-932	-961	-863	-775	-971	-1059	-710
Scrubber Inlet Temperature (°C)	24	27	30	32	31	29	26
Inflow to Scrubber (m^3/h)	22,100	22,800	28,000	22,800	22,300	23,500	23,700
Mass flow to Scrubber (tonnes/h)	25.9	26.6	31.7	26.6	25.2	27.4	27.2
Wet Side Vapours from HX1 - HX3							
Static pressure (Pa)	-1157	-1285	-1059	-1226	-1451	-1559	-1380
Temperature (°C)	38	41	39	46	44	21	46
Flow (m^3/h)	15,100	19,100	14,400	19,400	19,200	15,900	14,300
Mass flow (tonnes/h)	16.6	20.7	15.8	20.3	20.3	16.9	15.3
Uncovered Biofilter							
Fan 14.1 (ID1) outlet static pressure (Pa)	667	569	510	441	314	196	320
Air temperature to Uncovered Biofilter (°C)	26.6	32.4	31.2	34	35	19	32
Flow to Uncovered Biofilter (m^3/h)	39,900	43,500	43,200	41,800	41,400	39,900	33,200
Mass flow to Uncovered Biofilter (tonnes/h)	46	49	49	46	46	47	38
Biofilter Loading (m^3/h air per m^3 media)	56	62	62	59	59	57	52

Table 5. Summary of Issues and Potential Solutions

No	Item	Issue
1	SCADA HMI	On 'Biofilter and Heat Recovery' page, line from fan 9.3 to instruments HRP1 and HRT14 needs to be taken out of Wet Side Vapour HX and run above the HX. There is no connection to the HX - it is entirely separate.
2	SCADA HMI	On 'Biofilter and Heat Recovery' page, sensor HRT13 reading 100°C does not relate to line shown. Intrument HRT14 is located at inlet to the covered biofilter but is not shown on the SCADA page.
3	SCADA HMI	On 'Evaporator' page tag 7.6-1 needs to be moved for obvious association with the cold water temperature balloon.
4	SCADA HMI	On 'Biofilter and Heat Recovery' page, instrument HRP1 should be located between HRT13 (which should be HRT14) and the 9.3 fan.
5	SCADA HMI	On 'Evaporator' page, pump 7.5 needs to be labelled 'Concentrate Pump' and envelope at end of line needs to change 'Drive' to 'Driers'.
6	SCADA HMI	On 'Evaporator' page tag 7.3-4 is a temperature transmitter in the drier vapour stream immediately downstream of the evaporator. On the 'Heat Recovery Trends' page in the table on the right, this same transmitter appears to have the tag 7.4-4 as neither tags are in both places. This should be corrected to avoid confusion.
7	Vacuum Measurement	Existing Dwyer Magnehelic gauge being used is sensitive to orientation and not easily read. It is recommended that a Kane 3500-1 differential pressure meter be purchased from Teltherm Instruments. All extraction system air pressures are within instrument range of ± 8000Pa. Training to keep in range and only using (-) sensing tube for differential pressure measurement will give reliable reading and good life.
8	Outside Raw Material Bin Flow Measurement	Difficult to reliably measure. Installation of capped 20 BSP ports in bottom centre of extraction air duct and centre of north side, about 5m back from entry to scrubber inlet duct would allow measurement of total flow from outside raw material bin and feed conveyor. Port needs to be at location where covered biofilter air line can be stood on to make the port accessible or a platform provided. (See Item 9)
9	Scrubber Air Flow Measurement	Temperature gauge port on inlet bend currently used but error seems likely due to flow variation at bend. Two 20BSP capped ports at right angles upstream of the outside raw material bin entry duct would greatly assist flow measurement. A small length of walkway at higher level giving access to both outside raw material bin extraction duct and dryside duct for flow measurement would solve issues 8 and 9. If this is able to be done the flow measuring port in the raw material bin extraction air duct would be put in the top side of the duct.
10	Outside Raw Material Bin Discharge Conveyor	A 6.5mm diameter hole for vacuum measurement and preferably a M16 hole plugged with a short M16 SS bolt or polymer plug for flow measurement in the DN175 PVC pipe would allow the conveyor air extraction to be measured.
11	Dry Area Dust Filter	Screen needs cleaning monthly or more often if air meal dust loading is high.
12	Dry Area Dust Filter	Walkway needs extension out and step-up to dust filter to enable safe regular cleaning. Louvre mechanism needs be freed to enable closure during cleaning but also able to be positively clamped in the open operating position.
13	Unground Meal Bin	Air extraction lines need to be checked for build up of solids.
14	Unground Meal Bin	Fabric cover needs to be positioned to cover all of the open top of bin.

15	Unground Meal Conveyor from Driers	Currently no air extraction from entire drier meal discharge conveyor because vacuum in unground meal bin is too low. If currently disconnected duct (15, Fig 1) is not connected because conveyor access is needed at connection location then the duct should be repositioned to connect with the conveyor head space further downstream. It may be more appropriate to install a new Ø150 extraction duct from conveyor to Dry Area air duct nearer the Unground Meal bin.
16	pH sampling and test method	Monthly results from qualified lab testing are too variable. There is either a problem with the sampling or test method or both. Further investigation needed.
17	Covered Biofilter media depth	Bark-soil bed depth is less than the recommended guideline. With sensed break through of meal odour, the depth should be increased by 150mm to 200mm to minimise this.
18	Wet Side Extraction Air Temperature	Temperature has crept up and little margin to biofilter max temperature remains at daily peak. Need to get accessible plugged 20 BSP flow measuring ports installed in extraction ducts with hot emissions to accurately and repeatably determine the minimum extraction flow necessary to contain the emissions.
19	Fan 14.1 Discharge Duct Sealing	Stainless steel discharge duct from fan 14.1 frequently leaks at junction with concrete pipe due to inability of flexible sealant to cope with vibration. A circumferential sealing skirt secured with tensioned bands each side of the joint is needed to provide a more permanent seal.
20	Preheater Extraction Duct	New installed 250mm diameter duct has no means of restricting flow e.g. no slide valve. Nearby breaker to inside raw material bin conveyor has no extraction air. Raw material bin only has about a third of recommended flow but should match that of the preheater extraction. Consideration should be given to providing a larger duct with slide valve to the raw material bin which will draw more air via the breaker to raw material bin conveyor. Advantages: 1) reduced flow from preheater due to reduced vacuum at the tee, 2) cooler air going into the mix, 3) location of flow adjusting slide valve away from preheater duct where blockage is a risk, and 4) potential to draw some of the hot humid air that builds up in summer above the raw material bin.
21	Liquid phase tanks	Extraction vacuum is so high too much vapour is being removed. A working slide valve in the common leg is needed to reduce the vacuum in the tank headspace or alternatively some additional extraction air could be drawn from the sump, breaker and MD belt area nearby to moderate the vacuum.
22	Blood Decanter	Air extraction is inadequate to collect vapour emissions. Either the conveyor is too small i.e. not enough headspace for vapour transport along the screw to the larger extraction duct, or the 76 mm diameter dairy tube duct needs to be increased in size. Size of conveyor may be determined by specific blood properties requiring the conveyor to be small.
23	Drier Discharge Conveyor Extraction Duct	Disconnected Discharge Conveyor extraction duct should be blanked off and a new duct higher up the discharge conveyor provided with connection to the dryside air duct above. (i.e. provided higher up because seemingly the present connection point inhibits access to the conveyor for clearing blockage). Before doing so, the need to have extraction from the unground meal bin and the vibrating meal screen should all be considered.
24	Drier Feed Conveyor	Patch corroded slot admitting air beside the extraction air intake at the top of the conveyor.
25	Flow measurement platform for wet area big ducts	Platform with ladder access and flow measuring ports where big wet area ducts penetrate north wall would be helpful but does not look practical given the congested piping in the area.
26	Wet Process Heat Exchangers	Top air chamber should be inspected for clear ducting and tubes. Capped ports on top of the three cover plates are siezed and need freeing to enable pressure measurement.
27	Roller Doors on Building South Side	While installation of an airlock entry to the Wet Area on the south side looks impractical consideration should be given to installation of robust quick opening doors to minimise door open time.

APPENDIX 4 –

Gas Fired Boiler Maintenance

RCR Energy Service

NZ Form – Quarterly/Annual Safety Inspection for Unattended Boilers

Quarterly ■ Annual ☐

OWNER AND LOCATION	Affco Imlay Wanganui
Date of this service	17th January 2019
Date of last service	September 2018
Boiler capacity	9419kW
Official Number	170848
Tests conducted by	RCR Energy Service NZ

The following checks have been carried out in accordance with RCRE Procedure NZ-PRO-4001. Details of each procedure are given under the corresponding reference number in NZ-PRO-4001.

Functional test description	Checked (initials)	Comments / Action
1.1 **Safety valve** accumulation test (annual only)	N/A	
Check safety valve setting seal	SJ	In Place
1.2 **Combustion chamber temperature limiter**	SJ	Set at 850°C
1.3 **Feed tank / de-aerator low level cut out**	SJ	
1.4 **Boiler level control**	SJ	On production not tested at this visit
Spirax & Gestra Probe sets – High level water cut out & alarm	SJ	80mm
Spirax & Gestra Probe sets – First low water cut out & alarm	SJ	50mm
Spirax & Gestra Probe sets – Second low water cut out & alarm	SJ	Set at 50mbar
1.5 **Fuel pressure switches** Low pressure	SJ	Set at 300mbar
High pressure		

9 August 2010 NZ-FRM-4014 Page 1 of 4

RCR Energy Service

NZ Form – Quarterly/Annual Safety Inspection for Unattended Boilers

1.6	Feed water low pressure/flow switch	SJ	
1.7	Feed water level control system	SJ	SP 70%
1.8	Feed pumps / Circulating pumps Seals / bearings / motor ok	SJ	
	Check current draw	N/A	
	Timed changeover	SJ	
	Pump fault changeover	SJ	
1.9	Feed tank / deaerator Feed water temp. at least 85°C	SJ	94°C
1.10	Gas Train Check gas train & vents for leakage	SJ	
	Check pressures	SJ	3.5bar supply 1 mbar after reg on low fire
	Clean gas filter or replace element	N/A	
1.11	Burner Test valve proving	SJ	Set at 60mbar
	Check linkages for wear	SJ	
	Clean fan (if required)	N/A	
	Test air pressure switch	SJ	
	Test flame sensor	SJ	
1.12	Gauge glasses Blow down and observe action	SJ	
	Check/replace as required	SJ	Right hand gauge glass showing some wear. Recommend replacement in the near future.
1.13	Continuous blowdown Check operation of system	SJ	
1.14	Condensate turbidity system (where fitted) Calibrate - clean glass	SJ	Cleaned glass
1.15	Flame Observe shape and colour	SJ	
1.16	Power Failure Protection (if installed)	N/A	
1.17	Emergency Stop Test emergency stop working	N/A	
1.18	Dual fuel system (where fitted) Check for fuel leaks	N/A	
	Clean filters if due	N/A	
	Test run on the alternative fuel	N/A	

RCR Energy Service

NZ Form – Quarterly/Annual Safety Inspection for Unattended Boilers

2.1	**Log Book** Complete and correct	SJ	
2.2	**Non Conformance reports** Used correctly and being acted upon	SJ	
2.3	**Water testing** - Records of monthly testing by an ISO 17025 Registered Laboratory	SJ	
2.4	**Operator Roster** Check against training manual	SJ	

Failure of an item to fully pass the inspection constitutes a Non Conformance
Broadly, these fall into one of three categories

3.1 Minor Non Conformances not requiring immediate action

3.2 Non Conformances affecting the safety of the plant

3.3 Serious Non Conformances

Appropriate action must be taken as per NZ-PRO-4001

Combustion Analysis					
Firing Rate	dT °C	CO (ppm)	O_2%	Fuel Press mbar/bar	Efficiency % G
Low fire	109.3	0	6.70	130	85.5
25%	118.4	0	3.75		85.7
50%	126.2	0	3.25	125	85.5
75%	139	0	3.10		85
High fire	147.3	0	3.37	120	84.5

RCR Energy Service

NZ Form – Quarterly/Annual Safety Inspection for Unattended Boilers

For Hot Water Boilers Only			
Functional Test Description		Checked (initials)	Comments / Action
1.	Expansion Tank Low Water Level	N/A	
2.	Low System Pressure	N/A	
3.	High System Pressure	N/A	
4.	Ullage Tank Low Water Level, (if fitted)	N/A	
5.	Fill Pump Fault	N/A	

General Comments

Feed water level control set at 70%.
Feed pump total run hours not displaying on HMI?
All testing completed.
Right hand gauge glass showing some wear. Recommend replacement in the near future.

Tests Conducted by: Shane Jensen

Date: 17.01.19

APPENDIX 5 –

Horizons Annual Compliance Report – Non Compliance Responses

1. Condition 5 – **Significant Non Comply**

The following of the OMP has not managed to prevent objectionable odours leaving the AFFCO site. Therefore Horizons would like AFFCO to review the OMP. Please provide this review by the 1/07/19.

The Odour Management Plan has been reviewed by KupeTech – Condition 10 and Condition 31 Reports. Findings of that review along with an 'Action Plan List' can be viewed in Appendix 3.

2. Condition 6 – **Significant Non Comply**

63 Complaints, 38 substantiated by AFFCO (two described objectionable even in periods of short duration and six considered it would be objectionable if it occurred on a regular or frequent basis). Seven assessments by Horizons where the odour was described as objectionable, six of which occurred after the abatement notice was issued to cease odour.

The objectionable odours post abatement notice were attributed to mechanical breakdowns.

3. Condition 7 – **Low Risk Non Comply**

This condition has been Low Risk Non Complied as whilst the independent person has not been calibrated they have been used by AFFCO to assess odours complaints and it was due to my error that the calibration process was not followed up earlier. Please advise when the calibration of the independent person will take place by 15/05/19.

Olfactometry testing (baseline calibration) is set to take place on the 31st of May 2019 in Auckland (Watercare). Wayne Watson – Amourguard – Independent person – and the AFFCO Imlay Compliance Manager will take part in that calibration process.

4. Condition 8 – **Moderate Non Comply**

Whilst information has been provided to Horizons, in relation to breakdowns the information provided is not adequate and fails to comply with the consent. More detailed explanations need to be provided for odour issues / and or breakdown associated with the following dates; 19 to 20/09/18, 14/02/19 to 16/02/19, 20/02/19, 8/03/2019 to 10/03/19 and the 24/01/19. This can be included in the Annual Report due 1/06/19.

September 2018:-

Raw Material Quality:- *Odours were attributed to the quality of raw material received from Te Kuiti Meats and AFFCO Rangiuru. Although within the Resource Consent limits for mixed offals (48 hours from slaughter) the product once processed produced objectionable odours beyond the boundary fence.*

February 2019:-

Equipment Breakdown:- *There was a breakdown with the main in-feed screw conveyor and squeeze press. This resulted in a backlog of product within the inside raw bin.*

March 2019:-

Equipment Breakdown:- *This resulted in a backlog of product within the inside raw bin.*

1. *1:10 conveyor leaking in an unrepairable position. (Putting together a Capex to replace)*
2. *Pre-Breaker breaking hold down bolts. Stop, move back to correct position, tighten bolts and weld in stays to stop machine from moving.*
3. *2:4 conveyor flight breaks away and jambs up conveyor, remove broken flight from conveyor. Make up and re-weld section of flights to screw.*
4. *Dryer "B" breaker bars directional shoes dislodge and jamb up dryer.*
5. *Dryer "B" not moving product along, Take more shoes from Dryer "A" and install in Dryer "B"*
6. *Pre-Heater gearbox oil overheating. Inside raw bin over fill and 1:4 conveyor pops lids dropping product onto water pipe fracturing the water pipe, water sprays over the oil cooling motor causing the motor to over load and give up the ghost.*
7. *Inside raw bin has it's internal bracing pipe break loose. One piece travels up the 1:6 conveyor through the metal detector/magnet before jamming under the flights of the 1:7 conveyor, remove this piece and restart. Stop again after about 5 minutes as another longer piece of the bracing pipe emerges from the 1:6 conveyor. Gas cut up and remove.*

Summary:- *The Plant Engineer, Engineering Planner and Rendering Supervisor have been advised of the importance to keep an accurate log of rendering breakdowns. Reporting lines have also been advised so that timely reporting to Horizons representatives can be made as per the requirements of Condition 8.*

5. Condition 18– **Significant Non Compliance**

On the 12 April 2019 Horizons was notified that the raw bin had been ducted to the wet side biofilter. However, this almost a year over the consented time frame and has not followed the requirements of this condition. Please advise why the requirement of this condition that a small biofilter is constructed for the treating of air from the outside raw bin have not been met. This can be included in the Annual Report due 1/06/19.

Under previous management it was decided that the stand alone bio filter option was excessive in terms of size and location as well as cost. The question was put to Roger Cudmore (BE Hons - Chemical & Process) – 'Golders', the designer of the main bio filter, whether or not the existing covered bio filter could handle the extra loading from the outside raw bin. His response was as follows:-

"Hello Brent. The option of using the main biofilter is available because of the 5000 m3/hr (the ball park flow of extracted building air) that is pulled in by the dry side inlet duct – this could be diverted to a more important source as dry-side building air is not a priority. So 3600 m3/s (1 m3/s) could be instead targeted to the raw bin and discharge conveyor. The wet side duct is already loaded with most of the hot sources and needs to be cooled so it would make sense to keep the ambient raw material bin air flow out of this stream and instead connect this to the main dry-side manifold that connects to the dry side fan. The cost will relate to a long duct. Here is the table from our AEE with design flows for the wet and dry side – there is 7000 m3/hr dedicated to the dry side. Regards Roger"

6. Condition 21– **Moderate Non Compliance**

Whilst odour complaints have been notified to Horizons in accordance with this consent, the breakdowns have not been notified to Horizons within the above timeframes. With any future breakdowns they must be reported to Horizons via the Pollution Hotline (see condition 8 above request for further information).

Noted. All key personnel have been advised via email. Horizons 0800 number displayed on noticeboard in the Rendering Office.

7. Condition 10 – Report requested on the functioning of the odour management system.

Sent to Horizons on the 6th of May 2019.

8. Condition 11 - SKF009 – Stockyards Hygiene Check sheet is listed, please advise if these are completed on each occasion the stockyards are cleaned and provide copies 1/01/19 to 15/03/19.

Stockyards Hygiene Checksheets completed on a daily basis. Refer examples below:-

AFFCO IMLAY — ISSUE DATE: March 2016

STOCKYARDS HYGIENE / ANIMAL WELFARE / HAZARD CHECKSHEET

SKF 009 — Page 1 of 2

D/ SHIFT SUPERVISOR: Warren H — N/ SHIFT SUPERVISOR: [illegible] — WEEK ENDING: 26/01/19

DAILY INSPECTIONS: ✓ = Acceptable X = Unacceptable (Initial next to findings)

	MON		TUES		WED		THUR		FRI		SAT	
	DS	NS	DS	NS	DS	NS	DS	NS	DS	NS	DS	NS
HYDRAULIC RAMPS:- Ensure ramp is cleaned after use; Shock absorbent / anti slip mats in place ; Gap between ramp and unloading ramp is covered when in use; Unloading Bay Pens are fit for purpose eg. no damaged grating / fences sound and secure ; (Co-op) :- Portable ramp is in place when unloading from bottom deck of stock truck.	S	✓	✓	✓	✓	✓	✓	/	✓	✓		
BELLY WASH PENS:- Chemical in Pod; Chemical Prime Time = 20 seconds; Chemical Flow Time = 30 seconds; (Co-op):- Ensure Belly Wash Pens are not over-crowded when in use; Wash nozzles in working condition; stock washing meeting outcomes eg. Visually assess cleanliness of stock post washing.	T	✓	✓	✓	✓	✓	✓	✓	✓	✓		
PENS:- Ensure pens are hosed down at prescribed frequencies; No damaged flooring; No exposed / sharp edged rails that could cause harm to animals; (Co-op):- Ensure the gate is shut in Pen 16 / 16a.	H	✓	✓	✓	✓	✓	✓	✓	✓	✓		
WATER TROUGHS:- Ensure water troughs are clean; Fresh supply of running water; Report damaged drinkers to Supervisor immediately; (Co-op):- Ensure water troughs are inspected for cleanliness after each washdown of Pen.	U	✓	✓	✓	✓	✓	✓	✓	✓	✓		
RESTRAIN AREA:- Free of debris / Fly Blitzes in place; Clean and tidy; (Co-op):- (1) Ensure stock is removed from 'S' bend Pen during break periods; (2) Ensure stock is moved into Restrain Conveyor without twisting tails.	D	✓	✓	✓	✓	✓	✓	✓	✓	✓		
DRAINS - No blocked drains; waste water flowing freely.	A	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	Y											

CORRECTIVE ACTIONS:

AFFCO IMLAY — ISSUE DATE: March 2016

SKF 009

STOCKYARDS HYGIENE / ANIMAL WELFARE / HAZARD CHECKSHEET

Page 1 of 2

D/ SHIFT SUPERVISOR: Warren H. N/ SHIFT SUPERVISOR: [signature] WEEK ENDING: 16/2/19

DAILY INSPECTIONS: ✓ = Acceptable X = Unacceptable (Initial next to findings)

	MON		TUES		WED		THUR		FRI		SAT	
	DS	NS	DS	NS	DS	NS	DS	NS	DS	NS	DS	NS
HYDRAULIC RAMPS:- Ensure ramp is cleaned after use; Shock absorbent / anti slip mats in place ; Gap between ramp and unloading ramp is covered when in use; Unloading Bay Pens are fit for purpose eg. no damaged grating / fences sound and secure ; (Co-op) :- Portable ramp is in place when unloading from bottom deck of stock truck.	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓
BELLY WASH PENS:- Chemical in Pod; Chemical Prime Time = 20 seconds; Chemical Flow Time = 30 seconds; (Co-op):- Ensure Belly Wash Pens are not over-crowded when in use; Wash nozzles in working condition; stock washing meeting outcomes eg. Visually assess cleanliness of stock post washing.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PENS:- Ensure pens are hosed down at prescribed frequencies; No damaged flooring; No exposed / sharp edged rails that could cause harm to animals; (Co-op):- Ensure the gate is shut in Pen 16 / 16a.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WATER TROUGHS:- Ensure water troughs are clean; Fresh supply of running water; Report damaged drinkers to Supervisor immediately; (Co-op):- Ensure water troughs are inspected for cleanliness after each washdown of Pen.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
RESTRAIN AREA:- Free of debris / Fly Blitzes in place; Clean and tidy; (Co-op):- (1) Ensure stock is removed from 'S' bend Pen during break periods; (2) Ensure stock is moved into Restrain Conveyor without twisting tails.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DRAINS - No blocked drains; waste water flowing freely.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

CORRECTIVE ACTIONS:

AFFCO IMLAY — ISSUE DATE: March 2016

SKF 009

STOCKYARDS HYGIENE / ANIMAL WELFARE / HAZARD CHECKSHEET

Page 1 of 2

D/ SHIFT SUPERVISOR: Warren H N/ SHIFT SUPERVISOR: [signature] WEEK ENDING: 02/03/19

DAILY INSPECTIONS: ✓ = Acceptable X = Unacceptable (Initial next to findings)

	MON		TUES		WED		THUR		FRI		SAT	
	DS	NS	DS	NS	DS	NS	DS	NS	DS	NS	DS	NS
HYDRAULIC RAMPS:- Ensure ramp is cleaned after use; Shock absorbent / anti slip mats in place ; Gap between ramp and unloading ramp is covered when in use; Unloading Bay Pens are fit for purpose eg. no damaged grating / fences sound and secure ; (Co-op) :- Portable ramp is in place when unloading from bottom deck of stock truck.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
BELLY WASH PENS:- Chemical in Pod; Chemical Prime Time = 20 seconds; Chemical Flow Time = 30 seconds; (Co-op):- Ensure Belly Wash Pens are not over-crowded when in use; Wash nozzles in working condition; stock washing meeting outcomes eg. Visually assess cleanliness of stock post washing.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
PENS:- Ensure pens are hosed down at prescribed frequencies; No damaged flooring; No exposed / sharp edged rails that could cause harm to animals; (Co-op):- Ensure the gate is shut in Pen 16 / 16a.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
WATER TROUGHS:- Ensure water troughs are clean; Fresh supply of running water; Report damaged drinkers to Supervisor immediately; (Co-op):- Ensure water troughs are inspected for cleanliness after each washdown of Pen.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
RESTRAIN AREA:- Free of debris / Fly Blitzes in place; Clean and tidy; (Co-op):- (1) Ensure stock is removed from 'S' bend Pen during break periods; (2) Ensure stock is moved into Restrain Conveyor without twisting tails.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
DRAINS - No blocked drains; waste water flowing freely.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

CORRECTIVE ACTIONS:

[signature] 27/2/19.

9. Condition 12 please advise if AFFCO keep records of when the raw material receipting areas cleaning takes place and provide examples for the period 1/01/19 to 15/03/19.

Cleaning of raw material receipting area is completed on a daily basis. Refer examples below:-

AFFCO IMLAY — ISSUE DATE: April 2013

IMLAY RENDERING – WEEKLY WETSIDE AND OUTSIDE ENVIRONMENT HYGIENE REPORT

RMF 015b

Week Ending: 12/1/19

Inspect all items listed below for hygiene compliance. ✓ applicable box. If not applicable at the time of inspection write N/A. Corrective actions must be documented below for any items that are non compliant at time of inspection.

WET SIDE	YES	NO
New Truck bin hosed?	✓	
Old Truck Bin hosed?	✓	
Prebreaker?	✓	
Raw material bin?	✓	
Hogger?	✓	
Conveyor to Preheater?	✓	
Press cleaned and hosed?	✓	
Liquid phase tank decanter?	✓	
Liquid phase tank separator?	✓	
Flush out with water when finished?	✓	
Blood storage tanks wash?	✓	
Blood decanter acid washed?		
Drains hosed out?	✓	
All floors hosed?	✓	
Wet side secured?	✓	
Acid wash separators and decanter? (Beginning of week only)		

OUTSIDE ENVIRONMENT	YES	NO
Day Tallow Tank area clean?	✓	
Bulk Tallow Tank area clean and tidy?	✓	
Rendering External environment clean and tidy?	✓	

Comments / Corrective Actions:-

Leading Hand Signature:-

AFFCO IMLAY

ISSUE DATE: April 2013

IMLAY RENDERING – WEEKLY WETSIDE AND OUTSIDE ENVIRONMENT HYGIENE REPORT

RMF 015b

Week Ending: 9 – 2 – 19

Inspect all items listed below for hygiene compliance. ✓ applicable box. If not applicable at the time of inspection write N/A. Corrective actions must be documented below for any items that are non compliant at time of inspection.

WET SIDE	YES	NO
New Truck bin hosed?	✓	
Old Truck Bin hosed?	✓	
Prebreaka'?	✓	
Raw material bin?	✓	
Hogge'?	✓	
Conveyor to Preheate'?	✓	
Press cleaned and hosed?	✓	
Liquid phase tank decanter?	✓	
Liquid phase tank separator?	✓	
Flush out with water when finished?	✓	
Blood storage tanks wash?	✓	
Blood decanter acid washed?		
Drains hosed out?	✓	
All floors hosed?	✓	
Wet side secured?	✓	
Acid wash separators and decanter? **(Beginning of week only)**		

OUTSIDE ENVIRONMENT	YES	NO
Day Tallow Tank area clean?	✓	
Bulk Tallow Tank area clean and tidy?	✓	
Rendering External environment clean and tidy?	✓	

Comments / Corrective Actions:-

.eading Hand Signature:-

AFFCO IMLAY

ISSUE DATE: April 2013

IMLAY RENDERING – WEEKLY WETSIDE AND OUTSIDE ENVIRONMENT HYGIENE REPORT

RMF 015b

Week Ending: 23/3/19

Inspect all items listed below for hygiene compliance. ✓ applicable box. If not applicable at the time of inspection write N/A. Corrective actions must be documented below for any items that are non compliant at time of inspection.

WET SIDE	YES	NO
New Truck bin hosed?	✓	
Old Truck Bin hosed?	✓	
Prebreaker?	✓	
Raw material bin?	✓	
Hogger?	✓	
Conveyor to Preheater?	✓	
Press cleaned and hosed?	✓	
Liquid phase tank decanter?	✓	
Liquid phase tank separator?	✓	
Flush out with water when finished?	✓	
Blood storage tanks wash?	✓	
Blood decanter acid washed?		
Drains hosed out?	✓	
All floors hosed?	✓	
Wet side secured?	✓	
Acid wash separators and decanter? (Beginning of week only)		

OUTSIDE ENVIRONMENT	YES	NO
Day Tallow Tank area clean?	✓	
Bulk Tallow Tank area clean and tidy?	✓	
Rendering External environment clean and tidy?	✓	

2/4/19

Comments / Corrective Actions:-

Leading Hand Signature:-

10. Condition 17 – Please provide biofilter operational and maintenance logs for assessment for the reporting period 1/05/18 to 15/03/19.

A Bio Filter operational log is completed on a daily basis. Refer examples within the 'AFFCO Imlay Air Discharge Monitoring Report'.

11. Condition 29 – Please provide the results of the monthly odour surveys for the reporting period 1/05/18 to 15/03/19.

Monthly Odour Surveys can be found in Appendix 2 of this report.

12. Condition 30 – Please provide the electronic records of the temperatures over the reporting period 1/05/18 to 15/03/19.

*SCADA temperature records in relation to the Bio Filters are recorded daily on the **'Air Odour Resource Consent Monitoring Checksheet – RMF 008'**. Examples of SCADA Temperatures can be viewed within the 'AFFCO Imlay Air Discharge Monitoring Report'.*

13. Condition 34 – Please provide log records that demonstrate raw material received for rendering meets these conditions under consent 13, including the information relating to product accepted by Rangiuru and Te Kuiti meats in September 2018.

AFFCO Imlay receives raw material from two external processing plants:- AFFCO Manawatu – ME32 and Land Meat NZ Ltd – ME131. Daily records are maintained on the quality of those raw materials. Refer example below (two random days selected):-

RMF 009

AFFCO IMLAY RENDERING OPERATIONS

WEEK: 23

DATE: 05.03.19

INCOMING RENDERABLES

DAILY #	ARRIVAL TIME	SUPPLIER	ACID DOSED	MATERIAL CONDITION	REJECT YES/NO	pH <4.5	TEMP <20C	AGE <48hrs	TRANSPORT DKT.	WEIGHT DKT.	MBP BLOOD	MBP OFFAL	OTHER OFFAL	COLD STORES OFFAL	LAND MEATS OFFAL	LAND MEATS BLOOD	TOTAL OFFAL	ED NUMBER	Charged on Invoice Number
1	1130	LANDMEATS OFFAL	N	Mixed	N				13545	86464					11.400		11.400	ME131/053T	337984
2	1400	LANDMEATS OFFAL	N	Mixed	N				13546	86472					11.060		11.060	ME131/060T	337984
3	1730	LANDMEATS OFFAL	N	Mixed	N				13547	86484					9.400		9.400	ME131/061T	337984
4	1900	LANDMEATS BLOOD		3 Pods	N				337997							3.675	0.000	ME131/059T	337984
5		BEEF FACE PLATES		1 Bin	N												0.000		337984
6	1100	MBP OFFAL	Y	Mixed	N	5.4	26		13706	86465		30.520					30.520	ME32/89748T	338383
7		MBP OFFAL	Y	Mixed	N	5.6	28										0.000		
8	1630	MBP OFFAL	Y	Mixed	N	5.2	24		13707	86478		32.580					32.580	ME32/89749T	228383
9		MBP OFFAL	Y	Mixed	N	5.3	22										0.000		
10	2220	MBP OFFAL	Y	Mixed	N	4.8	23.1		13708	86486		30.260					30.260	ME32/89751T	338383
11		MBP OFFAL	Y	Mixed	N	4.7	25										0.000		
12	0140	MBP OFFAL	Y	Mixed	N	4.7	19.8		13709	86487		14.920					14.920	ME32/89752T	338383
13		MBP OFFAL	Y	Mixed	N												0.000		
14	0820	MBP BLOOD	N		N												0.000		
15																	0.000		
16																	0.000		
17																	0.000		
18																	0.000		
19																	0.000		
20																	0.000		
										TOTALS	0.000	108.280	0.000	0.000	31.860	3.675	140.140		

IMLAY PROCESSING

RAW MATERIAL TYPE	%	NO. of HEAD	TOTAL MT
Lamb Kill	0.005	6738	33.690
Sheep Kill	0.012	350	4.200
Calves Kill	0.007		0.000
Lamb Boned	0.004		0.000
Sheep Boned	0.008		0.000
Calves Boned	0.007		0.000
Truck Weights (Estimated)			34.000

IMLAY	37.890
OUTSIDE	140.140
RAW MATERIAL	178.030
CARRY OVER	0.000
TOTAL RAW MATERIAL	178.030

START:	0800	1900
	1200	0800
Total hrs	4.00	10.00
TOTAL HRS FOI	14.00	HRS
Start up/Shutd	2.50	HRS
Waiting for 2.11 tank		HRS
Dryer High An	2.00	HRS
Clean Up/Acid Wash		HRS
Maintenance		HRS
TOTAL HRS PROI	9.50	HRS

		M/T
Standard Hours	22	HRS
% of Standard	43.18	%
Raw Material per Hour	18.74	tonnes
Standard Tonnage	10	MT/h
% of Standard	187.40	%
FINISHED PRODUCT (APPROX.)		
MBM	42.73	
TALLOW	33.83	
MBM/HR	4.50	
TALLOW/HR	3.56	

COMMENTS:

ISSUED: OCT-05

RMF 009

AFFCO IMLAY RENDERING OPERATIONS

WEEK: 26

DATE: 28.03.19

INCOMING RENDERABLES

DAILY #	ARRIVAL TIME	SUPPLIER	ACID DOSED	MATERIAL CONDITION	REJECT YES/NO	pH <4.5	TEMP <20C	AGE <6hrs	TRANSPORT DKT.	WEIGHT DKT.	MBP BLOOD	MBP OFFAL	OTHER OFFAL	COLD STORES OFFAL	LAND MEATS OFFAL	LAND MEATS BLOOD	TOTAL OFFAL	ED NUMBER	Charged on Invoice Number
1	1100	LANDMEATS OFFAL	N	Mixed	N				13591	86927					12.54		12.540	ME131/515T	338041
2	1430	LANDMEATS OFFAL	N	Mixed	N				13592	86929					10		10.000	ME131/523T	338041
3	1620	LANDMEATS OFFAL	N	Mixed	N				13593	86938					9.28		9.280	ME131/524T	338041
4		LANDMEATS BLOOD	N	3 pods	N				338045							3.675	0.000	ME131/517T	338041
5		FACE PIECES 1 BIN	N	1 Bin	N												0.000	ME131/521T	338041
6	1100	MBP OFFAL	Y	Mixed truck	N	5.2	23.9		13824	86928		31.240					31.240	ME32/89902T	338044
7		MBP OFFAL	Y	Mixed trailer	N	5.2	24										0.000		
8	2130	MBP OFFAL	Y	Mixed trailer	N	5.2	23		13825	86943		27.020					27.020	ME32/89904T	338044
9		MBP OFFAL	Y	Mixed trailer	N	5.2	21										0.000		
10	0020	MBP OFFAL	Y	Mixed truck	N	5.4	23.8		13826	86944		26.420					26.420	ME32/88905T	338044
11		MBP OFFAL	Y	Mixed trailer	N	5.8	23.4										0.000		
12	0015	MBP OFFAL	Y	Mixed truck	N												0.000		
13		MBP OFFAL	Y	Mixed trailer	N												0.000		
14	1420	MBP BLOOD	N	Mixed trailer	N				13988	86931	21.300						0.000	ME32/89903T	
15																	0.000		
16																	0.000		
17																	0.000		
18																	0.000		
19																	0.000		
20																	0.000		
										TOTALS	21.300	84.680	0.000	0.000	31.82	3.675	116.500		

IMLAY PROCESSING

RAW MATERIAL TYPE	%	NO. of HEAD	TOTAL MT
Lamb Kill	0.005	3402	17.010
Sheep Kill	0.012	849	10.188
Calves Kill	0.007		0.000
Lamb Boned	0.004		0.000
Sheep Boned	0.008		0.000
Calves Boned	0.007		0.000
Truck Weights (Estimated)			68.000

IMLAY	27.198
OUTSIDE RAW MATERIAL	116.500
	143.698
CARRY OVER	0.000
TOTAL RAW MATERIAL	143.698

CURRENT SHIFT HOURS

	DAY	NIGHT
START:	0600	2000
FINISH :	2000	0600
Total hrs	12.00	12.00

TOTAL HRS FOR 24.00 HRS

Start up/Shutdown		HRS
Waiting for 2.11 tank		HRS
Dryer High Am	2.00	HRS
Clean Up/Acid Wash		HRS
Maintenance	12.00	HRS

TOTAL HRS PROD 10.00 HRS

Possible Production	100.00	M/T
Standard Hours	22.00	HRS
% of Standard	45.45	%
Raw Material per Hour	14.37	tonnes
Standard Tonnage	10.00	MT/ph
% of Standard	143.70	%

FINISHED PRODUCT (APPROX.)

MBM	34.49
TALLOW	27.30
MBM/HR	3.45
TALLOW/HR	2.73

COMMENTS:
1:19 Gearbox Faulted loss prod 14hrs

ISSUED: OCT-05

Information relating to Rangiuru and Te Kuiti Meats raw materials:-

RMF 009

AFFCO IMLAY RENDERING OPERATIONS

WEEK: 51

DATE: 18.09.18

INCOMING RENDERABLES

DAILY #	ARRIVAL TIME	SUPPLIER	ACID DOSED	MATERIAL CONDITION	REJECT YES/NO	pH <5.5	TEMP	AGE	TRANSPORT DKT.	WEIGHT DKT.	MBP BLOOD	MBP OFFAL	OTHER OFFAL	Te Kuiti Blood	LAND MEATS OFFAL	LAND MEATS BLOOD	TOTAL OFFAL	ED NUMBER
1	1100	LANDMEATS OFFAL	N	Hard / Soft	N				12094	83859					10.480		10.480	ME131/553601
2	1430	LANDMEATS OFFAL	N	Hard / Soft	N				12095	83860					9.840		9.840	ME131/553671
3	1730	LANDMEATS OFFAL	N	Hard / Soft	N				12096	83867					9.300		9.300	ME131/553681
4		LANDMEATS BLOOD	N		N				337039							3.910	0.000	ME131/553621
5	1100	MBP OFFAL	N	Hard / Soft	N					43059		28.200					28.200	ME32/89003T
6		MBP OFFAL	N	Hard / Soft	N					43085		7.240					7.240	ME32/89000T
7	1100	MBP BLOOD	N		N				334928	83858	9.900						0.000	ME32/88999T
8	1400	Te Kuiti Meats		Hard / Soft	Smelly			24hrs	59514					3000 litres			0.000	ME104/2475T
9	1400	Te Kuiti Meats		Hard / Soft	Smelly			24hrs	59515				1.000				1.000	ME104/2478T
10	1400	Te Kuiti Meats		Hard / Soft	Smelly			24hrs	59516				1.000				1.000	ME104/2477T
11	1400	Te Kuiti Meats		Hard / Soft	Smelly			24hrs	59517				0.000				0.000	ME104/2484T
12	1400	RANGIURU		12 Bins - Hard / Soft	Smelly			24hrs	59897				12.000				12.000	ME56/834158T
13																	0.000	
14																	0.000	
15																	0.000	
16																	0.000	
17																	0.000	
18																	0.000	
19																	0.000	
20																	0.000	
										TOTALS	9.900	35.440	14.000	0.000	29.620	3.910	79.060	

IMLAY PROCESSING

RAW MATERIAL TYPE	%	NO. of HEAD	TOTAL MT
Lamb Kill	0.005		0.000
Sheep Kill	0.012		0.000
Calves Kill	0.007		0.000
Lamb Boned	0.004		0.000
Sheep Boned	0.008		0.000
Calves Boned	0.007		0.000
Truck Weights (Estimated)			64.000

IMLAY	0.000
OUTSIDE RAW MATERIAL	79.060
	79.060
CARRY OVER	0.000
TOTAL RAW MATERIAL	79.060

START:	1700
	0600
Total hrs	14.00

TOTAL HRS FOR 14.00 HRS

Start up/Shutd	2.50	HRS
Waiting for 2.11 tank		HRS
Drier High Am	3.50	HRS
Clean Up/Acid Wash		HRS
Maintenance		HRS

TOTAL HRS PROD 8.00 HRS

Standard Hours	22	HRS
% of Standard	36.36	%
Raw Material per Hour	9.88	tonnes
Standard Tonnage	10	MT/ph
% of Standard	98.83	%

FINISHED PRODUCT (APPROX.)

MBM	18.97
TALLOW	15.02
MBM/HR	2.37
TALLOW/HR	1.88

COMMENTS:
No Imlay kill.

RMF 009

AFFCO IMLAY RENDERING OPERATIONS

WEEK: 51

DATE: 19.09.18

INCOMING RENDERABLES

DAILY #	ARRIVAL TIME	SUPPLIER	ACID DOSED	MATERIAL CONDITION	REJECT YES/NO	pH <8.5	TEMP	AGE	TRANSPORT DKT.	WEIGHT DKT.	MBP BLOOD	MBP OFFAL	OTHER OFFAL	Te Kuiti Blood	LAND MEATS OFFAL	LAND MEATS BLOOD	TOTAL OFFAL	ED NUMBER
1	1100	LANDMEATS OFFAL	N	Hard/Soft	N				12997	83873					11.64		11.640	ME131/55369T
2	1430	LANDMEATS OFFAL	N	Hard/Soft	N				12998	83880					9.58		9.580	ME131/55375T
3	1730	LANDMEATS OFFAL	N	Hard/Soft	N				12999	83902					9.18		9.180	ME131/55369T
4		LANDMEATS BLOOD	N		N											3.910	0.000	ME131/55371T
5	1530	MBP OFFAL	N	Hard / Soft	N				43102			32.410					32.410	ME32/89006T
6		MBP OFFAL	N		N												0.000	
7	1100	MBP BLOOD	N		N												0.000	
8	1400	Te Kuiti Meats	N	Hard / Soft	Smelly			24hrs	59621				2.000				2.000	ME104/2500T
9	1400	Te Kuiti Meats	N	Hard / Soft	Smelly			24hrs	59620				3.000				3.000	ME104/2499T
10	1400	Te Kuiti Meats	N	Hard / Soft	Smelly			24hrs	59619					4000 LITRES			0.000	ME104/2498T
11	1400	RANGIURU	N	5 BINS	Smelly			24hrs	59618				5.000				5.000	ME56/834159T
12																	0.000	
13																	0.000	
14																	0.000	
15																	0.000	
16																	0.000	
17																	0.000	
18																	0.000	
19																	0.000	
20																	0.000	
										TOTALS	0.000	32.410	10.000	0.000	30.40	3.910	72.810	

IMLAY PROCESSING

RAW MATERIAL TYPE	%	NO. of HEAD	TOTAL MT
Lamb Kill	0.005	2328	11.640
Sheep Kill	0.012	168	2.016
Calves Kill	0.007		0.000
Lamb Boned	0.004		0.000
Sheep Boned	0.008		0.000
Calves Boned	0.007		0.000
Truck Weights (Estimated)			60.000

IMLAY	13.656
OUTSIDE	72.810
RAW MATERIAL	86.466
CARRY OVER	0.000
TOTAL RAW MATERIAL	86.466

START: 1500
FINISH : 0330
Total hrs 11.50

TOTAL HRS FOR	11.50	HRS
Start up/Shutd	2.50	HRS
Waiting for 2.11 tank		HRS
Drier High Am	2.00	HRS
Clean Up/Acid Wash		HRS
Maintenance		HRS
TOTAL HRS P	7.00	HRS

Possible Production	78.00	M/T
Standard Hours	22.00	HRS
% of Standard	31.82	%
Raw Material per Hour	12.35	tonnes
Standard Tonnage	10.00	MT/ph
% of Standard	123.52	%

FINISHED PRODUCT (APPROX.)

MBM	20.75
TALLOW	16.43
MBM/HR	2.96
TALLOW/HR	2.35

COMMENTS:

RMF 009

AFFCO IMLAY RENDERING OPERATIONS

WEEK: 51

DATE: 20.09.18

INCOMING RENDERABLES

DAILY #	ARRIVAL TIME	SUPPLIER	ACID DOSED	MATERIAL TYPE: Soft,Mixed,Hard	REJECT YES/NO	pH <4.5	TEMP (<20C)	Hours soft	TRANSPORT DKT.	WEIGHT DKT.	MBP BLOOD	MBP OFFAL	OTHER OFFAL	Te Kuiti Blood	LAND MEATS MIXED OFFAL	LAND MEATS BLOOD	TOTAL OFFAL	ED NUMBER
1	1100	LANDMEATS OFFAL	N	Hard/Soft	N			4	13000	83907					11.86		11.860	ME131/55377T
2	1500	LANDMEATS OFFAL	N	Hard/Soft	N			4	13451	83910					8.88		8.880	ME131/55385T
3	1730	LANDMEATS OFFAL	N	Hard/Soft	N			4	14001	83930					9.36		9.360	ME131/55377T
4		LANDMEATS BLOOD	N		N											3.910	0.000	ME131/55379T
5	1700	MBP OFFAL	N	Hard/Soft	N					4131		33.170					33.170	ME32/89010T
6		MBP OFFAL															0.000	
7	1100	MBP BLOOD	N		N				334931	83905						14.600	0.000	ME32/89011T
8	1115	Te Kuiti Meats	N	Hard/Soft	N			12	59623				1.000				1.000	ME104/2511T
9	1115	Te Kuiti Meats	N	Hard/Soft	N			12	59626				1.000				1.000	ME104/2515T
10	1115	Te Kuiti Meats	N	Hard/Soft	N	6.88	18.8	12	59625				1.000				1.000	ME104/2512T
11	1115	Te Kuiti Meats	N	Hard/Soft	N			12	59624							4.000	0.000	ME104/2510T
12	1115	RANGIURU	N	19 bn Mixed Offals	N	5.99	22.9	16	59622				25.000				25.000	ME56/834160T
13																	0.000	
14																	0.000	
15																	0.000	
16																	0.000	
17																	0.000	
18																	0.000	
19																	0.000	
20																	0.000	
										TOTALS	0.000	33.170	28.000	0.000	30.10	22.510	91.279	

IMLAY PROCESSING

RAW MATERIAL TYPE	%	NO. of HEAD	TOTAL MT
Lamb Kill	0.005	2823	14.115
Sheep Kill	0.012	135	1.620
Calves Kill	0.007	1727	12.089
Lamb Boned	0.004		0.000
Sheep Boned	0.008		0.000
Calves Boned	0.007	1785	12.495
Truck Weights (Estimated)			58.000

IMLAY	40.319
OUTSIDE	91.270
RAW MATERIAL	131.589
CARRY OVER	0.000
TOTAL RAW MATERIAL	131.589

CURRENT SHIFT HOURS

	DAY	NIGHT
START:	1600	
FINISH :	0800	
Total hrs	16.00	

TOTAL HRS FOR	16.00	HRS
Start up/Shutd	2.50	HRS
Waiting for 2.11 tank		HRS
Drier High Am	4.00	HRS
Clean Up/Acid Wash		HRS
Maintenance		HRS
TOTAL HRS PROI	9.50	HRS

Possible Production	95.00	M/T
Standard Hours	22.00	HRS
% of Standard	43.18	%
Raw Material per Hour	13.85	tonnes
Standard Tonnage	10.00	MT/ph
% of Standard	138.51	%

FINISHED PRODUCT (APPROX.)

MBM	31.56
TALLOW	25.09
MBM/HR	3.32
TALLOW/HR	2.63

COMMENTS: