# AFFCO IMLAY

# ANNUAL AIR DISCHARGE MONITORING REPORT – 2023 / 2024

# AFFCO IMLAY WANGANUI

## AIR DISCHARGE PERMIT:-
## ATH-2007010926.01

## MONITORING REPORT

## 1 MAY 2023 TO 30 APRIL 2024

**COMPILED BY:**
**RICKY GOWAN – AFFCO IMLAY COMPLIANCE MANAGER**

## 1.0 TABLE OF CONTENTS



**APPENDICES:-**

## 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 2024 |
| **Scope:** | Air Discharge Annual Monitoring Report 2024 | | |
| **Author:** | Ricky Gowan | | |

This Report covers the period from the 1st of May 2023 to the 30th of April 2024 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.

All Schedule 1 items raised by Imlay Management and KupeTech have been completed.

### 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:-**

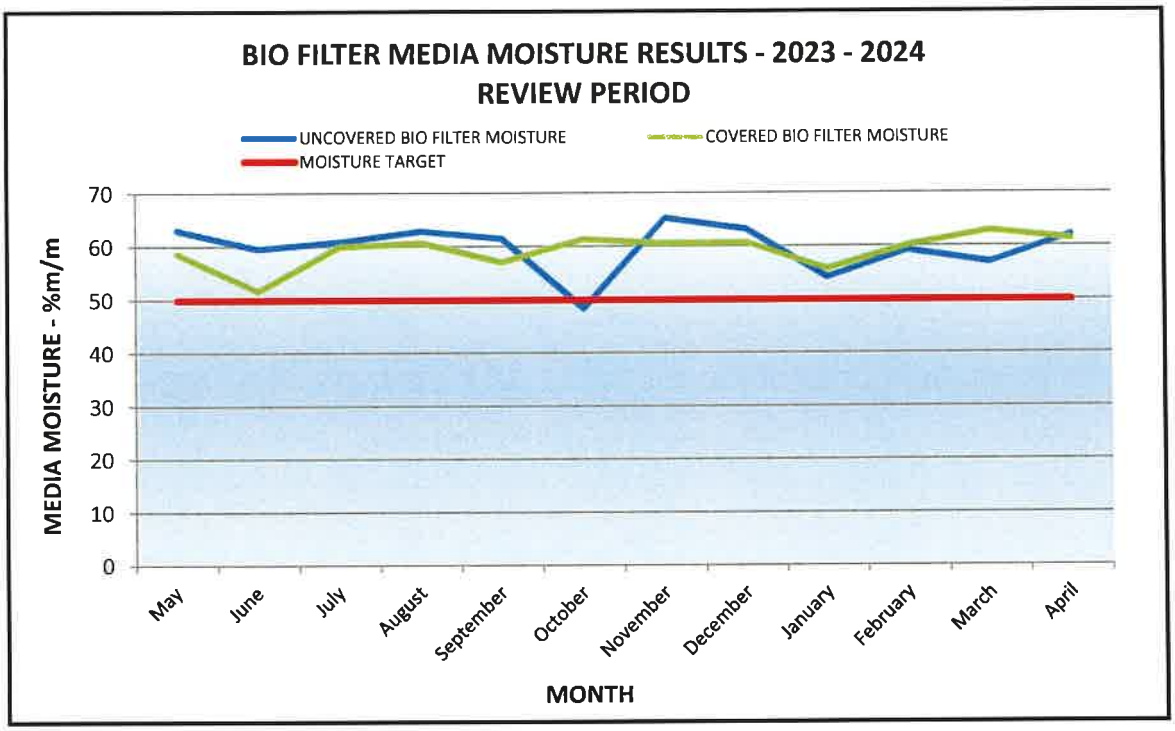
The back pressure of both covered and uncovered bio-filters are continuously recorded via the SCADA system.

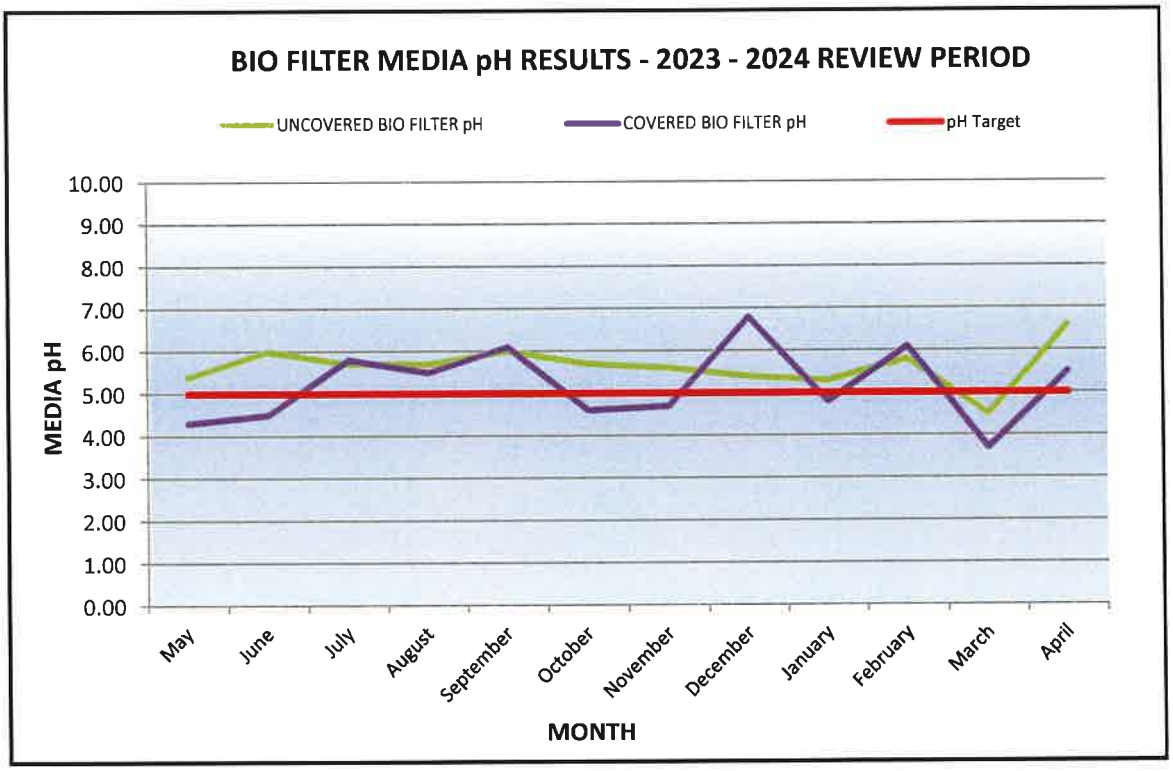
**Daily manual back-pressure checks, visual inspection for moisture content, leakage and odour discharge:-**

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'**. All daily monitoring records are held on file in the Rendering Office. **'Air Odour Resource Consent Monitoring Checksheet – RMF 008'** pdf files for the review period sent to Horizons via USB flash drive.

**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:-




John Vickerman - KupeTech – has stated in the 2024 KupeTech Annual Report that an investigation into the covered bio filter media is required. Refer KupeTech Report.

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

**'Air Odour Resource Consent Monitoring Checksheet – RMF 008'** pdf files for the review period sent to Horizons via USB flash drive.

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

Refer Appendix 3 for 2024 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 – 2024 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'**. All daily monitoring records are held on file in the Rendering Office. **'Air Odour Resource Consent Monitoring Checksheet – RMF 008'** pdf files for the review period sent to Horizons via USB flash drive.

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 were no incidents of planned maintenance that could result in odours released into the atmosphere during the review period. Rendering maintenance pdf files for the review period sent to Horizons via USB flash drive.

## 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 MPI (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'**.

**'Imlay Rendering Shift Report – RMF 012'** pdf files for the review period sent to Horizons via USB flash drive.

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

The Complaints Register for 2023 / 2024 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 2024. A copy of the minutes can be found in Appendix 5 of this report.

## 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'. Armourguard 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 2023 / 2024 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'**.

**'Air Odour Resource Consent Monitoring Checksheet – RMF 008'** pdf files for the review period sent to Horizons via USB flash drive.

**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. Refer Appendix 4 for the KupeTech Action List - 2024.

**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.

**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** | | | | | | | | | | | |
| 115194/1 | Viscera Table | N/A | N/A | N/A | N/A | 86.0 | 86.0 | 0.0 | ✓ | CW | 26/04/24 |
| 304724 | Brisket Cutter | N/A | N/A | N/A | N/A | 88.0 | 88.0 | 0.0 | ✓ | CW | 26/04/24 |
| 326979 | Auto-hock Cutter | | | | N/A | 84.0 | 84.0 | 0.0 | ✓ | CW | 26/04/24 |
| 3059223 | Thumb Tool (West) | N/A | N/A | N/A | N/A | 82.0 | 82.0 | 0.0 | ✓ | CW | 26/04/24 |
| 301074 | Thumb Tool (East) | N/A | N/A | N/A | N/A | 82.0 | 82.0 | 0.0 | ✓ | CW | 26/04/24 |
| | Hot Water Wash | *Hot Water Wash currently not in use. Carcases washed using cold water* | | | | | | | | | |
| **RENDERING PLANT – (Hand-wash Water Temperature)** | | | | | | | | | | | |
| 304724 | Dryer Condenser | 40.0 / 41.0 | | | | | | | ✓ | CW | 30/04/24 |
| 300739 | Odour Condensate | 40.0/ 41.0 | | | | | | | ✓ | CW | 30/04/24 |
| 304724 | Dryer Condensate | 42.0 / 42.0 | | | | | | | ✓ | CW | 30/04/24 |
| 300739 | Odour Condenser | 42.0 / 42.0 | | | | | | | ✓ | CW | 30/04/24 |
| E006481 | Rendering | Yokogawa | ✓ | N/A | *30/04/24* | 42.0 | 42.0 | 0.0 | ✓ | CW | 30/04/24 |
| 301074 | Dry-side Inlet Duct | 42.0 / 42.0 | | | | HRT 1 | | | ✓ | CW | 30/04/24 |
| 301074 | Dry-side Outlet Duct | 42.0 / 42.0 | | | | HRT 2 | | | ✓ | CW | 30/04/24 |
| 304724 | Westside Cooling Tower Outlet | 40.0 / 41.0 | | | | | | | ✓ | CW | 30/04/24 |

**NOTE:-**
1. Fixed Plant thermometers are replaced if they require an adjustment which is greater than 2 degC.
2. Fixed thermometers associated with the Rendering Department are to be calibrated in hand-wash water only.
3. All non-conforming thermometers are to be replaced with new thermometers.

# APPENDIX 1 –

# Complaints Register and Trending

**Complaints Register:-**

# ODOUR COMPLAINTS REGISTER 2023 - 2024

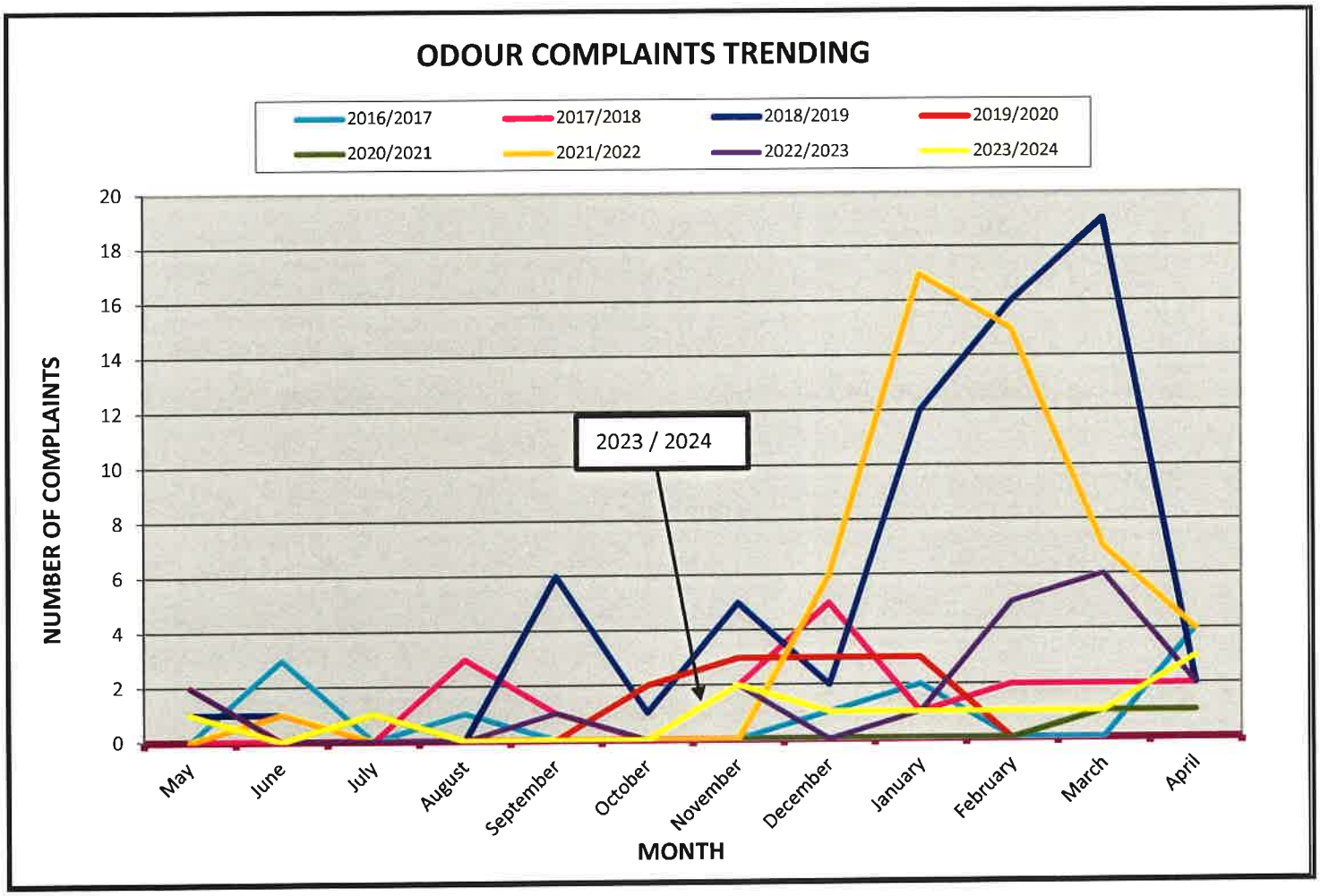
**(Period from the 1st of May 2023 to 30th of April 2024)**

| Nº | NAME | ADDRESS | DATE | TIME REPORTED | TIME OF INVESTIGATION | COMMENTS | SUBSTANTIATED (Ours) | UNSUBSTANTIATED |
|---|---|---|---|---|---|---|---|---|
| 1 | Horizons contacted odour phone. | Complainants address not given | 27.05.22 | 16:02 | 16:25 | No address given only that the complainant was calling from the western side of the Rendering Plant. Odour unsubstantiated. | | ✓ |
| 2 | Not known | 88 Koromiko Road | 26.07.23 | 15:04 | 15:15 | Received a phone call from a resident at 88 Koromiko Road regarding an odour complaint. Said it had been happening for days on end. Had a lengthy discussion with the complainant during the FIDOL assessment. | | ✓ |
| 3 | Jessica Smith | 5 Gunn Street | 08.11.23 | 18:55 | 19:16 | Received a phone call on AFFCO Odour phone from Jessica Smith at 18:55 - 5 Gunn Street. She stated that odours could be detected from 15:00 onwards. Odours were rated as strong. | ✓ | |
| 4 | Jessica Smith | 5 Gunn Street | 11.11.23 | 16:40 | 17:18 | Received a phone call on AFFCO Odour phone from Jessica Smith at 16:40 - 5 Gunn Street. She stated that odours were coming from Imlay. Amourguard detected some slight odours however the Imlay Rendering Plant was not operating. | | ✓ |

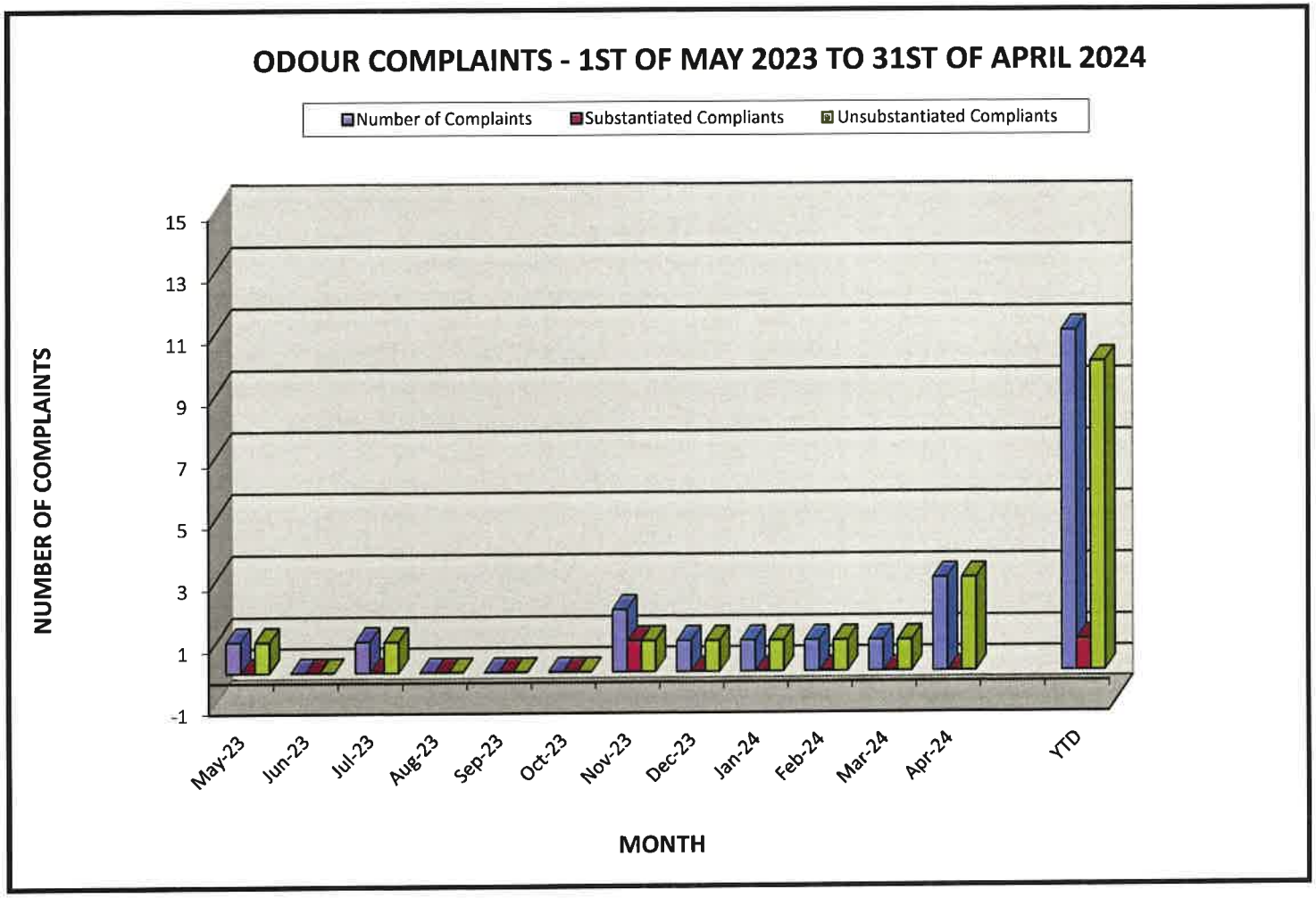
| Nº | NAME | ADDRESS | DATE | TIME REPORTED | TIME OF INVESTIGATION | COMMENTS | SUBSTANTIATED (Ours) | UNSUBSTANTIATED |
|---|---|---|---|---|---|---|---|---|
| 5 | Iona Soulsby | 1A Kings Ave | 09.12.23 | 11:10 | 12:10 | Received a phone call on AFFCO Odour phone at 11:10 - 1A Kings Ave. Imlay Rendering Plant was not operating. Armourguard FIDOL assessment stated that it wasn't an AFFCO odour. Most likely from Open Country. | | ✓ |
| 6 | Ronald Thomas | 33a Bignell Street | 17.01.24 | 16:16 | 18:02 | Received a call at 16:16 on the AFFCO Odour phone. Armourguard contacted immediately but were on a call out hence the delay in the time the odour complaint was investigated. Odours were described as 'aged offal' | | ✓ |
| 7 | Reuben Davis | 51 Balgownie Ave | 07.02.24 | 17:30 | 21:24 | Received a call from Horizons at 20:50 regarding an odour complaint lodged at 20:28 from a resident at 51 Balgownie Ave. Odour described as 'burnt bones'. Armourguard contacted. Armourguard FIDOL assessment stated that it wasn't an AFFCO odour at the time of their assessment. This was also backed up by Imlay's FIDOL investigation. Conclusion is that the odour was coming from industries west of the Plant. Odour unsubstantiated. | | ✓ |
| 8 | Christina Ivar | 10 Prince Street | 30.03.24 | 13:26 | 14:45 | Complainant rang odour phone at 13:26. Imlay Security Guard contacted Armourguard. Armourguard performed a FIDOL assessment at 14:45 (time delay due to call-out duties). No odours detected. Imlay Rendering Plant was not operating at time of complaint. | | ✓ |
| 9 | Not known | 31 Kings Ave | 01.04.24 | 18:56 | 19:15 | Complainant rang odour phone at 18:56. Imlay Security Guard contacted Armourguard. Armourguard performed a FIDOL assessment at 19:15. Faint smell detected. Not an Imlay odour. Imlay Rendering Plant was not operating at time of complaint. | | ✓ |

| Nº | NAME | ADDRESS | DATE | TIME REPORTED | TIME OF INVESTIGATION | COMMENTS | SUBSTANTIATED (Ours) | UNSUBSTANTIATED |
|---|---|---|---|---|---|---|---|---|
| 10 | JH Roofing Ltd | 31 Kings Ave | 08.04.24 | 13:55 | 14:06 | Complainant (roofers) stated that an odour had been present since 13:30. Armourguard contacted. FIDOL assessments carried out. Both Armourguard and AFFCO reps were in agreeance that the odour was an Open Country odour not Imlay Rendering Plant. | | ✓ |
| 11 | Not known | 31 Kings Ave | 21.04.24 | 22:12 | 22:12 | Complainant rang odour phone at 21:14. Imlay Security Guard contacted Armourguard at 21:15. Armourguard performed a FIDOL assessment at 22:12. Slight animal smell detected. Imlay Rendering Plant was not operating at time of complaint. | | ✓ |

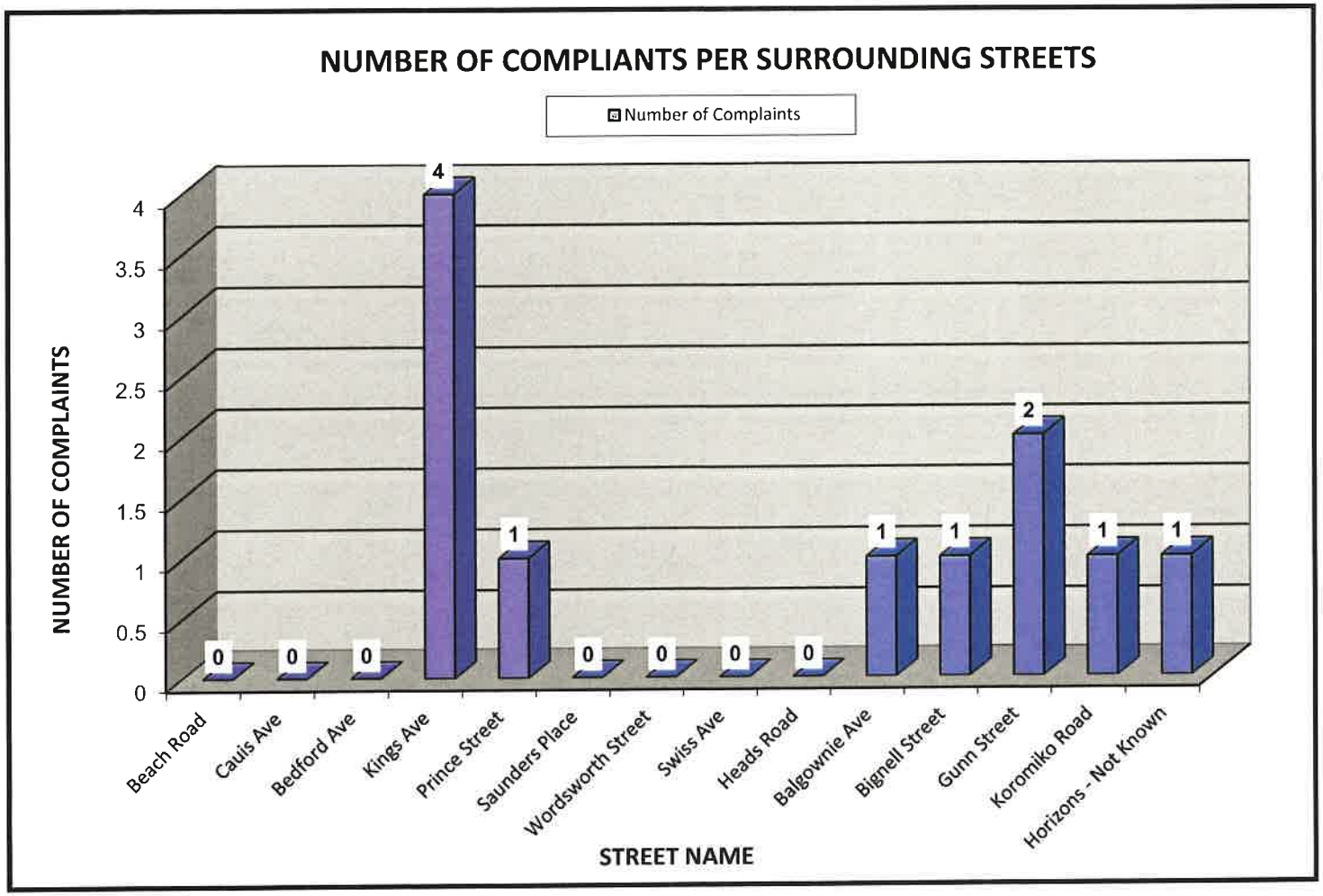
**Odour Complaint Trending History to Date:-**



**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



DATE:- 14 CS 23

ASSESSORS NAME:- Leonard Matapuku

REASON FOR INVESTIGATION:- (✓ applicable)

COMPLAINT [ ]

ODOUR SURVEY [✓]

INITIAL IMPRESSIONS:-

TIME OF INITIAL IMPRESSION:- 14 33

ODOUR INTENSITY:-

CHARACTER:-

GENERAL HEDONIC TONE:-

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 | |

| | | 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 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

RMF 001

ISSUE DATE:- March 2018

# ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)



DATE:- 20/6/23

ASSESSORS NAME:- Tash Whittleston

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:- 1117

| | | Intensity | Character/notes |
|---|---|---|---|
| 1st min | 0 | 0 | |
| Gownie Ave | 10 | 0 | |
| | 20 | 0 | |
| | 30 | 0 | |
| | 40 | 0 | |
| | 50 | 0 | |
| 2nd min | 0 | 0 | |
| Wordsworth St | 10 | 0 | |
| | 20 | 0 | |
| | 30 | 0 | |
| | 40 | 0 | |
| | 50 | 0 | |
| 3rd min | 0 | 0 | |
| Kings Ave outside 33 | 10 | 0 | |
| | 20 | 0 | |
| | 30 | 0 | |
| | 40 | 0 | |
| | 50 | 0 | |
| 4th min | 0 | 0 | |
| Bignell St outside #13 | 10 | 0 | |
| | 20 | 0 | |
| | 30 | 0 | |
| | 40 | 0 | |
| | 50 | 0 | |
| 5th min | 0 | 0 | |
| Bignell St outside campgrounds | 10 | 0 | |
| | 20 | 0 | |
| | 30 | 0 | |
| | 40 | 0 | |
| | 50 | 0 | |

| | | Intensity | Character/notes |
|---|---|---|---|
| 6th min | 0 | 0 | |
| Corner of Heads Rd & Hope St | 10 | 0 | |
| | 20 | 0 | |
| | 30 | 0 | |
| | 40 | 0 | |
| | 50 | 0 | |
| 7th min | 0 | 0 | |
| Corner of Heads Rd & Gunns Rd | 10 | 0 | |
| | 20 | 0 | |
| | 30 | 0 | |
| | 40 | 0 | |
| | 50 | 0 | |
| 8th min | 0 | 0 | |
| Corner of Beach Rd & Imlay St | 10 | 0 | |
| | 20 | 0 | |
| | 30 | 0 | |
| | 40 | 0 | |
| | 50 | 0 | |
| 9th min | 0 | 2 | |
| Back of Affco on Kaaroo Rd | 10 | 1 | |
| | 20 | 2 | |
| | 30 | 0 | |
| | 40 | 1 | |
| | 50 | 2 | |
| 10th min | 0 | 0 | |
| Leamington St outside #10 | 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:-* Fine clear day, No wind

5

AFFCO IMLAY

ISSUE DATE:- March 2018

# ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001



DATE:- 19 07 23

ASSESSORS NAME:- Leonard MoTapuky

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:- 8 00

| | | 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:- |
| 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 2018

# ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001 | 

DATE:- 22/8/23 | ASSESSORS NAME:- Dayne 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:- 10 30

| | | 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:- |
| 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 2018

# ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001



DATE:- 21/9/23

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:- 1120

| | | 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:- |
| 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:-*

ISSUE DATE:- March

# ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001 Page

DATE:- 17/10/23 ASSESSORS NAME:- Wayne Wotton

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:- 1100

| | | 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:- |
| 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:-*

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# ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)



DATE:- 17/11/23

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:- 1100

| | | 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:-

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 2018

# ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001 | 

DATE:- 19/12/23 | ASSESSORS NAME:- Tash Whitleston

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:- 1010

| | | 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 | 1 | |
| | 10 | 1 | |
| | 20 | 0 | |
| | 30 | 0 | |
| | 40 | 0 | |
| | 50 | 0 | |
| 5th min | 0 | 1 | |
| | 10 | 2 | |
| | 20 | 1 | |
| | 30 | 1 | |
| | 40 | 2 | |
| | 50 | 1 | |

| | | Intensity | Character/notes |
|---|---|---|---|
| 6th min | 0 | 0 | |
| | 10 | 0 | |
| | 20 | 0 | |
| | 30 | 0 | |
| | 40 | 0 | |
| | 50 | 0 | |
| 7th min | 0 | 1 | |
| | 10 | 1 | |
| | 20 | 0 | |
| | 30 | 1 | |
| | 40 | 1 | |
| | 50 | 1 | |
| 8th min | 0 | 1 | |
| | 10 | 2 | |
| | 20 | 1 | |
| | 30 | 1 | |
| | 40 | 2 | |
| | 50 | 1 | |
| 9th min | 0 | 1 | |
| | 10 | 0 | |
| | 20 | 0 | |
| | 30 | 0 | |
| | 40 | 0 | |
| | 50 | 1 | |
| 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:-*
Odour detected is possibly from open country

AFFCO IMLAY — ISSUE DATE:- March 2018

# ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

RMF 001 — 

DATE:- 19/1/24 — 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:- 1024

| | | 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 | 2 | |
| | 10 | 2 | |
| | 20 | 1 | |
| | 30 | 1 | |
| | 40 | 1 | |
| | 50 | 2 | |

| | | 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 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



DATE:- 21/2/24

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:- 1119

| | | 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:- | |
| 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

RMF 001

# ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)

ISSUE DATE:- March 2018



DATE:- 19/03/24

ASSESSORS NAME:- Tash Whittleston

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:- 1047

| | | Intensity | Character/notes |
|---|---|---|---|
| 1st min | 0 | 1 | |
| | 10 | 1 | |
| | 20 | 0 | |
| | 30 | 1 | |
| | 40 | 1 | |
| | 50 | 0 | |
| 2nd min | 0 | 0 | |
| | 10 | 0 | |
| | 20 | 0 | |
| | 30 | 1 | |
| | 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 | 2 | |
| | 10 | 1 | |
| | 20 | 2 | |
| | 30 | 2 | |
| | 40 | 2 | |
| | 50 | 2 | |
| 7th min | 0 | 1 | |
| | 10 | 0 | |
| | 20 | 0 | |
| | 30 | 0 | |
| | 40 | 0 | |
| | 50 | 0 | |
| 8th min | 0 | 1 | |
| | 10 | 1 | |
| | 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 | 1 | |
| | 10 | 0 | |
| | 20 | 0 | |
| | 30 | 0 | |
| | 40 | 1 | |
| | 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:-*

* Initial Impression as I drove through Intersection smelled like the milk powder Plant However, the rest of the time all I could smell was stock effluent

ISSUE DATE:- Mar 2018

# ODOUR MEASUREMENT RECORD SHEET (FIDOL SYSTEM)



DATE:- 18/4/24

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:- 1515

| | | 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 | 1 | |
| | 10 | 2 | |
| | 20 | 3 | |
| | 30 | 3 | |
| | 40 | 2 | |
| | 50 | 2 | |

| | | 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 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:-* Back of Affco Strong Smell

# APPENDIX 3 –

# KupeTech Annual Report - 2024

# AFFCO Imlay Whanganui Rendering Plant

## Audit of Odour Control Systems

### AFFCO New Zealand Ltd

Reference: A235623

Revision: 2

2024-06-10

KupeTech

# Document Control Record

Document prepared by:

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## Document Control

| | |
|---|---|
| **Report Title** | Biofilter Inspection |
| **Project Number** | A235623 |
| **File Path** | E:\Kupe\AFFCO\235623 2024 Inspection Report Rev 2 |
| **Client** | AFFCO New Zealand Ltd |
| **Client Contact** | Ricky Gowan |
| | |

| Rev | Date | Rev Details | Author | Reviewer | Approver |
|---|---|---|---|---|---|
| 0 | 7 Jun 2024 | | J Vickerman<br>Mech Engineer | | J Vickerman<br>Director |
| 1 | 10 Jun 2024 | Review | J Vickerman<br>Mech Engineer | B McHardy<br>Process Engineer | J Vickerman<br>Director |
| 2 | 10 Jun 2024 | Correction | J Vickerman<br>Mech Engineer | B McHardy<br>Process Engineer | J Vickerman<br>Director |
| | | | | | |
| | | | | | |
| | | | | | |

| Approval | | | |
|---|---|---|---|
| Author signature | JVickerman | Approver signature | JVickerman |
| Name | J Vickerman | Name | J Vickerman |

# Contents



# Appendix

**Imlay Rendering Plant Biofilter Systems Inspection**

This report summarises the results from inspection of the Rendering Plant odour extraction and biofilter systems at the Imlay meat processing works on 25 and 27 March, 9 April and 1 May 2024. The report also includes some data from work carried out on 27 and 29 November 2023.

## 1. Background

Under the 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. [Manawatu Whanganui Regional Council].*
>
> *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.

## 2. Recent Inspections

The most recent visits to Imlay prior to 27 November 2023 were on 28 February, 7 and 14 March 2023. This was reported on 11 April 2023 with minor Revisions 1 and 2 being issued on 14 April and 11 May 2023.

## 3. Figures and Tables in the Appendix

In Figures 1, 2 and 3 numbers in balloons have been given for identification of the extraction point locations referred to in this report. Note that the same equipment items may have a different number to earlier reports.

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

Figure 2 provides a schematic of the dry area point source extractions.

Figure 3 provides a schematic of the outdoor dry area, outdoor wet area and outdoor drier air extraction systems feeding the biofilters. Typical air flows (A) ranging from 1,000 to 30,000 $m^3/h$, static pressures measured in Pascals (Pa) and temperatures measured in degrees centigrade (°C) are given in a few locations. Tags for some instruments in the DCS / SCADA system are also given for reporting reference.

Fig 4a provides a diagram of the bed pressure test port locations on the uncovered biofilter.

Fig 4b provides a key for symbols used in Figs 1 to 3.

Fig 5 provides velocity measuring port detail which is needed for some items in Tables 6 and 7 (below).

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 Area to Uncovered Biofilter in Fig 3.

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

Table 4 in the Appendix gives a snapshot of the building internal temperatures and humidity.

Table 5 in the Appendix provides an overview of historical measured data since 2019 for comparison. Earlier data does exist, but process equipment changes have occurred over the years so comparison may not be comparing like for like. Biofilter media has changed, a waste-heat evaporator was introduced into the drier extracted airstream, the covered biofilter fan was changed, and from 2019, biofilter airflow measuring instrument and locations have changed to be compliant with ISO 10780.

Table 6 lists the vacuum monitoring ports in the RMF008 monitoring check sheet together with specific comment relating to each port and how monitoring could be improved.

Table 7 has the list of issues for improvement or corrective action from the 2023 report with further comment and added items arising from this report.

## 4. System Description

With reference to the Figure 1 Wet Area point source extractions:

a) Air in the factory Wet Area is drawn into air extraction ducting at locations where process equipment is known to emit adverse 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). Further ports used in the annual measurement have also been numbered. An "f" suffix after the number indicates it is an airflow measuring port as in Fig 5. Other ports of or larger than a 15mm BSP thread socket (BS21 Rp or ISO 7/1 Rp) may also be used for flow measurement. A 't' suffix indicates above a slide valve; 'b' below a slide valve; 'n' north; 's' south; 'e' east; and 'w' west.

b) Air is also extracted from the driers feed conveyor head space and the driers discharge conveyor headspace in the Dry Area.

With reference to the Figure 2 Dry Area point source extractions:

c) Factory air from the Dry Area is extracted at the Air Intake Louvre which had earlier been called the "Dust Filter" but is merely a coarse screen covering flow control louvres. The extraction duct also collects head space air from the Ground and Unground Meal Bins along the way before exiting the building and combining outside with reception bin air before entering the scrubber as shown in Fig 3.

d) Vapour from the driers is conveyed in a separate line to the trash vessel outside as shown in Fig 3. Although the extracted vapours are at slightly less than atmospheric pressure, they are typically around 110°C.

With reference to Figure 3 outdoor biofilter systems:

e) Dry Area air passes through a packed bed spray tower (Dry Area Air Scrubber) to a common induced draught fan 14.1 which discharges into the uncovered biofilter. The primary function of the spray tower is to remove dust particles and protect the biofilter from clogging and cool and humidify the Dry Area air. Air extraction from the outside raw material reception bin (point source 1); the underground conveyor stairwell; and the feed conveyor (point source 21) is also combined with the inflow to the scrubber.

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

g) Wet Area air and vapour is cooled in the heat exchangers HX1, HX2 and HX3, with some water removal. The Wet Area gas then passes to the common 14.1 fan which discharges into the uncovered biofilter.

h) Drier gas and vapour pass 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 extracted from the evaporator by the 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. After cooling and water removal the Drier gas passes to fan 9.3 and then discharges to the covered biofilter.

## 5. Process Measurements

The biofilter gas and vapour systems temperatures, pressures and gas velocities were measured by a calibrated thermocouple (or in some cases a calibrated Pt-100 thermal sensor), a differential pressure meter (Kane 3500-1), a water manometer, an ISO10780 compliant pitot tube and a micro-anemometer (Schiltknecht MiniAir20 Micro) by removing plugs and inserting instruments at:

- Two 32 NB measurement ports (27) located 33m downstream from fan 9.3 (Fig 3).
- The gas ductwork inlet to the Dry Area Air scrubber (26) at a temperature gauge port adjacent instrument HRT1 (Fig 3).
- The gas ductwork outlet from the scrubber measured at the thermometer port (28) beside HRT2 upstream of the flow restricting louvre adjacent the 14.1 fan (Fig 3).
- The gas outlet ductwork from Wet Area Heat Exchangers HX1, HX2 and HX3 (24), prior to the connection with ductwork from the Dry Process scrubber and prior to the 14.1 fan (Fig 3).
- The gas outlet duct from the 14.1 fan at two 50 NB ports (25) 13m downstream of the fan (Fig 3).
- Static pressure measurements made at five locations around the uncovered biofilter distributor ducting ends as shown in Fig 4a, (E, F, G, H, J).
- Temperature and pH measurement of the biofilter media in samples taken from the quadrants at 150 mm depth.
- Flow measurement ports in the reception bin and feed conveyor air extraction ducting (22, 21,1 Fig 3) and the ground raw material bin (2, Fig 1).

- In-duct velocity measurements to determine flowrate have also been made at the preheater (3), squeeze press feed conveyor (7b), squeeze press (8, 8s,8t), press solids–decanter solids conveyor (8c-12e, 12, 12w), separator and decanter feed tanks air extraction ducting (14, 14e, 14w), drier feed conveyor (11), and drier discharge conveyor (16) in (Fig 1). Static pressure (vacuum) measurements were made at most of these locations in the current inspection together with air velocity measurements as set out in Table 3.

In some cases where flow measuring ports were not available, air flow through screens into the equipment was measured e.g., dry area air intake louvre (30, Fig 1), ground raw material bin (Fig 2) hatch and reception conveyor stairwell (part of 1 in Fig 3).

## 6. Comments on Flowrates, Pressure and Temperatures

Tables 1 to 3 give the results of velocity, flowrate and temperature measurements taken on 25 and 27 March 2024, 9 April 2024 and 1 May 2024 which were characterised by warm temperatures with moderate north-west to west winds.

From the data in Tables 1 and 2:

### 6.1 Covered Biofilter Airflow

The air flow to the covered biofilter was found to be 1270 - 1400 $m^3/h$ or 1.5 – 1.7 tonnes/hour (tph) with an average of 1350 $m^3/h$. This airflow is slightly more than that found last year but is still within the range seen over the last four years.

Following installation of the evaporator in 2015 - 2016 the flow to the covered biofilter from fan 9.3 was reduced (to limit drier vapour vacuum at the evaporator to 200 Pa) to aid evaporator operation. The fan 9.3 was then also replaced with one having different flow characteristics. Hence the biofilter is still operating well within its original design capability.

Both driers were operating for at least 30h prior to the testing except for 23 March where the plant had been shut over the weekend and restarted 8h earlier. The drier vapour duct vacuum at point 33 (Fig 2) was found to be 9 Pa. Measurement was made directly at the duct port and the fitting checked to be clear. This is lower than previous years but both driers appeared to be operating well and no puffing was seen.

### 6.2 Uncovered Biofilter Airflow

The air flow to the uncovered biofilter was measured to be 29,600 – 30,400 $m^3/h$ or 34 – 35 tph with an average of 30,000 $m^3/h$.

The measured airflow is a little below the recommended guideline of Table 4 in the Air Discharge Consent application.

As has been observed in the past there was some variation in the air flow to the biofilter. Likely causes of the variation are opening/closing of the reception bin cover and varying bursts of heated vapour (mainly steam) pushed into the extracted air in different parts of the process such as at the preheater and separators.

From Figure 3 and Table 2 it can be seen that a total flow of 28,340 $m^3/h$ (based on the sum of the separately measured streams) is made up of 11,960 $m^3/h$ wet area air and vapour and 16,380 $m^3/h$ dry area air (32.8 tph made up of 13.4 tph of wet area air and vapour and 19.5 tph of Dry Area Air). Of the dry area air: 6,590 $m^3/h$ comes from the reception bin and feed conveyor; 9,790 $m^3/h$ comes from the dry area air intake (30 Fig 2); and 400 – 700 $m^3/h$ comes from the ground meal bin (31) and the the unground meal bin (30).

The measured air flow from the scrubber to the uncovered biofilter is slightly lower than what would be expected from the measured inflow but does reflect the effect of cooling of the airstream. The dry area airflow is slightly lower than that measured in 2020 to 2023.

Measurement of air flow into the scrubber in Table 2 (F) has had a degree of uncertainty in the past due to measurement having to be made crosswise at the inlet bend. Close upstream to the bend is a tee where air from the reception bin and feed conveyor enters the dry area duct off-centre likely causing turbulent (swirling) flow in this part of the duct. As the ISO 10780 L-type pitot tube has the static pressure measuring ports at a different location to the nose – the static pressure ports may be getting some velocity head from the turbulence, potentially giving a slightly lower static vacuum than is the case.

The wet area vapour flow is similar to what it was in 2020, 2021 and 2023. Beneficial changes to enhance odour containment within the wet area have been made in the last few years such as closure of the press side doors, closure of the decanter feed tank 2.11 extraction duct, closure of the drainer conveyor hatch and closure of the separator feed tank 2.15 ducting. These changes will have reduced the wet area flow but increased the vacuum within the processing equipment.

Extraction flows from the preheater; the decanter feed tank and the separator feed tank are important to be balanced – not too much heat removal and not too little air extraction.

### 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 separately reported on the biofilter moisture content and pH. As commented in earlier reports some of the results have been quite variable and this is believed due to variation in sampling and variation within the bed. As part of the audit an independent check of the media moisture content and pH was made. Results are given in Tables 1 and 2. On 25 March 2024 five separate samples were taken at random locations from different quadrants and middle of the uncovered biofilter, and four separate samples from the covered biofilter. Particular care was taken to ensure surface dry bark was scooped clear and then each sample was gathered from 150 mm depth relative to the un-scooped surface and sealed in a snap lock bag. Multiple moisture and pH tests were then made on the gathered samples.

The pH results obtained from the 25 March 2024 sampling of the covered biofilter media were lower than expected, hence the testing was repeated on 1 May 2024 with samples taken more centrally within each quadrant. This confirmed the earlier low values and is consistent with the AFFCO results for March and May. It is noted that AFFCO had a pH 5.50 result in April consistent with what was found in the south-east quadrant on 25 March.

It is noted that all of the moisture test results (Table 1, C) were within the recommended moisture range and consistent with each other.

Similar to previous years with the pH testing, getting enough smaller particulate material aside from large pieces of bark was not easy, so double the sample size and water was used i.e., 20g sub-samples taken and mixed with 100g of demin water, stirred for 60s and allowed to settle. The clarified water was then transferred to test tubes, allowed to further settle (giving around 3h total settling time), then the pH was measured. This gave good depth for electrode insertion for pH measurement with consistent stable results.

No traces of ammonia were sensed at the covered biolfilter unlike last year. The pH of the media in both biofilters has become more acid since last year and the covered biofilter media pH must now be close to the limit for effective operation. Having said that, the threshold for sensing covered biofilter odour in odour assessments ranged from 2m to 35m downwind, so it is still functioning as it should.

The air loading on the covered biofilter of 11 $m^3/h$ of air per $m^3$ of media is well below the Consent Application Table 4 guideline maximum of 35 $m^3/h$ of air per $m^3$ for soil-bark beds.

In mid-2020 the media depth was increased to around 0.65 m with new soil-bark. A depth gauge has long existed in the centre of the biofilter but appears to indicate a minimum depth of bed where the base level is varying rather than an average depth. Last year a depth of 0.42 m was taken for the loading calculation which was too conservative. The average depth was reassessed at 0.6 m and this was used in the loading calculation. The bed pressure drop was found to be 14 Pa, which is about the same as last year.

Temperatures in the bed at 200mm depth ranged between 23 and 26°C. Examination of the SCADA record for temperature upstream of the biofilter generally shows good control. In Table 1, C, the temperature distribution indicates that the air is evenly distributed throughout the bed.

The following points are noted:

a) When the biofilter was built the airflow was three times what it is now. Later installation of the evaporator reduced the biofilter loading (from around 30 to around 10 $m^3$ air/h per $m^3$ of media which is the current value).

b) Compared to many other biofilters, the AFFCO Imlay biofilters have a large surface area for the treated airflow (6 $m^3$/h air per $m^2$ of covered biofilter surface and 23 $m^3$/h per $m^2$ of uncovered biofilter surface – others are known in the range 60 to 90 but this has not adversely affected their efficiency).

c) Bed pressure drop is primarily determined by bed cross-section area (depth to a lesser extent) hence the AFFCO biofilters have low pressure drop compared with many others.

The covered biofilter is within its design and operating parameters. Some break down of bark is evident by an apparent increase in fines. The size distribution could be checked by analysis and improved by screening to reduce the fines, but pressure drop due to fines does not seem to be an issue. Attempts in the past to increase bed pH in the past have not worked well. If the low pH remains or falls further, bark replacement is needed. The air distribution laterals need to be checked and replaced if found clogged with fat.

### 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 audit check testing, the moisture content measurements in the uncovered biofilter ranged from 62 to 64% moisture w/w wet basis. All test results have been within the 50 to 65% guideline.

Temperatures measured in the bed ranged from 19°C to 22°C on 25 March 2024. These were slightly lower than expected. Further measurement on 1 May 2024 gave 23°C to 29°C which was more normal. All temperatures met the consent guidelines. Generally, the distribution is good. Examination of the SCADA data shows that air going to the biofilter has been steady and well controlled.

Following the 2020 report the depth of bark media in the uncovered biofilter bed was increased with addition of new bark to give a depth around 0.7m. This has sunk a little to around 0.65m. The average measured flowrate of 30,010 $m^3$/h air gives a current biofilter loading of 36 $m^3$/h of air per $m^3$ of media. There are no concerns with this current volumetric loading, particularly as a quarter of the flow is relatively clean air drawn from the raw material reception bin and given that the cross-section loading is low.

The media pH in quadrant samples and centre, all taken at 100 - 150mm depth, were found to range between 4.9 and 5.6 and the average is slightly lower than last year. As discussed in 6.3 above the use of 20g sub-samples mixed with 100g of demin water gave stable repeatable results with the membrane pH meter. The bed pH is getting close to the low point of the recommended guideline value but in several odour surveys, no evidence of wet-side odour could be sensed downwind or at any location on the bed surface.

The air static pressure at the test point downstream of the 14.1 fan is slightly less than last year at an average of 307 Pa. This is likely due to a slight break down of the bark and for slightly less flow.

Bed pressure drop at the four biofilter manometer points E, F, G, J (Table 2, identified in Fig 4a) ranged from 22 to 37 Pa which is similar to last year and is still low compared to many biofilters. In 2017 when all the biofilter media was replaced two vent tubes K and L were installed, apparently to indicate when bed pressure drop gets too high by venting air. There was no observable flow from these and when sealed off the respective pressures at the vent tube ports were 20 and 22 Pa.

## 7. Point Source Extraction System (PSES)

The point source extraction system (PSES) is a widely accepted effective energy efficient 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 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 uncovered biofilter was found to be around 30,010 $m^3/h$. 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 recommended point source design flows was 17,450 $m^3/h$ which is well below the total air flow to the biofilter.

The optimal operating air flowrate for each point source extraction is determined by the minimum required to contain the process emission and this should be below the recommended design flow. Too much hot air extracted is unnecessary energy lost but also fine solids and fat aerosols from the material being processed can be carried into the ducting and eventually cause a blockage.

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.

The application made for the current discharge consent included a guideline for effective working of the PSES which was maintaining a minimum vacuum of 100 Pa g at ducting connections to equipment. Based on this, AFFCO developed the Air Odour Resource Consent Monitoring Checksheet RMF 008 where in Section 1 fourteen wet area odour extraction monitoring points were adopted to achieve a target of ≥ 100 Pa vacuum in order to comply with Consent Conditions 18a; 19a; 19c. Similarly, in Section 2 for five Dry Area monitoring points.

Fig 1 illustrates the location of the wet area points and includes two dry area points because they are connected to the wet area extraction manifold duct. Fig 2 illustrates the dry area monitoring points. Note some of the 20 and 30 series numbers do not exist on the RMF 008 check sheet but have been provided for identification of points in this report. As in Table 3 the 15 RMF 008 wet area monitoring points are identified but more numbers are given in Fig 1 corresponding to installed ports or other measurement locations.

Following ongoing difficulties in getting the monitoring working well an offer was made to review the RMF 008 in the 2023 report. The review was issued on 14 November 2023.

A range of specific improvements for monitoring were suggested. Many have already been implemented by AFFCO.

In effective PSES odour containment, it is primarily the momentum of inward flowing air at all equipment openings that provides a barrier to odour getting out into the factory ambient air. Hence while attempting to meet the consent requirements as much as practicably possible, attention has

been given to ensuring that all openings in processing equipment, large and small, have a measurable inward air velocity at openings.

The inward air velocity at openings can vary widely depending on the area of the openings into the equipment relative to the extraction duct size; the configuration of the manifolds or main ducting the extraction ducts are connected to; and the length of ducting to the fan creating the vacuum. For example, the wet area north manifold has around 480 Pa vacuum at its end whereas the south manifold only has around 40 Pa vacuum near the ground raw material bin. Each connection to the extraction system requires separate consideration based on what is needed to provide inward moving air at the openings into the equipment.

Once flowrates are determined or set according to a guideline such as the recommended design flows referred to in consent condition 5 (a)(iii)(1) but modified up or down according to the inward velocity need at equipment openings, the static pressure at appropriate vacuum monitoring locations can then be measured and regularly recorded in the RMF008 monitoring.

Previous reports have covered issues with various monitoring points and a mix of actions arising from them and the conflicting consent conditions has created uncertainty where things stand. Table 3 provides a list of vacuum measurements with measured flowrates at ports now believed to be used in the RMF008 monitoring with notes where appropriate. To clarify port locations, Table 6 has been provided with detailed notes about each port with reference to photos. Some ports at new locations are already being used in the monitoring while others are yet to be provided. The ports yet to be provided have also been added to the Action List in Table 7.

**Points relating to current operation of the PSES:**

- the Imlay LTRP is predominantly achieving effective point source extraction. The odour producing processing steps are carried out in equipment built to draw in surrounding air which is then drawn through the extraction system ducting and discharged through the biofilter.
- Material (offal and bone) received for processing is being processed as soon as possible while fresh, to minimise odour production.
- Ongoing steps are being taken to further enclose the processing equipment and adjust airflows for more effective extraction wherever possible.
- In Table 6 vacuum measurement ports that are prone to blockage, are being relocated to a simple 6.5 mm diameter hole in the head space wall of the equipment targeted e.g., conveyor top plate or chamber wall at an accessible location. The Ø6.5 mm hole has been chosen to suit three types of vacuum measuring tube and is easily cleared upon any sign of blockage.
- The Imlay Odour Management Plan (OMP) along with SCADA recorded data and the Consent Monitoring Checksheet RMF 008 is comprehensive and has been revised for more effective monitoring and to record compliance.
- Ongoing progress has been made in quantifying air flowrates in ducts and the expected associated vacuums. When an issue is developing e.g., clogging of media or duct blockage, knowing what is not normal can be helpful in identifying problems. While the point source monitoring target of ≥100 Pa vacuum in the Checksheet was originally imposed by the consent conditions to ensure compliance, in many cases this degree of vacuum is not achievable with the existing ducting and equipment. In some cases, it would draw too much air and cause problems such as entrainment of solids into the air stream such as that from the unground and ground meal bins. As seen in Table 3 with ports 14, 14e and 14w, there can also be a big difference between vacuum in the equipment headspace and vacuum downstream of a slide valve. The key objective is to measure and record what is observed without concern for whether the vacuum is too low as the most important criteria is whether the adverse odour is being captured by the extraction system.

- Having observed rendering processing at Imlay for approaching two decades, the ongoing effort of the current leadership and operators' teamwork to eliminate or minimise the adverse odours in what is a difficult working environment, has to be acknowledged. The rendering processing has its complexities but fulfils an essential task for the society in which we live.

## 8. Independent downwind odour assessment

The first odour assessment was made mid-morning on 25 March 2024 soon after first entry to the site. It was a fine mainly blue-sky around 18°C with moderate NW wind. The rendering plant inside and outside was remarkably clean, even in areas where localised odour is normally expected. The plant had been shut down over the weekend and it was understood that a special effort to clean up the previous week had been made. The only odour to note was within 2m downwind of the covered biofilter and immediately beside the wastewater well near the milliscreen.

A further odour assessment was made mid-morning on 9 April 2024. The wind was moderate from the north. Traverses were made north and south of the biofilters, along the lane between the rendering plant and the biofilters, through the reception bin area, around the building east side, around the slaughter ramp area and to the southern boundary fence, along to the wastewater discharge wells, then up the road to the west gate. At no time was any distinctive rendering plant odour sensed at the Imlay site boundaries. The only adverse odour sensed was very localised:

a) The covered biofilter distinctive cooked meal odour was able to be sensed up to 35 m downwind i.e. to the southwest. An assessment of Intensity and Hedonic tone at the biofilter rated it I = 1; H = -1. The covered biofilter sump was well sealed with only the faintest hint of leakage.
b) Ovine urine/faecal odour was sensed coming from liquor in the Save-All and the wastewater discharge well to the west. In contrast the solids from the rotary screen into the open top skip had no distinct odour.
c) No trace of any wet area odour could be sensed anywhere around the uncovered biofilter nor at any location traversed on the biofilter.
d) Slight stickwater odour could be sensed for around 2 m of the trash vessel.
e) In the vicinity of the reception bin, the characteristic raw odour could be sensed in a zone to around 10 m south of the bin. This area does get regularly washed down but fatty splash is inevitable and is not easily removed without cleaning agent.

Overall, it was evident that good attention to cleanliness outdoors was effectively minimising the spread of odour.

## 9. Operation of the LTRP under negative pressure:

In the moderate north to west wind conditions on 9 April and 1 May 2024 the dry area vacuum was measured to be 10 Pa with the doors closed. The wet area was slightly less, around 6 Pa. Although these vacuums are marginal, the negative pressures inside the wet and dry areas were nevertheless containing odours within the building.

## 10. SCADA Logged Data

The SCADA data for 1 June 2023 to 30 April 2023 has been viewed. Even though there can be quite a bit of variation within the normal operating parameters, nothing was found in the record of particular concern.

Temperature instruments in the SCADA system showed good correspondence with the test instruments. The biofilter air flow pressure sensors are not as useful due to the low resolution

attainable with the systems very low pressures, but averaged multiple samples gave surprisingly good correspondence with the manual measurement. Overall, the SCADA system appears to be working well.

## 11. Action Points

A summary of the 2023 residual action points with comment and further action points for consideration arising out of the 2024 audit are given in Table 7 in the Appendix.

Many of the action points relate to changes to improve the vacuum monitoring. Others are to enable better quantification of the air flow being extracted from equipment, which although the flows may be small are largely unknown, such as with air drawn from the meal bins which can currently only be inferred by the difference in other measured flows.

## 12. Conclusions

12.1 The current depth of the covered and uncovered biofilter beds is giving even distribution of air in the beds with low bed pressure drop. The biofilter loadings are in line with or below that recommended in the consent application. Meal odour was able be sensed within around 35m downwind of the covered biofilter. This is similar to what has been sensed in recent years. No adverse odour was able to be sensed from the uncovered biofilter.

12.2 The low pH found in the covered biofilter upper bed is a significant concern. When a shut is planned serious consideration should be given to bed replacement.

12.3 Ongoing progress has been made in closing in equipment items which have previously been sources of steam and odour getting into the wet area workspace. Air extraction balancing work done in 2023 provided a better balance of air extraction flows from around the press, the decanter feed tank 2.11 and the separator feed tank 2.15 while still containing vapour in equipment head space. Attention has been given to ensuring that all openings in processing equipment has sufficient inward air momentum to contain adverse odour. Air flows are now substantially in line with those recommended in the consent application.

12.4 At the time of the air discharge consent application no air was being extracted from the outside reception bin. Now around 23% of the airflow to the uncovered biofilter (6,590 $m^3/h$) is being drawn from the reception bin and feed conveyor. This appears to be working effectively without the need for a further enclosure.

## 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 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 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, he 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 did the work, commencing around 2009. There was a change in Aurecon policy in 2017 (driven from Australia) preventing the AFFCO work continuing however John has continued to do the work through Kupe Technologies Ltd. He still does occasional work for Aurecon NZ as a Senior Engineer.

Bruce McHardy has a Bachelor of Engineering Degree in Chemical and Materials Engineering from Auckland University. He worked as a graduate engineer at Imperial Chemical Industries NZ for five years on the design, construction and installation of new plants for Wood Panel Resins, Water Gel Explosives and a Pharmaceutical Disinfectant. He then moved to production supervision and spent 23 years in Operational management in the Wood Resins, Paint Resins, Solvent Adhesives and Paint manufacturing industries. After a period of running his own business, he has been employed with engineering consultants Aurecon NZ Ltd for fifteen years as a Process Engineer working on a diverse range of projects. Latterly employment at Aurecon has been on a casual basis.

# Appendix

## Figures



## Tables



## Photographs

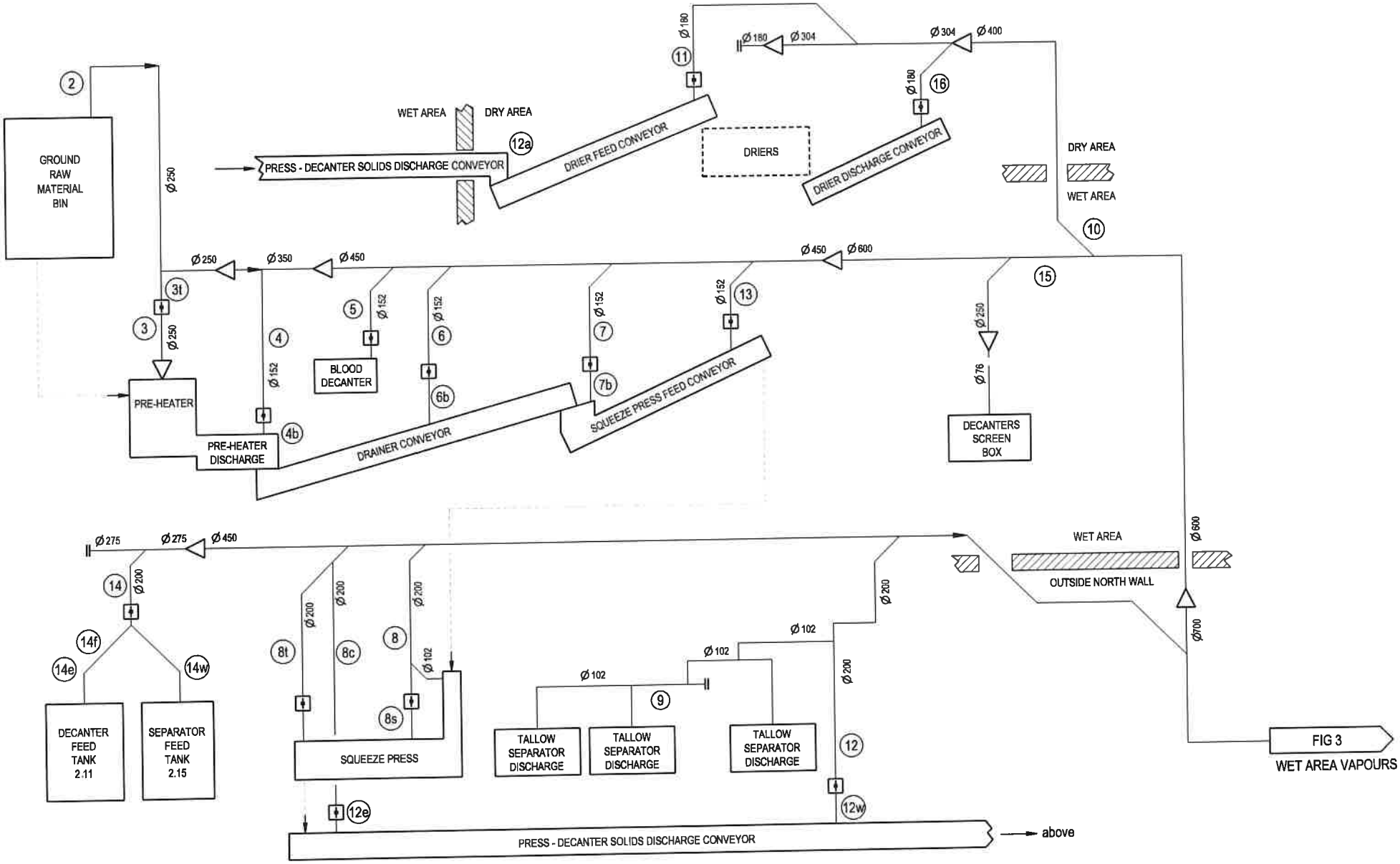



Fig 1. Wet Area Point Source Extractions at AFFCO Imlay Plant - Apr 2024

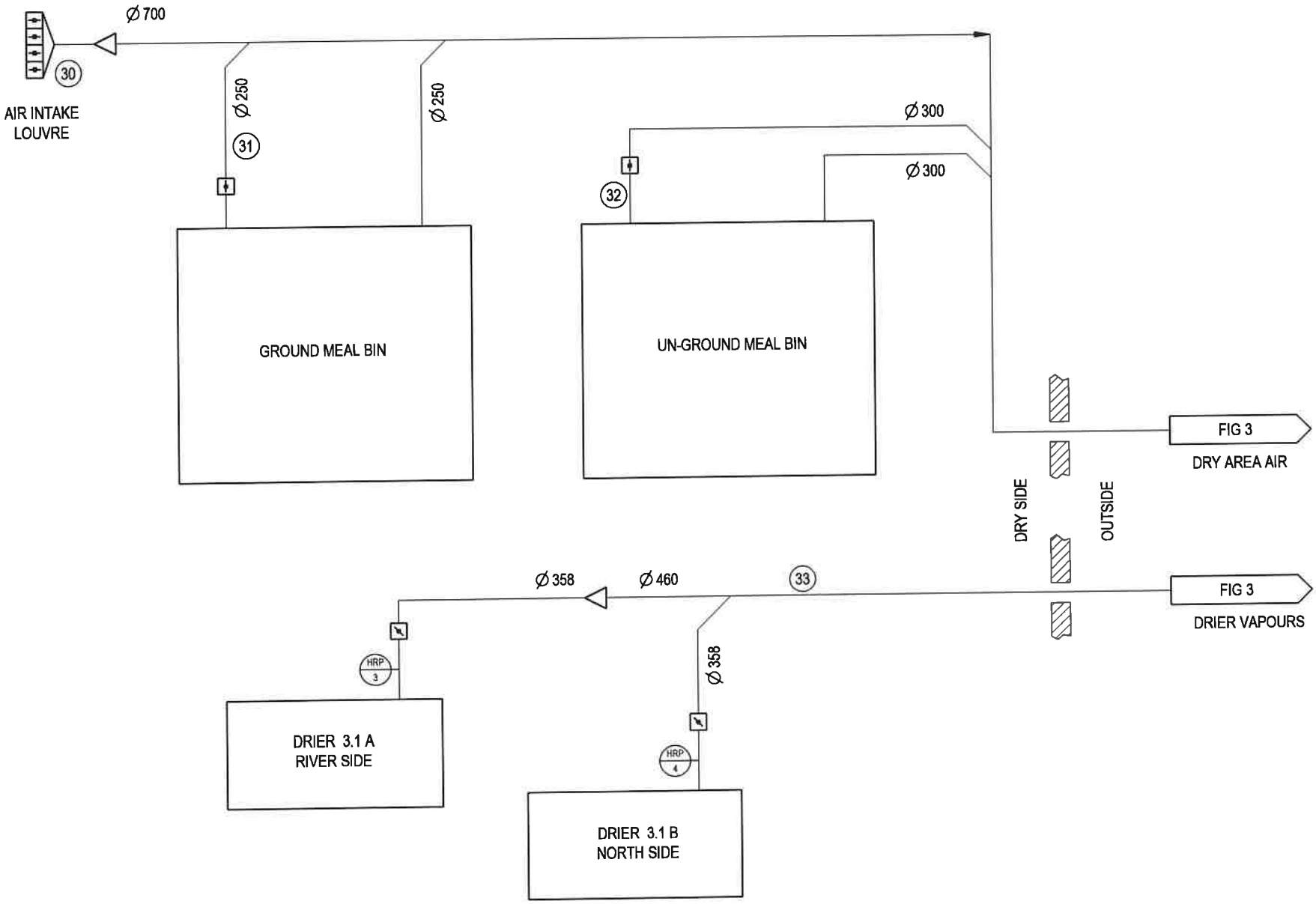



Fig 2. Dry Area Point Source Extractions at AFFCO Imlay Plant - Apr 2024

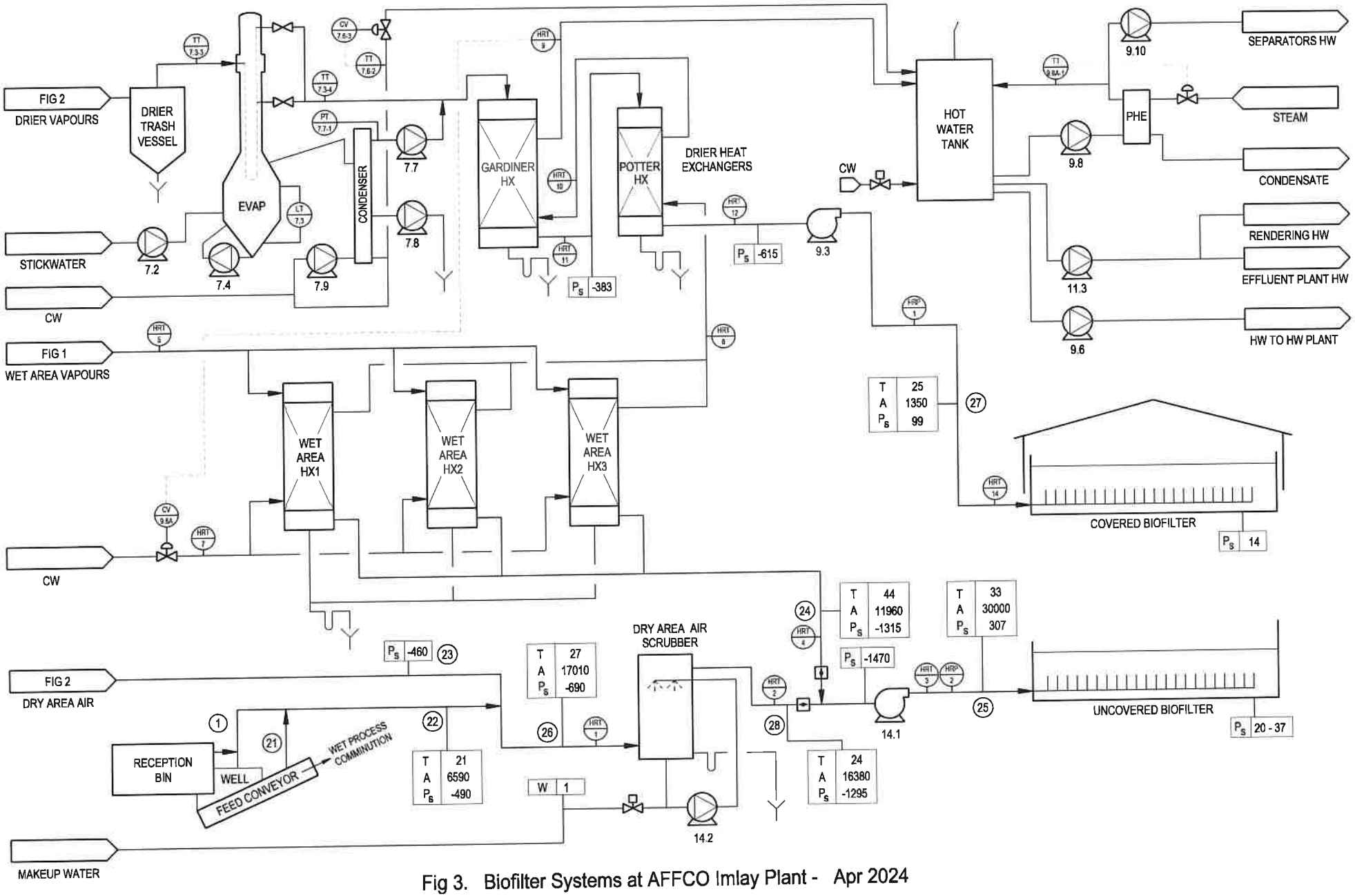



Fig 3. Biofilter Systems at AFFCO Imlay Plant - Apr 2024

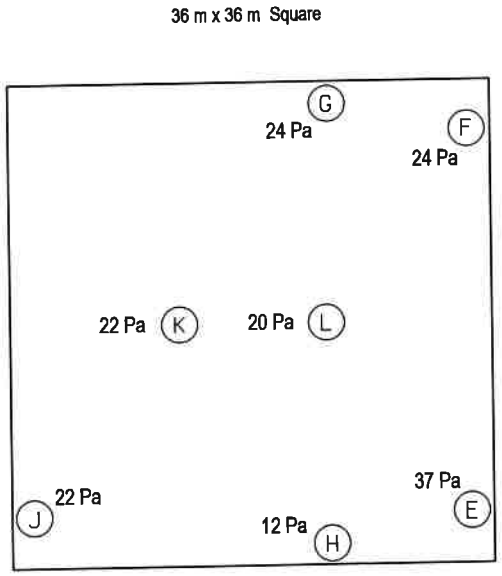



Fig 4a. Uncovered Biofilter Test Port Locations

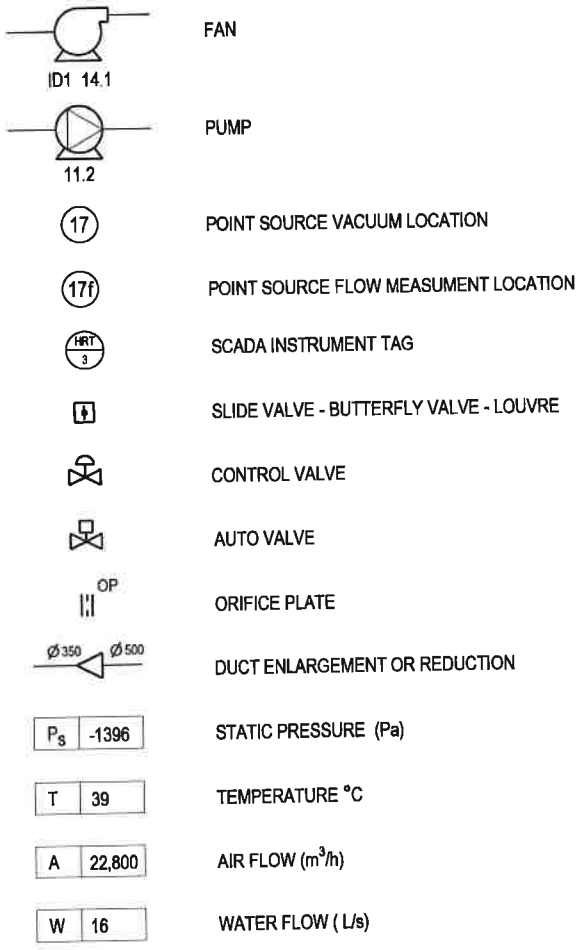



Fig 4b. Key to Symbols used in Figures 1 to 3

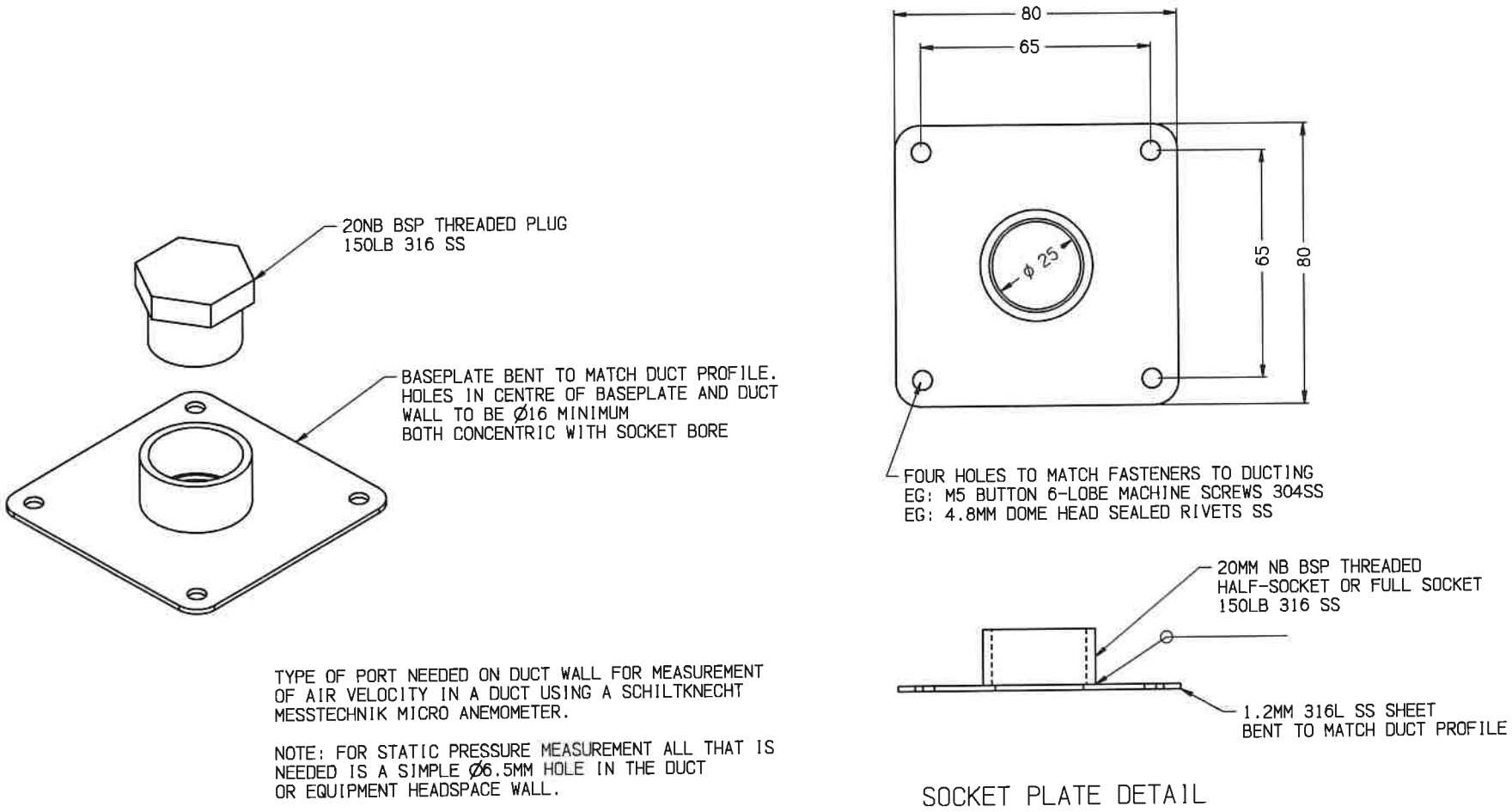



Fig 5. Port Detail Needed for Air Velocity Measurement in Ducting

## Table 1: AFFCO Imlay - Covered Biofilter

| Performance Assessment | 25-Mar-24 | 27-Mar-24 | 9-Apr-24 | 1-May-24 |
|---|---|---|---|---|
| **A Ambient Conditions** | | | | |
| On site temperatures (open air) | 18 - 23 °C | 19 to 22 °C | 20 to 24 °C | 15 to 19 °C |
| Humidity (site open air) | 63 - 69 % RH | 69 to 75 % RH | 50 to 55 % RH | 70 to 90 % RH |
| Atmospheric pressure | 101.3 kPa | 101.1 kPa | 102.5 kPa | 101.0 kPa |
| Wind | Mod NW to W 8 - 10 m/s | Mod NW to W 6 - 10 m/s | Mod N to NW 4 - 5 m/s | Mod NW to W 3 - 5 m/s |

**B Measured Air Flow to Covered Biofilter** At 32NB measuring ports (location 27 in Fig 3) and according to ISO 10780

| Test Sheet Ref | | Duct Diameter mm | Static Head Pa | Dynamic Head pitot Pa | Air °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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24015 | 25/03/24 | 302 | 97 | | 25.6 | 101.4 | | 1.17 | 5.2 | 1,344 | 0.44 | 1.6 |
| 24015 | 25/03/24 | 302 | 96 | | 26.4 | 101.4 | | 1.16 | 5.3 | 1,356 | 0.44 | 1.6 |
| 24015 | 25/03/24 | 302 | 96 | 15 | 26.4 | 101.3 | 0.98 | 1.16 | 4.9 | 1,274 | 0.41 | 1.5 |
| 24016 | 9/04/24 | 302 | 102 | | 23.9 | 102.4 | | 1.19 | 5.4 | 1,385 | 0.46 | 1.6 |
| 24016 | 9/04/24 | 302 | 103 | | 23.8 | 102.4 | | 1.19 | 5.4 | 1,400 | 0.46 | 1.7 |
| | | | *99* | | | *25* | | | | *1352* | | *1.6* |

*Measurement was with both driers and evaporator operating*

**C Covered Biofilter Characteristics**

| | |
|---|---|
| Length (E-W) | 16.0 m |
| Width (N-S) | 13.2 m |
| Av media depth | 0.6 m |
| Media bed area | 211 m² |
| Media volume | 127 m³ |

*Samples for moisture and pH (I) analysis taken 25/03/24 1230 - 1340h*

*pH (II) samples taken 1/05/24 1200h*

**Media pH (I)**
s < 0.26

| | | |
|---|---|---|
| NW | | NE |
| | 3.47 - 3.54 / 4.85 - 4.93 | 3.82 - 3.87 / 5.33 - 5.81 |
| SW | *River Side* | SE |

**Media pH (II)**
s < 0.06

| | | |
|---|---|---|
| NW | | NE |
| | 3.84 - 3.86 / 4.87 - 4.98 | 4.33 - 4.35 / 3.49 - 3.51 |
| SW | *River Side* | SE |

**Media Temperature**
°C at 200 mm depth

| | | | | |
|---|---|---|---|---|
| NW | | | | NE |
| | 26.3 | 26.1 | 24.7 | 25.3 |
| | 24.9 | 24.7 | 26.1 | 25.1 |
| | 25.2 | 26.3 | 26.0 | 24.9 |
| | 26.5 | 25.0 | 26.3 | 23.4 |
| SW | *River Side* | | | SE |

**Media Moisture Analysis**
%w/w (wet basis)

| | | | |
|---|---|---|---|
| NW | 61.5 | 54.8 | NE |
| SW | 60.1 | 59.2 | SE |
| | *River Side* | | |

**D Biofilter Bed Loading**

| | |
|---|---|
| Volumetric loading | 11 m³/h air per m³ media (based on average of all measured airflows above) |
| Cross-section loading | 6 m³/h air per m² media |

**E Duct Static Pressure**

| | |
|---|---|
| 9.3 (ID2) Fan Inlet static head | -610 to -630 Pa |
| 9.3 (ID2) Fan Outlet static head | 95 to 105 Pa |
| Biofilter end manhole static head | 14 Pa |

# Table 2: AFFCO Imlay - Uncovered Biofilter

| Performance Assessment | 25-Mar-24 | 27-Mar-24 | 9-Apr-24 | 1-May-24 |
|---|---|---|---|---|
| **A Ambient Conditions** | | | | |
| On site temperatures (open air) | 18 - 23 °C | 19 to 22 °C | 20 to 24 °C | 15 to 19 °C |
| Humidity (site open air) | 63 - 69 % RH | 69 to 75 % RH | 50 to 55 % RH | 70 to 90 % RH |
| Atmospheric pressure | 101.3 kPa | 101.2 kPa | 102.5 kPa | 101.0 kPa |
| Wind | Mod NW to W 8 - 10 m/s | Mod NW to W 6 - 10 m/s | Mod N to NW 4 - 5 m/s | Mod NW to W 3 - 5 m/s |

**B Measured Air Flow to Uncovered Biofilter**

At 50NB measuring ports 13m downstream of fan 14.1 (location 25 in Fig 3) and according to ISO 10780

| Test Sheet Ref | | Duct Diameter mm | Static Head Pa | Dynamic Head pitot Pa | Air °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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24018 | 9/04/24 | 898 | 305 | 108 | 33.8 | 102.3 | 0.98 | 1.14 | 13.3 | 30,417 | 9.62 | 34.6 |
| 24018 | 9/04/24 | 898 | 309 | | 32.6 | 102.3 | | 1.15 | 13.2 | 30,097 | 9.57 | 34.5 |
| 24019 | 9/04/24 | 898 | 307 | | 32.8 | 102.3 | | 1.14 | 13.0 | 29,641 | 9.42 | 33.9 |
| 24019 | 9/04/24 | 898 | 305 | | 33.4 | 102.3 | | 1.14 | 13.1 | 29,869 | 9.47 | 34.1 |
| | | | *307* | | *33* | | | | | *30,006* | | *34.3* |

**C Uncovered Biofilter Characteristics**

| | |
|---|---|
| Length | 36.0 m |
| Width | 35.7 m |
| Av media depth | 0.65 m |
| Media bed area | 1285 $m^2$ |
| Media volume | 835 $m^3$ |

**Media Moisture Analysis**

%w/w (wet basis)

| | | |
|---|---|---|
| NW 64.1 | | 63.6 NE |
| | 62.6 | |
| SW 64.1 | | 61.9 SE |

*River Side*

**Media pH**

s < 0.08

| | | |
|---|---|---|
| NW 5.46 - 5.58 | | 4.86 - 5.02 NE |
| | 5.31 - 5.38 | |
| SW 5.28 - 5.32 | | 5.06 - 5.07 SE |

*Samples for moisture and pH analysis taken 25/03/24 1230 - 1340h*

**Media Temperature**

°C at 200 mm depth 25 Mar 24

| | | | | |
|---|---|---|---|---|
| NW | 20.4 | 21.8 | 20.9 | 21.3 NE |
| | 20.1 | 18.9 | 17.0 | 21.5 |
| | 22.2 | 19.7 | 20.0 | 19.1 |
| SW | 18.9 | 19.6 | 21.1 | 18.9 SE |

*River Side*

°C at 200 mm depth 1 May 24

| | | | | |
|---|---|---|---|---|
| NW | 22.8 | 24.7 | 24.4 | 24.9 NE |
| | 24.1 | 24.5 | 24.6 | 24.2 |
| | 28.4 | 27.7 | 25.5 | 28.6 |
| SW | 27.8 | 28.3 | 26.5 | 25.9 SE |

*River Side*

**D Biofilter Bed Loading**

| | |
|---|---|
| Volumetric loading | 35.9 $m^3$/h air per $m^3$ media (based on average of the four airflows measured above) |
| Cross-section loading | 23.3 $m^3$/h air per $m^2$ media |

# Table 2 continued: AFFCO Imlay - Uncovered Biofilter

## E Measured Air flow from Wet Process Heat Exchangers

(Location 24 in Fig 3)

| Test Sheet Ref | | Duct Size W x H mm | | Static Head Pa | Dynamic Head pitot Pa | Air °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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24021 | 27/11/23 | 645 | 790 | -1339 | 27 | 28.4 | 101.4 | 0.98 | 1.16 | 6.7 | 11,814 | 3.79 | 13.6 |
| 24021 | 27/11/23 | 645 | 790 | -1339 | | 29.9 | 101.4 | | 1.15 | 6.5 | 11,997 | 3.82 | 13.8 |
| 24022 | 9/04/24 | 645 | 790 | -1319 | | 44.6 | 102.1 | | 1.08 | 6.4 | 11,740 | 3.53 | 12.7 |
| 24022 | 9/04/24 | 645 | 790 | -1309 | | 43.7 | 102.1 | | 1.09 | 6.7 | 12,290 | 3.70 | 13.3 |

## F Measured Air Flow into Dry Gas Scrubber

(Location 26 in Fig 3)

| Test Sheet Ref | | Duct Diameter mm | Static Head Pa | Dynamic Head pitot Pa | Air °C | RH % | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24022 | 1/05/24 | 680 | -690 | 100 | 27.3 | | 101.3 | 0.98 | 1.16 | 12.8 | 17,198 | 5.54 | 19.9 |
| 24022 | 1/05/24 | 680 | -685 | | 26.9 | 49 | 101.3 | | 1.17 | 12.9 | 16,866 | 5.48 | 19.7 |
| 24022 | 1/05/24 | 680 | -687 | | 27.6 | 51 | 101.2 | | 1.16 | 13.2 | 17,258 | 5.58 | 20.1 |

Static head measurement problematic due to tee close upstream and inlet bend to scrubber directing airflow unevenly.

## G Measured Air flow from Gas Scrubber

(Location 28 in Fig 3)

| Test Sheet Ref | | Duct Diameter mm | Static Head Pa | Dynamic Head pitot Pa | Air °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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24022 | 9/04/24 | 800 | -1290 | | 23.2 | 102.3 | | 1.19 | 9.1 | 16,467 | 5.43 | 19.6 |
| 24022 | 9/04/24 | 800 | -1300 | | 23.7 | 102.3 | | 1.19 | 9.0 | 16,286 | 5.37 | 19.3 |

# Table 2 continued: AFFCO Imlay - Uncovered Biofilter

**H** **Measured Air Flow from Outside Raw Material Bin and Feed Conveyor** (Location 22 in Fig 3)

| Test Sheet Ref | | Duct Size W x H mm | | Static Head Pa | Dynamic Head pitot Pa | Air °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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24024 | 9/04/24 | 400 | 400 | -488 | | 20.8 | 102.3 | | 1.20 | 11.4 | 6,589 | 2.20 | 7.9 |

**J** **Measured Air Flow from Raw Material Feed Conveyor** (Location 21 in Fig 3)

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24024 | 1/05/24 | 190 | -155 | | 20.7 | | 101.3 | | 1.02 | 10.3 | 1,055 | 0.30 | 1.1 |

**K** **Static Pressures**

| | Pa |
|---|---|
| 14.1 Fan Inlet static head | -1440 to -1510 |
| 14.1 Fan Outlet static head | 290 to 325 |
| Biofilter H branch end static head | 12 |
| Biofilter J branch end static head | 22 |
| Biofilter G branch end static head | 24 |
| Biofilter F branch end static head | 24 |
| Biofilter E branch end static head | 37 |
| Biofilter line K static head | 22 |
| Biofter line L static head | 20 |

## Table 3: AFFCO Imlay - Point Source Extraction Vacuum Measurement

| Port | RMF008 Port | Location | Vacuum (Pa) April 2024 | Velocity (m/s) | Dia (mm) W x H | Flowrate ($m^3/h$) |
|---|---|---|---|---|---|---|
| 1 | ✓ | Outside raw material bin | 190 - 200, 230 - 240 bin closed | 9.2 | 390 x 390 | 5060 (Note 1) |
| 21 | | Feed conveyor from raw material bin | 150 - 160, 170 - 175 bin closed | 10.3 | 190 | 1055 |
| 22 | | Raw material bin + feed conveyor | 480 - 490 | 11.4 | 400 x 400 | 6590 (Note 2) |
| 2 | ✓ | Duct from inside ground raw material bin | 36 - 40 | 6.1 - 6.6 | 250 | 1165 (Note 3) |
| 3 | ✓ | Pre-heater, below slide valve | 95 - 100 | 8.6 | 250 | 1510 (Note 4) |
| 4 | | Pre-heater discharge | 40 - 50 (Note 4A) | 23 | 150 | 1500 |
| 4b | ✓ | Pre-heater discharge, below slide valve | 15 | 2.6 | 280 x 580 | 1500 |
| 5 | ✓ | Blood decanter | 40 - 45 (Note 5) | | | |
| 6 | | Drainer conveyor, above slide valve | (see Note 6) | 12.6 | 150 | 800 |
| 6b | ✓ | Drainer conveyor, below slide valve | 64 - 68 (Note 6) | 2.9 | 350 x 220 | 800 |
| 7 | | Press Feed Conveyor, above slide valve | Blocked Port | 13.9 | 150 | 880 |
| 7b | ✓ | Press Feed Conveyor, below slide valve | 50 - 55, hatch open 15 (Note 7) | 3.1 | 350 x 230 | 880 |
| 8 | ✓ | Press, feed end above slide valve | 380 - 450 (Note 17) | 6.7 | 202 | 760 to 1000 |
| 8c-12e | | Press solids discharge conveyor | 470 - 490 | 6.1 | 202 | 710 |
| 8s | | Press, feed end below slide valve | 12 | 3.1 | 350 x 225 | 360 to 600 |
| 8t | | Press tail end above slide valve | 485 - 495 | 5.2 | 202 | 600 |
| 9 | ✓ | Tallow separator discharge chambers 3x | 220 - 230 | 4 - 14 | 98 | 120 x 3 |
| 10 | ✓ | Drier conveyors extraction manifold | 438 - 440 (Note 8) | | | |
| 11 | ✓ | Drier feed conveyor | 80 - 85 (Note 9) | 7.4 | 170 | 610 |
| 12 | ✓ | Press-Decanter solids discharge conveyor | 355 - 365 | 7.6 | 200 | 860 (Note 10) |
| 12w | | Press-Decanter solids discharge conveyor | 21 | 3.0 | 350 x 225 | 860 |
| 13 | ✓ | Press Feed Conveyor, above slide valve | Blocked Port | 3.9 | 350 x 27 | 133 (Note 15) |
| 14 | ✓ | Decanter + separator liquid feed tanks | 460 - 470 | | | 1360 (Note 11) |
| 14e | | Decanter feed tank 2.11 | 240 - 250 | 5.2 | 200 | 590 (Note 12) |
| 14w | | Separator feed tank 2.15 | 290 - 295 | 6.8 | 200 | 770 (Note 12) |
| 15 | ✓ | South manifold at exit from wet area | 465 - 475 (Note 8) | | | |
| 16 | | Drier meal discharge conveyor duct | 32 | 2.3 | 175 | 200 (Note 13) |
| 30 | ✓ | Dry area air intake | 78 | 4.5 | | 9,790 |
| 31 | ✓ | Ground meal bin | 9 | | | 200 x 2 (Note 14) |
| 32 | | Unground meal bin | 2 | | | 50 x 2 (Note 14) |
| 33 | ✓ | Drier Vapour Duct | 9 (Note 16) | | | |

**Table 3 Notes on Following Page**

## Table 3: Continued

**NOTES:**

1 Flowrate determined by flow measurement at port 1 less 490 m3/h drawn from feed conveyor stairwell gives 5060 m3/h drawn from reception bin. The difference between flow at 22 (6590 m3/h) less measured flow at 21 (1055 m3/h) less 490 m3/h from the well gives 5045 m3/h drawn from reception bin. The flow varies depending on whether the bin is open or closed and the alignment of the retractable lid with the bin when closed.

2 The total flow from reception bin, feed conveyor and feed conveyor stairwell, measured upstream of merging with air from the dry area, prior to entering the scubber. (Location 22 in Fig 3).

3 The bin hatch is normally open, drawing in air from near wet area ceiling. Air flow into bin hatch is 725 $m^3$/h. Air extracted from bin is 1165 $m^3$/h hence 440 $m^3$/h is likely being drawn up bin feed conveyor from grinder. When the bin hatch is closed flow at port 2 was 1080 m3/h. Flow into the bin hatch in Nov 2023 was 805 m3/h.

4 After balancing 27 Nov 2023 velocity was 5.2 m/s, flowrate was 910 m3/h, vacuum was 35 to 40 Pa. Slide valve subsequently opened from 137 mm to 175 mm to capture steamy emission at high end of the thermal cycling. The higher velocity has created flow measurement issues due to fat aerosol in air stream.

4A Old port 4 where vacuum was measured above slide valve and blockage prone. The vacuum (4b) now is measured at hole in the discharge chamber wall. Vacuum 4b is low but a flowrate of 1500 m3/h into open hatch is effectively capturing odour.

5 The vacuum now measured at 7 mm hole in extraction duct above first bend, below the slide valve. The old port 5 was located above the slide valve and frequently blocked.

6 Measured at small hole in side of the transition box below the slide valve with the lower hatch cover on the drainer conveyor open. The old port 6 was located above the slide valve and frequently blocked. Airflow determined by measurement through drainer conveyor hatch and adjacent slot.

7 Port 7b in the side of the transition box was used for vacuum measurement below slide valve. The old port 7 fitting was above slide valve and blocked. Port 7 duct air extraction frequently occurs with the feed box hatch open.

8 Previous Port 10 measurement was made at the extraction duct entrance inside the decanters screen box which also gave an indication of static pressure in the manifold overhead. The two remote pressure sensing lines got installed from the manifold overhead when only one or the other was required. These were numbered 10 and 15. The driers discharge conveyor extraction duct which was previously numbered 15 is now numbered 16 in Fig 1 to avoid confusion.

9 This extraction duct draws air from the driers feed cross-conveyor. Both driers were operating and there is headspace for air to be extracted from the cross-conveyor south end. Indications are that extracted air is being drawn from the cross conveyor with practically none drawn up from press-decanter solids conveyor.

10 The extracted air from decanter solids conveyor goes to same manifold as the separators extracted air (see Fig 1). An objective has been to draw more air from the solids conveyor through adjustment of slide valve below port 12 to increase vacuum at the end of the conveyor located in the dry-area. Have not yet achieved the adjustment required. The cause still being investigated.

11 The original port 14 was earlier relocated to above the slide valve for tanks 2.11 + 2.15 and this is now recorded on the RMF008.

12 The flow and pressure measurement for the respective tanks was made in each leg.

13 The slide valve is ineffective but approximately 200 m3/h air is still being extracted.

14 The total flow from the bins is estimated to be 400 - 700 m3/h by subtracting air intake 30 flow from dryside air flow at scrubber. The airflow from each bin is difficult to determine. Both bins have vacuum beneath the fabric covers which is sufficient to contain odour without excessive extracted air entrainment of meal dust to the scrubber.

15 Port 13 is inaccessible. The flow in was determined by velocity measurement at gap in conveyor top plate.

16 Both driers operating. Measured directly at the duct without using the remote sensing tube.

17 The duct is not level, condensate is trapped in the duct at port 8, hence the measured flow varies. Approx 400 m3/h is drawn from press headbox, hence 370 to 600 m3/h from 8s gives 770 to 1000 m3/h at port 8, consistent with what was measured.

## Table 4: Building Environment

Measured on 7/05/2024 between 1446 h and 1512 h

Outdoor conditions south of building
18 °C, 82% RH, light W wind 3 m/s

| Location Inside Building | °C | Relative Humidity (RH) % |
|---|---|---|
| **Dry Area** | | |
| Walkway between driers | 24.8 | 55.1 |
| Ground level (west of driers) | 25.1 | 50.9 |
| Ground level (east of driers) | 24.9 | 54.4 |
| Top of steps by sifters | 26.2 | 52.8 |
| NE corner finished meal bin walkway | 27.2 | 49.1 |
| N side walkway by finished meal bin | 27.8 | 49.1 |
| NW corner finished meal bin walkway | 28.0 | 48.1 |
| Air intake dry area | 29.0 | 46.1 |
| S side walkway finished meal bin | 29.2 | 44.8 |
| Top of steps by finished meal bin | 29.4 | 43.2 |
| **Offices** | | |
| Control room air inlet | 22.4 | 63.3 |
| Lunch room at air inlet | 21.0 | 65.1 |
| Lunch room stove/fridge mid-height | 21.6 | 63.2 |
| Office | 22.1 | 64.5 |
| **Wet Area** | | |
| Walkway above blood tanks | 24.2 | 65.9 |
| Walkway day bin N side W | 25.1 | 62.3 |
| Walkway day bin N side E | 25.4 | 60.5 |
| Day bin hatch (air in) | 25.6 | 60.0 |
| Mid-level walkway by pre-heater | 25.7 | 57.7 |
| Above preheater feed conveyor | 25.7 | 57.6 |
| Bottom of steps by preheater | 25.1 | 55.3 |
| By blood tanks roller door | 24.3 | 57.7 |
| By workshop door | 24.5 | 58.5 |
| Separator floor | 24.6 | 57.7 |
| Separator floor by press | 24.6 | 58.6 |
| By decanters stickwater screen box | 24.8 | 57.2 |
| By sump door | 23.4 | 63.5 |

Table 5: AFFCO Imlay - Rendering Plant Historical Air Extraction Data

| | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|
| **Drier Vapours** | | | | | | |
| Fan 9.3 inlet static pressure (Pa) | -490 | -485 | -790 | -740 | -750 | -620 |
| Fan 9.3 (ID2) outlet static pressure (Pa) | 80 | 82 | 105 | 67 | 70 | 99 |
| Fan 9.3 (ID2) outlet air temperature (°C) | 23 | 29 | 35 | 26 | 26 | 25 |
| Covered Biofilter inlet total pressure (Pa) | 6 | 3 | 20 | 13 | 12 | 14 |
| Flow to Covered Biofilter ($m^3/h$) | 1080 | 1000 | 1400 | 1220 | 1090 | 1350 |
| Mass flow to Covered Biofilter (tonnes/h) | 1.2 | 1.2 | 1.6 | 1.4 | 1.3 | 1.6 |
| Biofilter Loading ($m^3/h$ air per $m^3$ media) | 12 | 11 | 10 | 12 | 12 | 11 |
| **Non-Drier Vapours** | | | | | | |
| **Dry Area Air** | | | | | | |
| Scrubber Inlet Static Pressure (Pa) | -710 | -560 | -647 | -593 | -740 | -687 |
| Scrubber Inlet Temperature ( °C) | 26 | 36 | 27 | 26 | 26 | 27 |
| Inflow to Scrubber ($m^3/h$) | 23,700 | 19,000 | 19,000 | 17,930 | 18,750 | 17,110 |
| Including Reception Bin + Feed Conveyor ($m^3/h$) | | 6,800 | 7,200 | 6,230 | 7,200 | 6,590 |
| Mass flow to Scrubber (tonnes/h) | 27.2 | 21.4 | 22.6 | 20.9 | 21.8 | 19.9 |
| **Wet Area Vapours from HX1 - HX3** | | | | | | |
| Static pressure (Pa) | -1380 | -1400 | -1420 | -1360 | -1360 | -1320 |
| Temperature (°C) | 46 | 44 | 41 | 45 | 43 | 44 |
| Flow ($m^3/h$) | 14,300 | 12,000 | 13,100 | 15,990 | 12,020 | 11,960 |
| Mass flow (tonnes/h) | 15.3 | 12.7 | 14.1 | 17.0 | 13.1 | 13.4 |
| **Uncovered Biofilter** | | | | | | |
| Fan 14.1 (ID1) outlet static pressure (Pa) | 320 | 525 | 478 | 460 | 325 | 307 |
| Air temperature to Uncovered Biofilter (°C) | 32 | 37 | 31 | 27 | 33 | 33 |
| Flow to Uncovered Biofilter ($m^3/h$) | 33,200 | 31,000 | 27,600 | 29,500 | 30,370 | 30,010 |
| Mass flow to Uncovered Biofilter (tonnes/h) | 38 | 34 | 32 | 34 | 34 | 34 |
| Biofilter Loading ($m^3/h$ air per $m^3$ media) | 52 | 53 | 31 | 35 | 36 | 36 |

# Table 6. List of Wetside Vacuum Monitoring Ports used with the RMF 008 Form

Following the review of the RMF 008 form in Nov 2023 a list was to be provided clarifying action needed relating to wetside vacuum ports. Any work needed to provide a port at a new location is in the Table 7 action list. This table is provided to clarify which old ports are retained and which are at new locations. Some currently used ports have already been relocated from their original designated positions in former action work.

| RMF008 Port Number | Location | Notes |
|---|---|---|
| 1 | East of steps to feed conveyor well at outside reception bin. See Fig 3. | Retain as is.<br>Feed conveyor port 21 nearby is also available if there is a problem with port 1, but port 1 as is gives good indication that air extraction from the reception bin is working. |
| 2 | In duct above Ground Raw Material Bin. See Fig 1. | Retain as is.<br>Being the port most remote from the extraction fan 14.1, vacuum is low due to pressure loss along the wet area southern manifold. Port provides good indication of extraction from the ground raw material bin and its feed conveyor. |
| 3 | Duct from preheater, below slide valve. See Fig 1. | Retain as is. |
| 4 | Duct from preheater outlet. Needs to change to below slide valve. See location 4b in Fig 1. | Existing port prone to blockage and does not give accurate indication of outlet headspace vacuum due to presence of slide valve.<br>Relocated port 4 could simply be the unused rivet hole seen in photo 24-101 enlarged to Ø6.5mm but a better solution is a clean new hole drilled at the location shown in photo 24-101.<br>Vacuum is low but it gives a good indication of effective extraction in the outlet headspace verified by velocity measurement of air flowing into the hatch. |
| 5 | Hole in extraction duct below slide valve being used instead of port 5 seen in Fig 1. | Existing port 5 blocked constantly and gave false indication of headspace vacuum.<br>Extraction duct 5 will no longer be needed with a new processing arrangement. |
| 6 | Duct from drainer conveyor. Needs to change to be below slide valve. See location 6b in Fig 1. | Existing port prone to blockage and does not give accurate indication of outlet headspace vacuum due to presence of slide valve. The hole in the side of the duct transition box seen in photo 24-102 is being used as the relocated vacuum port 6. |
| 6F | Duct from drainer conveyor. Needs a Fig 5 type port for velocity measurement to determine airflow. See location 6b in Fig 1. | Only present way of estimating airflow from drainer conveyor is measuring airflow into hatch and gaps at lower end. Some flow is presumed to also be drawn from the hopper 7b at the conveyor head hence a Fig 5 type port mounted on the transition box as shown in photo 24-103 would give a more accurate measure of flow. A port mounted higher up on the duct where old port 6 is would not be able to be safely accessed for flow measurement. |
| 7 | Duct from press feed conveyor inlet. Location 7b in Fig 1. | Transition box already has a flow measuring port 7b. Also need a simple Ø6.5 hole in wall below flow measuring port for RMF008 vacuum monitoring. See photo 24-104. |
| 8 | Location 8 in Fig 1. | Retain port 8 as is.<br>See photos 24-107 and 24-108. Although located above slide valve 8s, port 8 includes airflow from the feed hopper. Duct is sloping downwards towards the bend. Duct 8 needs to be lifted at the support seen in background so that condensate drains back to press. When monitoring port 8 is open, vacuum in duct holds condensate in duct from draining. Attaching a flexible tube to the lower port 8 provides sufficient vacuum at the port for the liquid to drain through the tube. |

| | | |
|---|---|---|
| 9 | Location 9 in Fig 1. | See photo 24-109. Good location for vacuum monitoring. Use of Pneufit swivel bend prone to regular blockage - would be better using a simple Ø6.5 mm hole in tube wall which can readily be seen to be clear. Air inflow through open hole at 230 Pa vacuum in tube would be < 2m3/h. Static vacuum varies depending on stage of separator operating cycle.<br>There are issues with airflow measurement. Fig 5 type flow velocity measuring port including separator extraction flow and port 12 flow is proposed at 12t in photo 24-110. This will enable the total separator + conveyor 12w airflow to be determined. |
| 10<br>15 | Locations 10 and 15 in Fig 1. | These ports originated from a request for (Fig 5 type) velocity measuring ports - if practical - to be able to determine the total airflows from the wet area southern manifold and the dry area manifold joining the line. This would have also enabled determination of the airflow from the wet area northern manifold by difference from the total measured flow at the wet area heat exchangers HX1 to HX3.<br>The practical difficulty was that it would have required some work platform accessed by a caged ladder due to the height of the ducts, because direct access to the port is needed for velocity measurement in the duct.<br>The present ports 10 and 15 have piping extending down to ground level enabling static vacuum measurement, but not velocity measurement, hence are of limited use but are recorded in the RMF008 monitoring. |
| 11 | Location 11 in Fig 1 | See photo 24-111. Existing port 11 is good for velocity measurement but poor for vacuum monitoring. Location is difficult to safely access for regular monitoring hence the remote tube seen in the photo has been installed to enable monitoring at ground level. The swivel bend Pneufit tube connection seen in the photo is prone to blockage and is above the slide valve giving a false indication of conveyor headspace vacuum.<br>A simple Ø6.5 hole at the location 11b is all that is needed for vacuum measurement, but given the difficulty of access, installation of a straight pneufit connection at 11b with the flexible tube to ground level would likely result in more reliable monitoring. |
| 12 | Location 12 in Fig 1. | Existing port 12 can be seen in photos 24-109, 24-110 and 24-112. This is used for RMF008 vacuum monitoring. It is also used for air velocity measurement. Retain as is for now.<br>For ducts < Ø300 mm, one to three velocity measurements on a diametric line will normally give a good average velocity, providing the port has about five diameters of straight duct upstream of any flow disturbances such as bends and slide valves. In many cases there is no choice and the circumstances of each location have to be considered. In velocity measurement, this port 12 has given unexpected results, suggesting higher velocity air is flowing to one side or the other of the port diametric line. This could be resolved by installation of another Fig 5 port at 90° to port 12 in the diametric plane but in this case port 12w (see Fig 1 and photo 24-112) is available to give confirmation of flow.<br>A further complication is that the static vacuums and airflows in the Ø102 port 9 line (seen in photo 24-109) vary depending on whether a separator is doing a bowl dump. There is no suitable location in the Ø102 line for airflow measurement, hence new Fig 5 port 12t as in photo 24-110 is proposed to be able to determine the total air extracted from the separators and the conveyor duct 12.<br>The indicated location for port 12t is not ideal, but the port with a vertical diametric line accessed from below is practical.<br>For the RMF008 vacuum monitoring, a Ø6.5 mm hole should be drilled in the plug closing port 12w. This will enable the vacuum in the solids conveyor headspace to be monitored and can become the location for the RMF008 port 12 monitoring once the conveyor closure issues are resolved.<br>In flow adjustment and balancing work it has been an objective to achieve more conveyor headspace vacuum to the west of duct 12w. That is, to get more vacuum at the end of the press - decanter solids discharge conveyor, 12a in Fig 1 and photo 24-117. The increased vacuum sought has not yet been achieved yet by adjustment of slide valve 12w. This is thought to be because too much ambient air is getting into the conveyor towards the end. Photo 24-122 shows one section of the conveyor top plate which is warped and potentially a likely location for unwanted air ingress. Improving the conveyor closure will aid better vacuum in the end headspace. |

| | | |
|---|---|---|
| 13 | Location 13 in Fig 1. | The vacuum monitoring of the remote tube 13 should cease for the RMF008. The remote tube constantly blocks and the duct connection is above slide valve, from which it appears that the slide has been removed. See photo 24-105. The duct connection is unable to be safely accessed in regular monitoring for unblocking. Note in photo 24-106 the west side of the duct transition box has an existing port for vacuum monitoring but cannot be easily accessed. Extraction at 13 in Fig 1 is at least 100m3/h with at least 15 Pa vacuum in the conveyor headspace, determined by velocity measurement into the gap seen in the photo 24-105 foreground. Press feed hopper below also likely extracts some air from the feed conveyor headspace. The gap should be covered, to reduce the inflow and increase the headspace vacuum, but leaving a small hole around Ø20mm for insertion of a vacuum measuring tube and inwards velocity measurement. As standing on the top of the press is required to do this, it should only be done occasionally e.g. a monthly check. |
| 14 | Location 14 in Fig 1. | See photos 24-113 and 24-114.<br>When vacuum monitoring was introduced the vacuum was measured at 14f seen in photo 24-113. Port 14e was later added to enable velocity measurement. By removing the valve at 14w it was also found that velocity could be measured in that branch, except misalignment of the ducts resulted in much of the air being drawn from the surrounding airspace rather than the tank 2.15. AFFCO remedied this in earlier actions.<br>At one time the air flow from the two tanks was too high, with excessive loss of heat. Adjustment of the airflows has been made. Current damper and slide valve settings are providing adequate vacuum in the tank headspaces such that ambient air is being drawn in at all tank apertures, preventing odour escape and minimising the heat loss.<br>From the photos it can be seen that there are essentially three vacuum zones: tank headspace vacuum; Y-branch vacuum; and manifold vacuum above the slide valve. The vacuum in the Y-branches is similar due to the connected ducts. The dampers enable trimming of extraction flows from one tank relative to the other. The vacuum measured at Port 14 is more a reflection of the vacuum in the manifold above (wet area north manifold) rather than that in the tank headspaces.<br>It is understood that the RMF008 monitoring was moved from port 14f to 14 due to safety concerns. Monitoring at 14f required standing on the tank top - both tanks get hot during processing and a slip hazard frequently exists. Extension of the vacuum port 14 as seen in the photos enables it to be monitored at any time from the walkway.<br>In the recent audit vacuum measurement, it was initially found that the port 14 vacuum was only 26 Pa. This was not credible and the end of the remote connection was found to be blocked. After cleaning the fitting the true vacuum was found to be 460 Pa.<br>Another consideration is that a damper or the slide valve could be fully closed or blocked, giving no tank headspace vacuum, yet port 14 would give a good vacuum result.<br>It is our view that the monitoring could be improved by:<br>a) Retaining the port 14 monitoring as is, as it provides an instant accesible check on vacuum at any time during processing.<br>b) On a weekly basis, when the tanks are not hot but the fan 14.1 is operating, poke a flexible vacuum measuring tube into each tank headspace through one of the old instrument apertures in the tank tops. The measured vacuum should be around 200 Pa with the tank lids closed. This would provide confirmation that port 14 is working and that vacuum in the tank headspaces is good. |

| | | |
|---|---|---|
| 16 | Location 16 in Fig 1. | In earlier reports this was port 15. It is now port 16 due to cut sheetmetal 15 identification being used for the wet area southern manifold vacuum port, as above and in Fig 1.<br>Port 16 seen in photo 24-115 is prone to blockage due to the presence of dust along with high localised velocity in the vicinity of the slide valve. The vacuum measured at the port was initially 32 Pa, but after a quick unblock was around 420 Pa. The vacuum in the conveyor headspace was only around 15 Pa. It was noted that an adjacent conveyor cover plate/hatch had separated at the hinge (see photo 24-116) creating the long gap through which ambient air was inward flowing. Opening the slide valve more to achieve more headspace vacuum is unlikely to have much effect but if it did, merely hastens the rate of blockage. Reducing or eliminating the gap is needed to increase the headspace vacuum.<br>Port 16 is located above the slide valve and hence gives poor indication of conveyor headspace vacuum. For improved RMF008 monitoring, a new port 16b located as shown in photo 24-115 should be provided. This is just a simple Ø6.5 mm hole in the side of the transition box which can easily be unblocked if needed and seen to be unblocked when doing the vacuum measurement.<br>On the RMF008 monitoring sheet:<br>a) in section 1, the 'Thursday:-Driers Manifold' should become 'Thursday:- Main Duct 15'<br>b) in section 2, the Tues box should become '10:- Driers Manifold / 16:- Drier Discharge Conveyor'. [That is two figures be given in the Vac Result box e.g. 440/32, as these figures together give a better indication of duct blockage.]<br>With the new vacuum measuring port (16b), the ball valve at port 16 can be removed and replaced by a 20 mm BSP plug. Note that this port will still be used for air velocity measurement but the valve or plug would be removed to do this. |
| 30 | Location 30 in Fig 2. | See photo 24-118. This is the vacuum monitoring port immediately downstream of the air intake flow adjusting louvre and gives around 70 - 80 Pa when the louvre is clean. It is obvious when the louvre needs cleaning and lower vacuum readings typically indicate that the port fitting is blocked. Air flow into the duct is measured at the louvre face so the port is good as is. |
| 31 | Location 31 in Fig 2. | See photos 24-118 and 24-119. This port was originally installed for monitoring the ground meal bin headspace vacuum. It is located downstream of the slide valve; is prone to blockage; another parallel duct which has no slide valve also extracts air from the bin headspace; and the port is unable to be used for velocity measurement because it is too small.<br>The top of the bin is covered with a fabric blanket. Only a small amount of vacuum in the bin headspace is needed (contrary to one Consent requirement) to remove off-gassing odour from the meal without entraining excessive meal dust into the extraction system. The headspace vacuum can be measured by inserting a flexible sensing tube under the blanket. A more reliable measure for RMF008 monitoring is to use a simple Ø6.5 mm hole in the duct wall just below port 31 so it is readily accessible. Also a similar hole to be provided at a similar location in the parallel duct. These holes will give a higher vacuum than in the bin headspace but give larger numbers for comparison. The existing Port 31 should be replaced with a Fig 5 type port which will enable air velocity in the duct to be measured. Similarly, another Fig 5 type port should be installed on the parallel duct. These new ports can be designated 31w and 31e (west and east) to distinguish them. Until they are installed they will not be shown in Fig 2.<br>Although the measured velocities will be low, their determination matters to achieve the balance between good odour removal without entraining excessive dust and knowing what is happening in each duct. At present the only measure of bin extraction flows has been difference between the airflow at the scrubber less the airflow from the reception bin and the dryside air intake.<br>In summary what is required is:<br>a) a Fig 5 type port for air velocity measurement, in both ducts, located where port 31 is at present and at 31e as in photo 24-119, and<br>b) a simple Ø6.5 mm diameter hole in each duct wall about 50 mm below the new ports for the RMF008 vacuum measurements. |

| | | |
|---|---|---|
| 32 | Location 32 in Fig 2. | See photos 24-120 and 24-121. Port 32 was first used to get an indication of velocity using a pitot tube but the velocity was too low for reliable measurement. The micro anemometer is capable of better measurement but the port hole (under the flap) is too small to insert the instrument. An elliptical hole in the surface of the box, Ø16 mm with the axis perpendicular to the duct centreline that lies in the same direction as the slide moves, is needed for the micro anemometer where port 32 is. This is so the anemometer can be moved across the air flow below the slide valve in the same direction that the slide moves. This is not ideal because it is difficult to assess the average velocity and the effective flow cross-section with the mis-match between transition box section and the slide valve aperture.<br>For RMF008 vacuum measurement, a simple Ø 6.5 mm hole in the vertical face of the duct transition box, for each of the two ducts, shown as 32x and 32 y in photos 24-120 and 121, will give a higher vacuum than in the bin headspace. This will give larger more consistent numbers for comparison in monitoring than inserting a vacuum measuring tube under the bin fabric cover.<br>For a velocity measurement, to determine the air flowrate, new Fig 5 type ports located in the bottom of each duct as shown as 32w and 32e in photos 24-120 and 121 would work best and is identified as Option 2 in the photos. Finding a workable location is difficult in this case and would require standing on a temporary supporting panel on the top of the bin fabric supporting steel mesh. For the proposed new port 32e in photo 24-121, the port would be located as far as possible along the straight horizontal run of duct while still safely standing on top of the bin.<br>It is not clear at present whether standing on the top of the bin to access the two ducts would necessarily fall into the category of 'working at heights' but it is expected that a body harness and tether would still be required for protection against the unlikely possibility of a trip resulting in a fall right over the walkway and handrail.<br>The other option for duct air velocity measurement (identified as Option 1 in the photos), is to install a similar port to that done for Port 32 in the second duct transition box. This port is designated 32z in the photos.<br>Despite the velocity measurement challenge, Option 1 is considered best and easiest to implement. Providing new Fig 5 type ports are installed in the ground meal bin ducts at 31 and 31e, it will be possible to check the flows obtained at ports 32 and 32z by deducting the other known flows from those measured at the scrubber. |

## Table 7. Summary of Issues and Potential Solutions from 2023 and 2024

### A: Review of 2023 Open Items *[Comments in italics are current comments]*

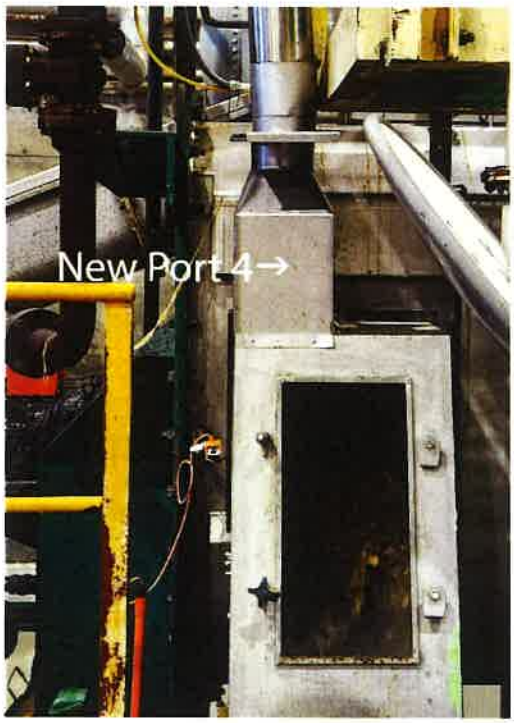
| | | | |
|---|---|---|---|
| 2023-1 | Analogue temperature and pressure gauges on ducting used for manual temperature and pressure recording in check sheet RMF 008. | Gauges not reading accurately. Sensor corroded in some. Need replacement or calibration to ensure an accurate record is made. | *[All temperature and pressure gauges seen on ducting during inspection were in good order and reading as expected.]* |
| 2023-2 | RMF 008 vacuum measuring port locations for remote tubes prone to blockage. | Relocate measuring location to simple Ø6.5mm hole in an accessible wall of the equipment head space (i.e., upstream of the slide valve). | *[Largely implemented. Table 6 lists the current status of the various ports.]* |
| 2023-3 | Decanter Feed Tank 2.11 air extraction duct butterfly valve | Need to close butterfly valve slightly to reduce flow to 300 m3/h. | *[Butterfly valve was closed to 30° giving 570 - 770 m3/h, 70% of previous flow. Valve set at this position to maintain adequate inward velocity at tank openings.]* |
| 2023-4 | Press extraction ducts and cross-conveyor extraction ducts | Need to reduce flow rates by adjustment of slide valves at 8t and 8s to achieve total flow around 1000 m3/h subject to satisfactory performance checking. At same time conveyor slide valves 12e and 12w need to be opened a little to increase conveyor head space vacuum. Consequent effect on drier feed conveyor, separator manifold and south manifold equipment will also need to be checked. | *[Adjustment done in Nov 2023. Issue was found with duct at port 8 not being level and accumulating condensate. This affected measured velocity. A better balance was achieved but further issues were found that are still being resolved.]* |
| 2023-5 | Exhaust ducting from driers vacuum measuring port (33, Fig 3) | Solids blocked fitting, needs replacement, together with new line to remote monitoring station. | *[This was done by AFFCO in 2023 and was working in March 2024]* |
| 2023-6 | Review of RMF 008 Check Sheet | Carry out a review based on a list to be provided of potential corrections and clarifications to ensure accurate meaningful monitoring occurs. | Kupetech to provide list. *[RMF 008 amendment completed.]* |
| 2022-4 | Separator Discharge Manifold and Decanter Solids Conveyor Extraction Air Balance | Further flow measurement and calculation needed to confirm what is happening in the piping including Port 9 and Port 12 followed by further balancing if needed. Similar checks are also needed in relation to Ports 3 and 14. | *[2023: Further flow measurement has confirmed the need for further flow balancing at the decanter feed tank, the press and the solids cross-conveyor.]* *[2024: Closure of openings in decanter feed tank extraction ducting has enabled better flow measurement of air extracted from heated tanks 2.11 and 2.15 able to be related to vacuum at port 14.. Port 9 piping still has issues for which further action is proposed. Extraction air flow at Ports 12 and 12w has increased but the adjustment wanted has not yet been achieved. Futher action is being proposed to try and resolve this. Port 3 adjustment is being limited by preheater steam valve control.]* |

# B: 2024 Issues

| No | Item | Issue (As stated in the 2024 Report) | Comment |
|---|---|---|---|
| 2024-1 | Provide Ø6.5 mm hole in preheater outlet box | See Table 6 Port 4 note and photo 24-101. | |
| 2024-2 | Blood decanter air extraction duct | Steamy emissions not captured. Port 5 located above slide valve.<br>See Table 6 port 5 note. | Monitoring location changed to hole at duct bend below slide valve. Decanter to be replaced by new processing equipment. |
| 2024-3 | Drainer conveyor air extraction duct | Remote port 6 frequently blocked and above slide valve.<br>See Table 6 port 6 note. | Vacuum monitoring location changed to port 6 as seen in photo 24-102. |
| 2024-4 | Drainer conveyor extracted air flow measurement. | Fig 5 type port needed for air flow measurement.<br>See Table 6 port 6F note and photo 24-103 for location. | |
| 2024-5 | Press feed conveyor inlet hopper: provide Ø6.5 mm hole in box wall below flow measuring port for RMF008 vacuum monitoring. | See Table 6 Port 7 note and photo 24-104 for location. | |
| 2024-6 | Raise Ø200 mm extraction duct at support north of Port 8 | Duct falls towards bend resulting in condensate entrapment limiting air flow cross section and adversely affecting vacuum measurement. See Table 6 Port 8 note and photos 24-107 and 24-108. | |
| 2024-7 | Provide Ø6.5 mm hole in extraction duct to one side of port 9 for vacuum monitoring | See Table 6 Port 9 note re Ø6.5 mm hole. | |
| 2024-8 | Provide Fig 5 flow measuring port to measure separator + conveyor 12w air flow | See Table 6 Port 9 note re Fig 5 type port and photo 24-110. | |
| 2024-9 | Provide Ø6.5 mm hole in Port 11 extraction box for direct headspace vacuum monitoring | See Table 6 Port 11 note re vacuum monitoring at conveyor head. See photo 24-111. | |
| 2024-10 | Change Pneufit swivel bend fitting for straight Pneufit fitting at Port 11. | See Table 6 Port 11 note re remote vacuum monitoring connector at Port 12 to reduce blockage frequency and enable easy blockage clearance. See photo 24-111. | |
| 2024-11 | Drill Ø6.5 mm hole in centre of plug closing port 12w. | See Table 6 Port 12 note re vacuum monitoring port for conveyor headspace at port 12w seen in photo 24-112. | |
| 2024-12 | Install a Fig 5 port for separator air flow measurement. | See Table 6 Port 12 note re new port 12t as in photo 24-110, to enable measurement of separators + conveyor 12w total flow. | |
| 2024-13 | Reduce press-decanter solids conveyor top plate warp west of port 12w | See Table 6 Port 12 note re photo 24-122. Look for any other openings that can be reduced, to increase conveyor vacuum through to dry area. | |
| 2024-14 | Cease RMF008 monitoring of port 13 and reduce conveyor headspace opening | See Table 6 port 13 note. Close off gap seen in photo 24-105 except for a Ø20 mm hole approx that can be used for vacuum and inward velocity measurement. | |

| | | | |
|---|---|---|---|
| 2024-15 | Introduce occasional monitoring of liquid phase tanks headspace vacuum. | See Table 6 port 14 note. Insert vacuum measuring tube into tank headspace when tanks are not hot and fan 14.1 is operating, to check port 14 vacuum > tank headspace vacuum i.e. that port 14 is not blocked. | |
| 2024-16 | Provide Ø6.5 mm hole in driers discharge conveyor extraction box for vacuum monitoring | See Table 6 port 16 note and new port 16b in photo 24-115. | |
| 2024-17 | Replace valve and tail piece at port 16 with 20 BSP plug. | See Table 6 port 16 note. Valve and tail piece not required with new port 16b and is an unnecessary obstruction to gather dust. Special gland is interchanged with plug during velocity measurement. | |
| 2024-18 | Modify section 2 of the RMF008 to include port 10/16 in the Tuesday box | See Table 6 port 16 note. | |
| 2024-19 | Ground meal bin air extraction monitoring ports. | See Table 6 port 31 note and photos 24-118 and 119.<br>Install new Fig 5 type ports at 31 and in the parallel duct. (designate 31e and 31w).<br>Provide Ø6.5 holes in duct 50 mm below new Fig 5 ports for vacuum monitoring. | |
| 2024-20 | Unground meal bin air extraction velocity measuring ports | See Table 6 port 32 note and photos 24-120 and 121.<br>Install port same as 32 in east extraction box (port 32z in photos) and make holes under flabs Ø16 min in horizontal slide direction. | |
| 2024-21 | Unground meal bin air extraction vacuum monitoring ports | See Table 6 port 32 note and photos 24-120 and 121.<br>Provide Ø6.5 mm holes (32x and 32y in photos) in vertical side of the transition box for vacuum monitoring. | |
| 2024-22 | Preheater steam control valve control loop tuning | See photos 24-123 and 24-124 of extracted air temperature logging at the same location shown in photo 24-125. Temperature control hunting affects the air temperature right through to the uncovered biofilter. Photo 24-124 from 2022 was logged for less time than in 24-123 and the throughput then may have been more steady, so not a fair comparison, but it appears that something has changed with the sensing and or control loop tuning. Varying temperature affects the airflows and the slide valve downstream of port 3 was opened further to contain steamy emission at temperature peaks. This carries the adverse effect of greater fat transport in the extracted air and less margin below the temperature limit for air going to the uncovered biofilter. Greater stability would assist monitoring vacuum comparison and enable a reduction in the preheater extracted airflow, reducing risk of exceeding consent biofilter temperature limit. | |
| 2024-23 | Covered biofilter media now at limit of acidity guideline. | Further monitoring to confirm low pH values.<br>Air distributing laterals under bed to be checked for clear passages i.e. not blocked with fat. | |
| 2024-24 | Covered biofilter media. | If pH further declines, or laterals found blocked as in 2024-23, replace media.<br>If media replaced, ensure central bed depth gauge firmly installed with datum set at average base height. | |
| 2024-25 | Vacuum in driers extraction duct, port 33. | Measured vacuum 9 Pa is low compared to previous years. It may be necessary to adjust valves and/or other restriction at evaporator to increase vacuum slightly. This will also slightly increase airflow to the covered biofilter. | |

# Photographs



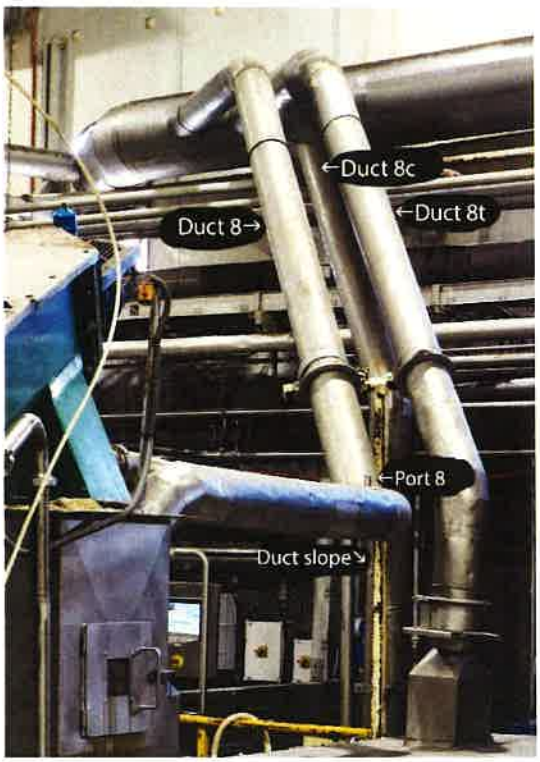

24-101: New Vacuum Port 4 Location


24-103: Drainer conveyor new Fig 5 flow measuring port location


24-102: New Vacuum Port 6 (existing)

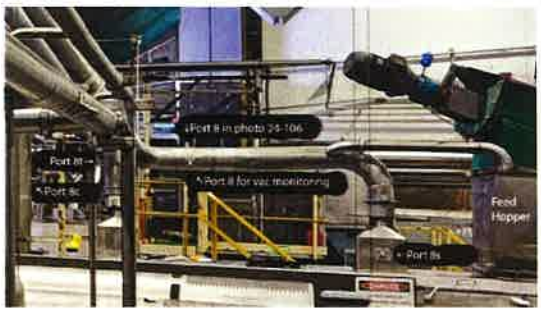

24-104: New vacuum port 7 location


24-105: Existing port 13 location




24-107: Duct 8 with upper Port 8

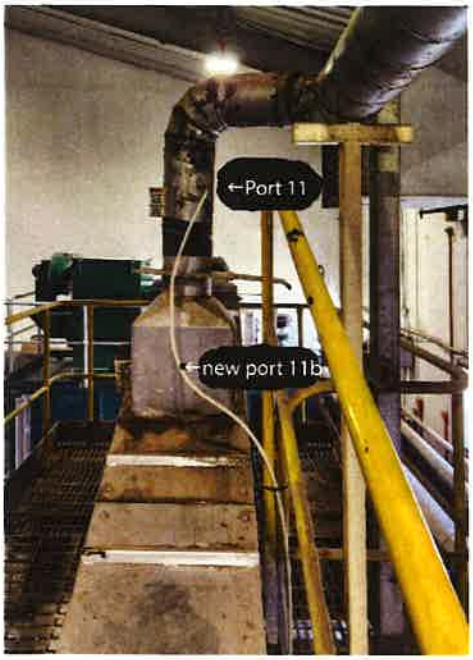

24-106: West side of Duct 13




24-108: Monitoring Port 8 and Ports 8s, 8t, 8c

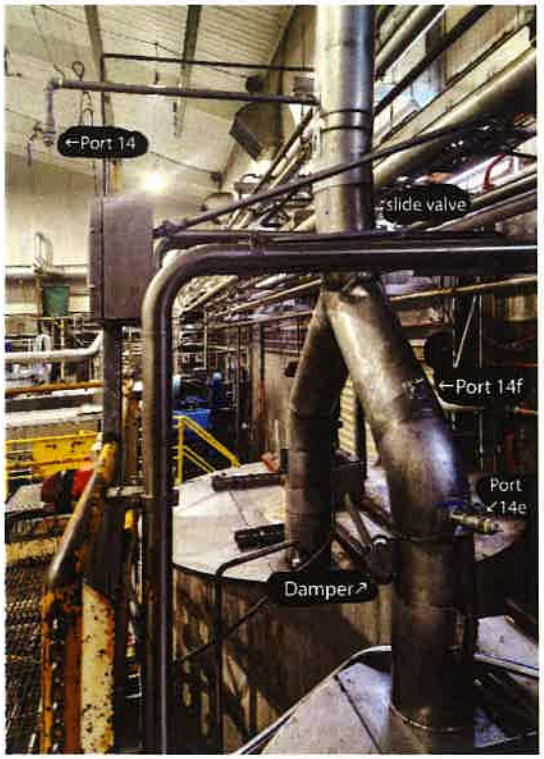

24-109: Port 9 to Duct 12 piping


24-110: New Fig 5 port 12t

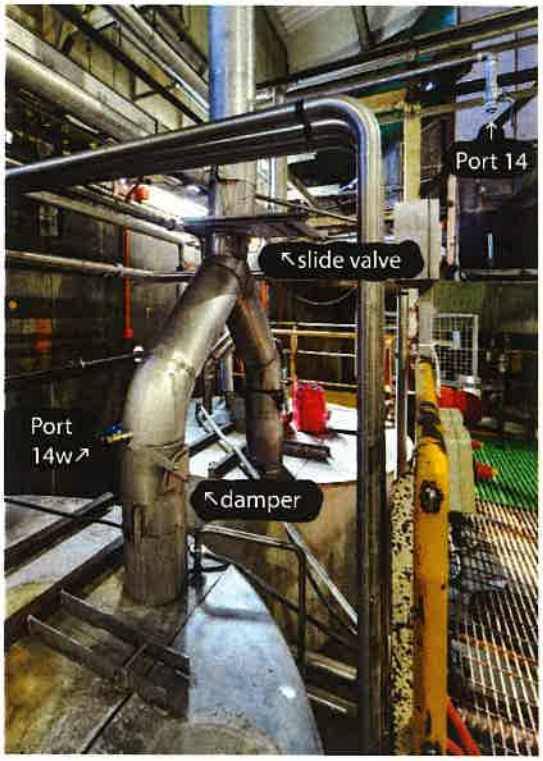



24-111: Driers Feed Conveyor Port 11


24-112: Ports 12 and 12w

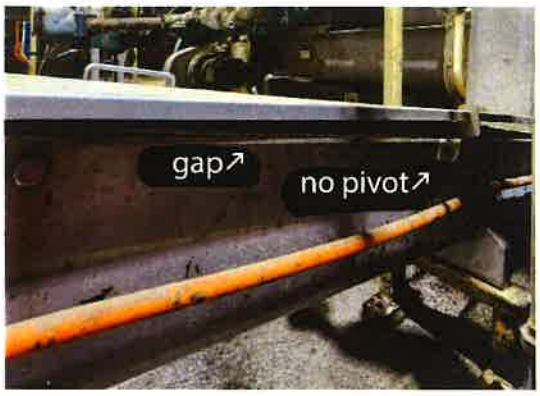



24-113: Decanter Feed Tank 2.11 ports




24-114: Separator Feed Tank 2.15 ports


24-115: Meal Discharge Conveyor Port 16



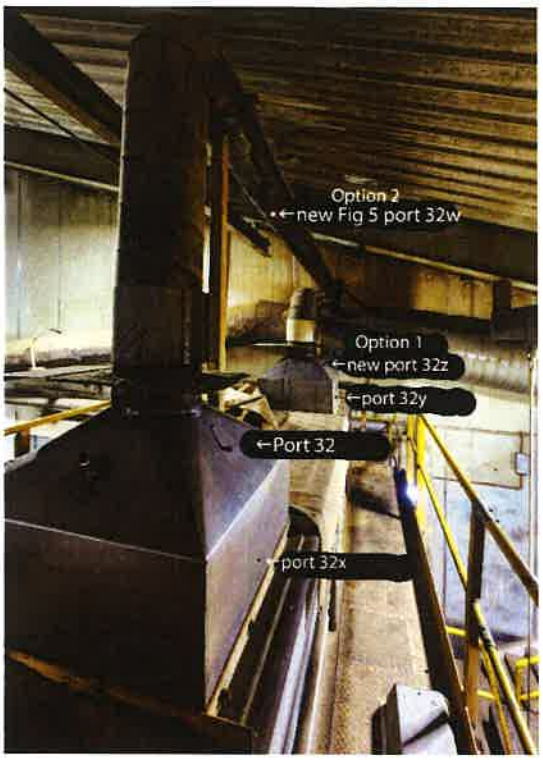

24-116: Discharge conveyor lid gap


24-117: Location 12a in Fig 1

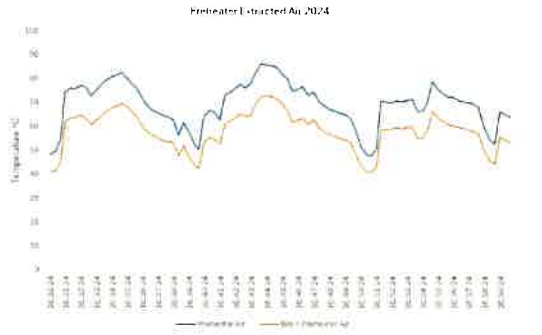

24-118: Ports 30 and 31 in Fig 2


24-119: Ground meal bin ducting

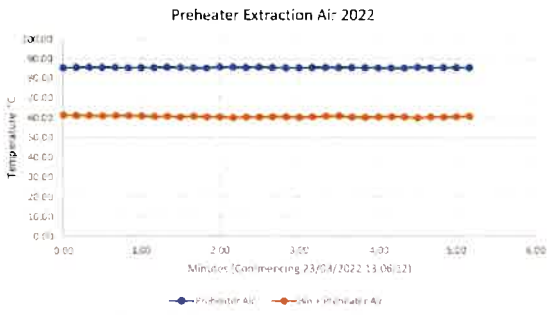

24-122: Conveyor between 12w and 12a



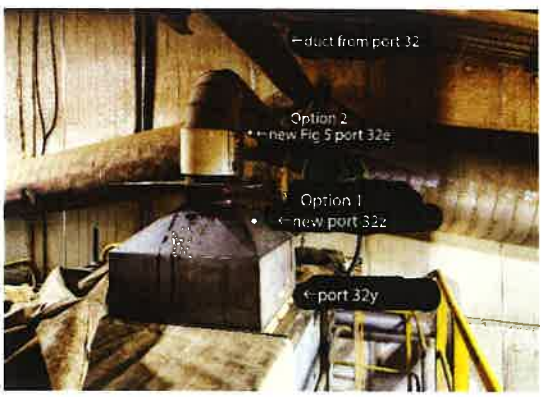

24-120: Unground meal bin ports west



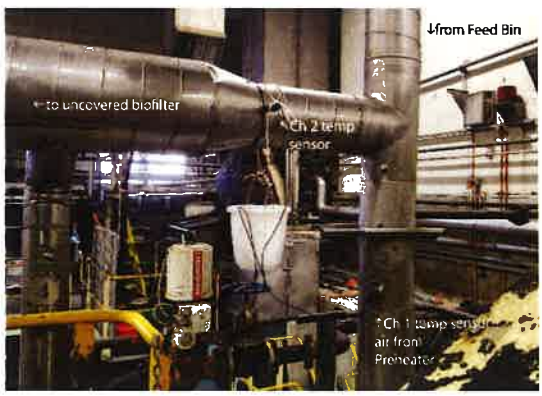

24-123: Preheater Extracted Air 2024




24-124: Preheater Extracted Air 2022




24-121: Unground meal bin port west




24-125: Preheater air temp logging

# APPENDIX 4 –

# KupeTech Action List - 2024

## Table 7. Summary of Issues and Potential Solutions from 2023 and 2024

### A: Review of 2023 Open Items *[Comments in italics are current comments]*

| | | | |
|---|---|---|---|
| 2023-1 | Analogue temperature and pressure gauges on ducting used for manual temperature and pressure recording in check sheet RMF 008. | Gauges not reading accurately. Sensor corroded in some. Need replacement or calibration to ensure an accurate record is made. | *[All temperature and pressure gauges seen on ducting during inspection were in good order and reading as expected.]* |
| 2023-2 | RMF 008 vacuum measuring port locations for remote tubes prone to blockage. | Relocate measuring location to simple Ø6.5mm hole in an accessible wall of the equipment head space (i.e., upstream of the slide valve). | *[Largely implemented. Table 6 lists the current status of the various ports.]* |
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| 2023-4 | Press extraction ducts and cross-conveyor extraction ducts | Need to reduce flow rates by adjustment of slide valves at 8t and 8s to achieve total flow around 1000 m3/h subject to satisfactory performance checking. At same time conveyor slide valves 12e and 12w need to be opened a little to increase conveyor head space vacuum. Consequent effect on drier feed conveyor, separator manifold and south manifold equipment will also need to be checked. | *[Adjustment done in Nov 2023. Issue was found with duct at port 8 not being level and accumulating condensate. This affected measured velocity. A better balance was achieved but further issues were found that are still being resolved.]* |
| 2023-5 | Exhaust ducting from driers vacuum measuring port (33, Fig 3) | Solids blocked fitting, needs replacement, together with new line to remote monitoring station. | *[This was done by AFFCO in 2023 and was working in March 2024]* |
| 2023-6 | Review of RMF 008 Check Sheet | Carry out a review based on a list to be provided of potential corrections and clarifications to ensure accurate meaningful monitoring occurs. | Kupetech to provide list. *[RMF 008 amendments completed.]* |
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## B: 2024 Issues

| No | Item | Issue (As stated in the 2024 Report) | Comment |
|---|---|---|---|
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| 2024-2 | Blood decanter air extraction duct | Steamy emissions not captured. Port 5 located above slide valve. See Table 6 port 5 note. | Monitoring location changed to hole at duct bend below slide valve. Decanter to be replaced by new processing equipment. |
| 2024-3 | Drainer conveyor air extraction duct | Remote port 6 frequently blocked and above slide valve. See Table 6 port 6 note. | Vacuum monitoring location changed to port 6 as seen in photo 24-102. |
| 2024-4 | Drainer conveyor extracted air flow measurement. | Fig 5 type port needed for air flow measurement. See Table 6 port 6F note and photo 24-103 for location. | |
| 2024-5 | Press feed conveyor inlet hopper: provide Ø6.5 mm hole in box wall below flow measuring port for RMF008 vacuum monitoring. | See Table 6 Port 7 note and photo 24-104 for location. | |
| 2024-6 | Raise Ø200 mm extraction duct at support north of Port 8 | Duct falls towards bend resulting in condensate entrapment limiting air flow cross section and adversely affecting vacuum measurement. See Table 6 Port 8 note and photos 24-107 and 24-108. | |
| 2024-7 | Provide Ø6.5 mm hole in extraction duct to one side of port 9 for vacuum monitoring | See Table 6 Port 9 note re Ø6.5 mm hole. | |
| 2024-8 | Provide Fig 5 flow measuring port to measure separator + conveyor 12w air flow | See Table 6 Port 9 note re Fig 5 type port and photo 24-110. | |
| 2024-9 | Provide Ø6.5 mm hole in Port 11 extraction box for direct headspace vacuum monitoring | See Table 6 Port 11 note re vacuum monitoring at conveyor head. See photo 24-111. | |
| 2024-10 | Change Pneufit swivel bend fitting for straight Pneufit fitting at Port 11. | See Table 6 Port 11 note re remote vacuum monitoring connector at Port 12 to reduce blockage frequency and enable easy blockage clearance. See photo 24-111. | |
| 2024-11 | Drill Ø6.5 mm hole in centre of plug closing port 12w. | See Table 6 Port 12 note re vacuum monitoring port for conveyor headspace at port 12w seen in photo 24-112. | |
| 2024-12 | Install a Fig 5 port for separator air flow measurement. | See Table 6 Port 12 note re new port 12t as in photo 24-110, to enable measurement of separators + conveyor 12w total flow. | |
| 2024-13 | Reduce press-decanter solids conveyor top plate warp west of port 12w | See Table 6 Port 12 note re photo 24-122. Look for any other openings that can be reduced, to increase conveyor vacuum through to dry area. | |
| 2024-14 | Cease RMF008 monitoring of port 13 and reduce conveyor headspace opening | See Table 6 port 13 note. Close off gap seen in photo 24-105 except for a Ø20 mm hole approx that can be used for vacuum and inward velocity measurement. | |
| 2024-15 | Introduce occasional monitoring of liquid phase tanks headspace vacuum. | See Table 6 port 14 note. Insert vacuum measuring tube into tank headspace when tanks are not hot and fan 14.1 is operating, to check port 14 vacuum > tank headspace vacuum i.e. that port 14 is not blocked. | |
| 2024-16 | Provide Ø6.5 mm hole in driers discharge conveyor extraction box for vacuum monitoring | See Table 6 port 16 note and new port 16b in photo 24-115. | |

| | | | |
|---|---|---|---|
| 2024-17 | Replace valve and tail piece at port 16 with 20 BSP plug. | See Table 6 port 16 note. Valve and tail piece not required with new port 16b and is an unnecessary obstruction to gather dust. Special gland is interchanged with plug during velocity measurement. | |
| 2024-18 | Modify section 2 of the RMF008 to include port 10/16 in the Tuesday box | See Table 6 port 16 note. | |
| 2024-19 | Ground meal bin air extraction monitoring ports. | See Table 6 port 31 note and photos 24-118 and 119.<br>Install new Fig 5 type ports at 31 and in the parallel duct. (designate 31e and 31w).<br>Provide Ø6.5 holes in duct 50 mm below new Fig 5 ports for vacuum monitoring. | |
| 2024-20 | Unground meal bin air extraction velocity measuring ports | See Table 6 port 32 note and photos 24-120 and 121.<br>Install port same as 32 in east extraction box (port 32z in photos) and make holes under flabs Ø16 min in horizontal slide direction. | |
| 2024-21 | Unground meal bin air extraction vacuum monitoring ports | See Table 6 port 32 note and photos 24-120 and 121.<br>Provide Ø6.5 mm holes (32x and 32y in photos) in vertical side of the transition box for vacuum monitoring. | |
| 2024-22 | Preheater steam control valve control loop tuning | See photos 24-123 and 24-124 of extracted air temperature logging at the same location shown in photo 24-125. Temperature control hunting affects the air temperature right through to the uncovered biofilter. Photo 24-124 from 2022 was logged for less time than in 24-123 and the throughput then may have been more steady, so not a fair comparison, but it appears that something has changed with the sensing and or control loop tuning. Varying temperature affects the airflows and the slide valve downstream of port 3 was opened further to contain steamy emission at temperature peaks. This carries the adverse effect of greater fat transport in the extracted air and less margin below the temperature limit for air going to the uncovered biofilter. Greater stability would assist monitoring vacuum comparison and enable a reduction in the preheater extracted airflow, reducing risk of exceeding consent biofilter temperature limit. | |
| 2024-23 | Covered biofilter media now at limit of acidity guideline. | Further monitoring to confirm low pH values.<br>Air distributing laterals under bed to be checked for clear passages i.e. not blocked with fat. | |
| 2024-24 | Covered biofilter media. | If pH further declines, or laterals found blocked as in 2024-23, replace media.<br>If media replaced, ensure central bed depth gauge firmly installed with datum set at average base height. | |
| 2024-25 | Vacuum in driers extraction duct, port 33. | Measured vacuum 9 Pa is low compared to previous years. It may be necessary to adjust valves and/or other restriction at evaporator to increase vacuum slightly. This will also slightly increase airflow to the covered biofilter. | |

# APPENDIX 5 –

# Community Liaison Group

# Minutes - 2024

AFFCO IMLAY

# COMMUNITY LIAISON GROUP MEETING – MARCH 2024

| | |
|---|---|
| **Date of Meeting:** | **27.03.24** |
| **Present:** | **Walid Mahmoud - Imlay Plant Manager (WM); Ricky Gowan - Imlay Compliance Manager (RG); Barbara Allan (BA); Graham Pearson (GP); Pita Kinaston – Horizons (PK); Stephen Bryson (SB); Lonia Sarniak (LS).** |
| **Apologies :-** | |

**ACTIONS AGREED:**

| Subject | Action |
|---|---|
| Topics of Discussion and Agreed Actions | **Meeting Agenda:-**<br><br>• Review 2023 CLG Meeting Minutes;<br>• Odour Complaint Trending;<br>• Points of Interest;<br>• Odour Complaint Register 2023 / 2024 period.<br><br>Minutes:-<br><br>RG:- Tabled meeting agenda. Covered the outstanding issue from the 2023 CLG Meeting. Discussed current odour complaint trends. Emphasised the fact that odour complaints were down 50% on the previous reporting period. Good gains made. Only 1 substantiated odour complaint for the period to date.<br><br>BA:- Agreed that results were pleasing, however the ultimate target is zero complaints and that the company should be striving to achieve this. Imlay reps were in agreeance with this.<br><br>SB / LS:- Raised the issue that there was a constant odour issue throughout January. Although they did not lay a complaint, they stated that particularly on calm days, Imlay rendering odours were constant. Imlay reps stated that there was nothing out of the ordinary during this period and suggested that a complaint is made so odour investigations can take place. SB raised a question if there was a known measurement factor that the number of odour complaints received could be calculated resulting in an adjusted 'actual' tally. PK – Horizons – stated that there is no known factor in existence. BA also backed this statement up as she had also done research on this subject.<br><br>SB:- Questioned PK on the FIDOL odour assessment procedure. PK explained what the acronym FIDOL stands for, plus the odour assessment approach and associated parameters such as:- General Hedonic Tone; Plume Width; Scale of Intensity; Wind Velocity and Wind Direction. RG stated that he would drop off a blank form to SB so he could familiarise himself with those parameters ***(RG to action – completed 28.03.24)***. SB also made a suggestion that Horizons should do a leaflet drop off in the neighbourhood explaining the definition of 'objectionable odours'. (NOTE:- There is a definition on the reverse side of the FIDOL Assessment Form).<br><br>SB:- Asked the Imlay reps if an investigation was carried out on 'unsubstantiated odour complaints', as to the source of the odour, as well as daily monitoring on rendering odour performance. RG responded that yes an upwind assessment is carried out to ascertain if the odour originated from businesses west of Imlay. RG also stated that daily routine monitoring is carried out within Imlay's boundary fence. RG stated that other businesses were a source of odours, such as the new composting site next to the Council pump station. Horizons were unaware of this composting business. GP stated the composting company is 'Easy Earth' composting, which collects household and commercial food scraps. They are also contracted to process all WDC owned buildings food scraps. Easy Earth have been a source of odours recently.<br><br>WM:- stated that Imlay gets the blame for all odours within the area. A lot of it is to do with historical performance.<br><br>SB:- Stated that Open Country produced the most odours. SB asked Horizons if Open Country had a consent that they had to comply with. PK responded 'yes'. Suggested that if SB had concerns that he should contact Horizons via the Pollution Hotline.<br><br>BA:- stated that Imlay's consent is coming up for renewal and that if anyone has an issue, they should submit their concerns. BA also requested that Imlay upload the complaints register on the website each time a complaint is made. ***(RG to action - Completed)***.<br><br>Meeting closed 18:40. Thanks to all those who attended. |