Air Noise Environment
Environmental Monitoring and Assessment

# Odour Audit - JJ Richards Glendenning

## JJ Richards & Sons

**Date of Issue: 27 September 2018**

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# DOCUMENT CONTROL SHEET

## Document Details

| | |
|---|---|
| Project Reference: | 4022.3AuditReport02.odt |
| Document Title: | Odour Audit - JJ Richards Glendenning |
| Client: | JJ Richards & Sons |
| Document Reference: | /Network/Projects/4022.3/Reporting/4022.3AuditReport02.odt |

## Revision History

| Version: | Issue Date: | Author: | Description: | Approved by: |
|---|---|---|---|---|
| 00 | 25/9/18 | Samuel Wong | Internal Draft | - |
| 01 | 26/9/18 | Samuel Wong | Draft for Client | Claire Richardson |
| 02 | 27/9/18 | Samuel Wong | Final for Client | Claire Richardson |
| **Revision:** | **Issue Date:** | **Author:** | **Details of Revision:** | |
| 01.1 | | | | |
| 01.2 | | | | |
| 02.1 | | | | |
| 02.2 | | | | |



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Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s).

The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Air Noise Environment Pty Ltd for the purposes of this project is both complete and accurate.

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# 1 Introduction

## 1.1 Scope of Study

JJ Richards & Sons commissioned Air Noise Environment to undertake an odour audit of their liquid waste transfer facility located at 14 Rayben Street, Glendenning. The audit was undertaken to review current odour management practices and mitigation measures at the site as required by the site's Development Consent (11 January 2017) and NSW Environmental Protection Licence (Number 21053, 31 May 2018).

The audit was undertaken by Samuel Wong (Senior Environmental Engineer, BEng(Chem)), a qualified air quality consultant with over 10 years experience. Air emissions testing was conducted by Gary Hall (Air Monitoring Manager, BSc(Hons)) who has over 20 years in air monitoring, particularly as a source-sampling specialist. These personnel were approved by NSW EPA for completing the audit, prior to the audit being undertaken.

## 1.2 Approval Conditions

The audit was undertaken to address the requirements of the Development Consent and Environmental Protection License (EPL) for the site. Table 1.1 presents a summary of the Development and EPL conditions, and the report sections addressing each of the conditions.

Table 1.1 - Approval Conditions and Report Section

| EPL Condition E4 | Development Consent Condition B14 | Report Section |
|---|---|---|
| a) Present the results (including test reports) of post commissioning sampling and analysis for the discharge from activated carbon filter(s) servicing the organic waste process area. The post commissioning sampling and analysis required under condition M2. The sampling methods are those contained in the Approved Methods for Sampling and Analysis of Air Pollutants in NSW (EPA, 2016 ).<br><br>Detailed activity data and process description at the time of sampling must be included. | c) Include sampling and analysis undertaken in accordance with an EPL. | Post-commissioning testing was undertaken on 28 August 2018. A summary of the testing completed is provided in Section 3. Appendix B presents a technical report showing the methodology and results of the testing. |
| b) Compare results of post commissioning sampling with the emission estimation in the Air and Noise Assessment submitted as part of Development Application SSD6767. | f) validate the development against the odour predictions in the EIS and RTS. | Section 3 presents a comparison of post-commissioning testing results and emissions estimation adopted in the DA assessment. Section 4 presents updated air dispersion modelling with the most recent emissions testing results. |

| EPL Condition E4 | Development Consent Condition B14 | Report Section |
|---|---|---|
| | | The results of the testing and revised modelling indicate actual odour emissions from the site are lower than those assumed in the DA assessment. |
| c) Details and analysis of any odour complaints received and any actions taken to address verified complaints. Any analysis conducted should make reference to the data collected by the on-site meteorological station required under condition M4 and operational details at the time of receiving the complaint. | d) include a summary of air and odour emission related complaints and any actions there were carried out to address the complaints.<br>e) if odour complaints are received, the audit team must review the meteorological data for the Site and the region to establish the likelihood that the source of odour originated from the development. If it is likely that odour originated from the development it must be reported in accordance with Condition C7. | No odour complaints have been received by the facility since commencement of operations. |
| d) An evaluation of the performance of odour mitigation and management measures implemented at the premises, including the activated carbon filters(s). | b) audit the development whilst in full operation and during receival of organic waste.<br>g) Review design and management practices of the Development against industry best practice for air emissions and odour management. | See Section 2 |
| e) Where analysis undertaken in parts (b), (c), (d) indicates the potential for adverse odour beyond the site boundary investigation into additional reasonable and feasible mitigation measures must be conducted.<br>f) The nomination of a time frame to implement any additional measures identified in part (e). | h) Include an action plan that identifies and prioritise additional air and odour emission mitigation measures that may be necessary to reduce air emissions. | See Section 5 for recommendations. No significant odour issues were identified. |

## 1.3 This Report

This report presents the findings of the audit and emissions testing. Appendix A presents a glossary of terms to assist the reader.

This report also makes reference to the following related reports:

- DA air quality assessment – Air Noise Environment, Air and Noise Assessment – Proposed Liquid Waste Facility, Glendenning – FINAL, February 2016, Ref: 4022.1report02.odt
- Odour Management Plan – Air Noise Environment, Odour Management Plan – 14 Rayben Street, Glendenning – FINAL, April 2017, Ref:4022.2-OMP-07.odt.

# 2 Audit Outcomes

A site audit was undertaken on 22 August 2018. The audit was undertaken to observe and evaluate the odour mitigation and management measures adopted at the site while in full operation. Overall, odour emissions were considered to be mitigated and managed effectively, and JJ Richards & Sons personnel followed the requirements of the site OMP. Key observations that were made during the audit include the following (Appendix B presents photos from the site audit).

**Organics Waste Building**

- No odour was observed external to the building. Inside the building, the observed odour intensity was considered weak.
- The organic waste building is ventilated using 8 rooftop mechanical exhaust fans, directing odour emissions vertically;
- The organic waste building was well maintained and clean, and there were no spills observed;
- Odour Control Unit:
  - an Odour Pro Odour Control Unit using activated carbon was installed and operating as outlined in the site OMP. A large volume of additional activated carbon readily was available on site;
  - the OCU operates continuously during operations;
  - all organic waste tanks were fully sealed and connected to the OCU;
  - the DAF unit was located in an enclosed room and all emissions were vented via the OCU.
- Waste unloading:
  - Roller doors and entry doors remain closed at all times, except when trucks enter and leave the building. It was observed that the roller door is closed immediately after a truck enters or leaves the building;
  - An odour neutraliser is used as required and as per the OMP. At the time of the site visit, the neutraliser was applied on the back of the truck prior to departure;
  - When a truck has been emptied and the transfer line is disconnected, there is a potential for small amounts of liquid to spill on the floor. A container is located under the connection point to prevent spillage, and the truck is wiped down prior to departure.

**Waste Oil Area**

- All tanks are connected to a single rooftop vent. Hence, all breathing and unloading emissions will be released through this vent;
- The unloading process that was observed did not result in any spillage however, a container is placed under the connection point to the truck to collect any spillage (after being disconnected) as a precaution;

- there were 2 open transfer containers (approximately 1.5 m x 1.5 m x 1.5 m) for oily water however, these had negligible emissions (weak odour when making an observation directly above the surface of the oily water). These containers are for short-term storage only – oily water from a new used oil load is transferred to the container, before being immediately transferred to one of the permanent sealed tanks;
- spillage of used oil was observed below the filter area. The oil was noted to have been wiped down already with only a thin layer of residual waste oil remaining. No odour was identified except where observations were made directly above the floor. It is understood the spillage occurs during filter cleaning which is required on a daily basis.
- The unloading area is washed down as required (usually at the end of the day).

The containment of waste oil spills during filter cleaning at the waste oil area has been identified as the main area of potential improvement in odour management. This potential odour source is considered low risk in terms of potential impacts, nonetheless, improvements could be implemented. The nature of the filter changing procedure results in some waste oil spillage however, better containment of the spill will simplify cleaning procedures and the potential for odour. It is understood that containing the spills is difficult due to the minimal space provided below the filters. Discussions with JJ Richards & Sons indicates that this aspect of the operations is being reviewed to determine the most effective solution of containing the spill.

Table 2.1 presents a summary of the audit items and outcomes.

Table 2.1: Odour Audit Check-list

| Audit | Outcome |
|---|---|
| **General Odour Management Measures** | |
| Odour neutraliser back packs. | Pleasant Plus odour neutraliser provided in organics building. The neutraliser is used as required e.g. spills, odorous emissions, back of trucks. |
| Are there spill kits on site? | Spill kits are located inside and outside the organics building, and spill cloths are provided at the waste oil transfer area. |
| Are all emissions from organic tanks vented through a odour control system? | Yes. All organic tanks are vented through the Odour Pro FiltaCarb odour control unit. |
| **Organics Building** | |
| Is there a:<br>• designated unloading bay?<br>• Bunded concrete floor?<br>• Drainage to two blind sumps | Yes. There is a designated unloading bay for grease trap and used oil, and a loading bay. All tank areas are fully bunded and sumps are located in each area. |
| Is the organics building roofed and walled to prevent egress of odour? | Yes. Fully enclosed building has been constructed. |
| Are all doors and openings closed, except for egress/entry? | Yes. Upon arrival, all doors and roller doors were closed. Roller doors were noted to open only during truck arrival or departure. |
| Are all tanks and DAF located in a bunded tank farm of approximately 218 $m^3$ and vented through a carbon filter? | Yes. All organic tanks and the DAF unit are vented via the Odour Pro FiltaCarb odour control unit and within a bunded area. |

| Audit | Outcome |
|---|---|
| Are all treatment equipment and chemicals/additives in a 400 mm high tank farm within the buildings? | Yes. The caustic chemicals are in the same area as the organics tanks, which are bunded. |
| Are 8 exhaust fans provided? | Yes. 8 mechanical rooftop exhaust fans are spaced across the ceiling (Model RCV500-6D). |
| **Waste Acceptance Procedure** | |
| How do the sales personnel and customer service personnel evaluate waste prior to quotation? | Grease trap units must be registered under Sydney Water and therefore, must comply with relevant grease trap requirements. All collected waste is from registered units. |
| Is documentation cross checked at the time of receival with initial quotation and sale documentation? | Details of grease trap waste is recorded at pickup and at unloading (via automated scanning procedure). |
| **Waste Receival and Unloading** | |
| Are roller doors closed during unloading? | Yes. This was observed on multiple occasions. |
| Qualitative observations of all liquid waste receival operations is required by the OMP. | Yes.<br>Odour field sheets from Appendix B of the OMP were noted to be used on site. |
| **Odorous Loads** | |
| Are odour management measures implemented during an odorous load? Observe. | No odorous loads have occurred since commencement of operations. |
| Are the following steps undertaken during odorous loads:<br>close all doors;<br>use of odour neutraliser<br>investigation of source with Waste Acceptance Procedure of OMP (Appendix B). | No odorous loads have occurred since commencement of operations. |
| Qualitative odour surveys are required by the OMP (Appendix A) for unusually high odourous loads.<br><br>Review available documentation (if any). | No odorous loads have occurred since commencement of operations. |
| **Trucks Departing Site** | |
| Are vehicles inspected prior to leaving the site? | Yes. It was observed that the rear of the trucks was wiped down where necessary and the odour neutraliser was applied. |
| **Equipment Maintenance** | |
| Has there been any equipment malfunctions since commencement which could result in increased odour? (e.g. breakdown of OCU fan). If so, review actions taken to rectify. | No malfunctions have occurred.<br>It is noted that a large supply of additional activated carbon is located adjacent to the OCU. |
| Is weekly inspection and cleaning of sumps occurring? | The sumps are cleaned as required. Floors are also sprayed at the end of each day. |

# 3 Air Emissions Sampling

## 3.1 Overview

Air emissions sampling of odour was undertaken on 28 August 2018. A NATA technical report is provided in Appendix C. The following sections presents a summary of the sampling methodologies and results, with a comparison to the estimated emissions considered in the DA assessment.

## 3.2 Sampling Methodology

Emissions testing was completed on Tuesday 28 August 2018. The purpose of the testing was to:

1. Determine the odour control efficiency of the Odour Control Unit (OCU)
2. Determine odour emission concentrations and rates for key emission points (for comparison to DA assessment assumptions and for use in revised modelling)
3. Determine VOC concentrations at the inlet and outlet of the OCU as per the requirements of the Odour Management Plan to provide a basis for determining breakthrough.

Based on the goals of the sampling, Table 3.1 presents a summary of the tests completed on the day of the sampling. Table 3.2 presents the sampling methods adopted.

Table 3.1 - Emissions Tests

| Test | Type | Sampling Location | No. of Samples | Comments |
|---|---|---|---|---|
| 1 | Odour | Odour at inlet and outlet of carbon filter unit. | 4 (inlet and outlet in duplicates) | Sampling conducted during filling of process tanks to represent worst-case emissions. |
| 2 | Odour | Beneath one of the rooftop fans | 2 (Duplicates) | Sampling undertaken beneath one of the rooftop extraction fans. The fan was located nearest to the OCU (compared to other fans) and odour at this fan is assumed to be a worst-case. |
| 3-4 | Odour | Truck vent during filling of truck from two different waste oil tanks | 4 (2 different tanks in duplicates) | Access to the rooftop vent could not be gained. Therefore, sampling was undertaken at a truck vent, during filling of waste from the storage tanks. |
| 5 | VOCs | VOCs at inlet and outlet of carbon filter unit | Total of 12 samples<br>2 locations (inlet/outlet) x 3 waste sources x 2 (duplicates) | 3 different waste sources were considered to determine any VOC composition variation. |

Table 3.2: Summary Of Emission Monitoring Methods

| Measurement Parameter | Location | Method Equivalency | NATA Accredited |
|---|---|---|---|
| Sampling Positions | Scrubber Inlet | **AS4323.1-1995** Method 1: selection of sampling positions | Yes |
| Velocity, Flowrate and Temperature | Scrubber Inlet | **AS 4323.2-1995** "Stationary Source Emissions Method 2: Determination of Total Particulate Matter - Isokinetic Manual Sampling - Gravimetric Method"<br>**TM-2** USEPA (2000) Method 2 | Yes |
| Velocity | Mineral Oil Tanker Vents | Flow rate provided by tanker pump filling meter. | No |
| Moisture Content | Scrubber Inlet | **USEPA Method 4** Determination of Moisture Content in Stack Gases | Yes |
| Speciated Organic Compounds | Scrubber Inlet, Scrubber Outlet | **NIOSH Method 1500** Sampling onto carbon tubes with analysis by Gas Chromatograph | Yes |
| Odour | Scrubber Inlet, Scrubber Outlet, Oil Taker, Roof Vent | **AS/NZS 4323.3:2001** Stationary Source Emissions - Determination of Odour Concentration by Dynamic Olfactometry<br>NSW (**OM-7**) | Yes |

## 3.3 Odour Sampling Results

Table 3.3 presents a summary of the sampling results. Table 3.4 presents a comparison of the measured odour emission concentrations and rates against those considered in the DA assessment.

Table 3.3: Sampling Results

| Test | Sampling Location | Odour Concentration (OU) | Odour Emission Rate (OUV/s) |
|---|---|---|---|
| 1 | OCU Inlet | 2670 | 1027.2 |
| 1 | OCU Outlet | 73 | 27.9 |
| 3 | Rooftop Exhaust Fan | 51.5 | 82.4[a] |
| 4 | Waste Oil Filling | 7095 | 99.2 |
| 5 | Waste Oil Filling | 7215 | 102.0 |

[a] Based on maximum flow rate of rooftop fan (RCV500-6D) of 1.6 $m^3/s$

Table 3.4 - Comparison of Emissions Data – DA Assessment vs August 2018 Testing

| Odour Source | Total Odour Emission Rates (OUV/s) | |
|---|---|---|
| | DA Assessment | Post-Commissioning Testing |
| Organics Building | 486.9 OUV/s for tank filling<br>123.8 OUV/s for DAF Unit<br>**Total 610.7**[a] | 8 fans x 82.4 OUV/s[c]<br>**Total 659.2 OUV/s** |

| Odour Source | Total Odour Emission Rates (OUV/s) | |
|---|---|---|
| | DA Assessment | Post-Commissioning Testing |
| Waste Oil Transfer Area | 31.8 OUV/s for tank filling<br>4.0 OUV/s for breathing through 4 tanks<br>322.6 OUV/s for DAF unit<br>**Total 358.4 OUV/s**[b] | **99.2-102.0 OUV/s** for tank filling via single rooftop vent |
| **TOTAL** | **969.41 OUV/s** | **761.2 OUV/s** |

[a] Based on tank filling and a DAF unit carbon system outlet for the previous Seven Hills site. The Glendenning site has a different setup whereby all DAF and tank emissions are passed through an OCU, which vents inside the building. Potential odour inside the building is then vented externally through 8 automatic rooftop extraction fans.
[b] Based on tank filling, breathing for individual tanks and a DAF unit. The Glendenning site is setup differently whereby all tanks are vented via a single rooftop vent. There is no DAF unit.

The results of the sampling indicate an odour control efficiency of 97.3%. This measured efficiency indicates that the OCU was working effectively at the time of the sampling. Generally, activated carbon filters should achieve efficiencies well in excess of 90%.

Comparison of the emissions data shows that the DA assessment over-estimated odour emission rates. The DA assessment data was based on measured data from an older wet scrubber unit at the now decommissioned Seven Hills facility and also included a DAF unit for the waste oil transfer area (not required in the Glendenning site). Air dispersion modelling has also been undertaken to confirm predicted ground level odour concentrations in the surrounding area (see Section 4).

## 3.4 VOC Sampling Results

The VOC sampling did not identify any compounds above the detection limit. Full results are presented in Appendix C. The purpose of the sampling was to identify an appropriate compound for detecting carbon breakthrough using sampling tubes (as per Section 4.3.2 of the OMP). Therefore, it is recommended that the Odour Management Plan be updated with regards to the identification of carbon filter breakthrough.

In the absence of any specific compound indicators, the only quantitative means of assessing carbon breakthrough would be completion of odour sampling at the inlet and outlet on multiple occasions over time. The sampling would be required at a sufficient frequency to identify odour concentrations as a function of time or amount of organic waste loaded. It is noted that the transition from effective odour reduction to breakthrough occurs over very short period. Therefore this approach has significant limitations as odour sampling can only be undertaken at discrete points in time and the specific point of breakthrough may not be identified (making potential testing cost prohibitive).

An alternative means of identifying breakthrough is regular qualitative observations at the sample outlet. The outlet duct of the odour control unit has an extended port, which an operator can open and take observations of odour intensity. Therefore, the operator could make observations on the odour intensity from according to the following scale:

Table 3.5 - Odour Intensity Scale

| Odour Intensity Level | Description of Odour Intensity |
|---|---|
| 0 | Imperceptible |
| 1 | Barely perceptible |
| 2 | Weak |
| 3 | Distinct |
| 4 | Strong |
| 5 | Very Strong |
| 6 | Unbearably Strong |

The following procedure could be implemented:

- Take weekly odour observations at the outlet port during tank loading;
- If on a particular day the odour is identified as ‘Strong’ or more then take 3 more observations during filling activities (on the same day) to record any trends:
    - If the odour intensity reduces in subsequent observations, it is likely that the ‘Strong’ observation was due to a specific load. Continue making observations on a weekly basis.
    - If the odour intensity remains ‘Strong’ or more on the subsequent 3 loads, the carbon filter should be changed immediately.

Over time the above procedure may identify a typical time frame after which breakthrough is likely to occur. Odour sampling could be undertaken once this indicative time frame is established to avoid excessive numbers of discrete odour samples being taken.

# 4 Revised Air Dispersion Modelling

## 4.1 Introduction

The following section presents details of the air dispersion modelling using the measured data obtained during the 28 August 2018 testing. The modelling has adopted the same methodologies as those considered in the DA assessment report, including the type of dispersion model (CALPUFF modelling system) and derived meteorological data using CALMET. The following sections presents a summary of the post-commissioning emissions data and updated modelling results.

## 4.2 Emissions Data

Table 4.1 presents the modelled odour emissions data as per the 28 August 2018 testing discussed in the previous section.

Table 4.1 - Modelled Odour Emission Data

| Source | X (km) | Y km) | Relative Height (m) | Diameter (m) | Exit Velocity (m/s) | Temp (°C) | Odour Emission Rate (OUV/s) |
|---|---|---|---|---|---|---|---|
| Rooftop Vent 1 | 301.3492 | 6263.4589 | 7.5 | 0.9 m | 1.8 | Ambient | 82.4 |
| Rooftop Vent 2 | 301.3591 | 6263.4612 | 8.5 | 0.9 m | 2.5 | Ambient | 82.4 |
| Rooftop Vent 3 | 301.3660 | 6263.4604 | 8.5 | 0.9 m | 2.5 | Ambient | 82.4 |
| Rooftop Vent 4 | 301.3762 | 6263.4535 | 7.5 | 0.9 m | 2.5 | Ambient | 82.4 |
| Rooftop Vent 5 | 301.3746 | 6263.4439 | 7.5 | 0.9 m | 2.5 | Ambient | 82.4 |
| Rooftop Vent 6 | 301.3643 | 6263.4487 | 8.5 | 0.9 m | 2.5 | Ambient | 82.4 |
| Rooftop Vent 7 | 301.3571 | 6263.4499 | 8.5 | 0.9 m | 2.5 | Ambient | 82.4 |
| Rooftop Vent 8 | 301.3476 | 6263.4483 | 7.5 | 0.9 m | 2.5 | Ambient | 82.4 |
| Unloading of oil tanker | 301.4063 | 6263.4436 | 11.0 | 0.1 m | 2.5 | Ambient | 102.0 |

## 4.3 Modelled Receptors

As per the original assessment, residential receptor groups to the north (R1) and to the east (R2) have been considered. In addition, discrete receptors have been modelled along the boundary of the site. A gridded receptor grid of 50 m x 50 m has been used for the CALPUFF output data to provide a ground level concentration plot.


Figure 4.1 - Discrete Receptor Locations

## 4.4 Modelling Results

Table 4.2 presents predicted ground level concentrations at the nearest residential receptor groups. Figure 4.2 presents a predicted concentration plot for odour. The predicted odour concentrations are compliant with the relevant odour criteria and are significantly lower than those predicted for the DA assessment. The lower predicted concentrations are due to the lower odour emission rates and also the change in emission parameters for the as-built design (i.e. all emissions vented via rooftop vents in as-built design vs some ground level sources considered in DA assessment).

Table 4.2 - Predicted Odour Concentrations

| Receptor | Predicted Odour Concentration (OU, Peak) | |
|---|---|---|
| | DA Assessment | Post-Commissioning Results |
| Residential Group 1 (north) | 0.8 | 0.36 |
| Residential Group 2 (east) | 0.2 | 0.14 |
| Criteria | Peak, 99th Percentile | |

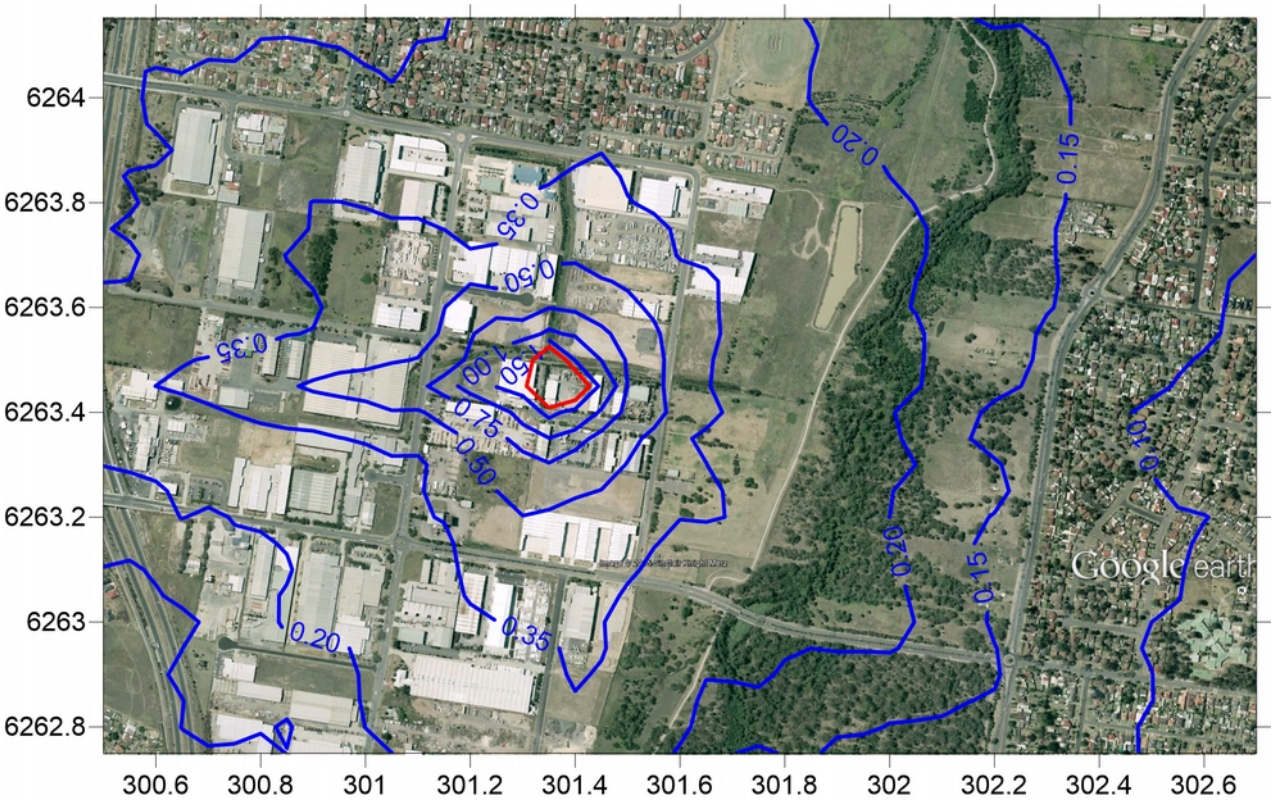



Figure 4.2: Predicted Ground Level Odour Concentrations

| | |
|---|---|
| **Scenario:** Worst-Case | **Averaging Time:** Peak, 99th Percentile |
| **Location:** Glendenning | **Units:** OU |
| **Pollutant:** Odour | **Criteria:** 2.0 OU |

# 5 Outcomes

Overall, odour emissions were considered to be mitigated and managed effectively, and site personnel followed the requirements of the site OMP. There have been no odour complaints since commencement, and the air dispersion modelling using post-commissioning testing data indicates predicted compliance with the relevant odour criteria.

It is recommended to update the odour management plan to identify an alternative means of identify carbon filter breakthrough. The sampling conducted did not identify any specific VOCs upon which to determine breakthrough as discussed in Section 4.3.2 of the OMP. A suggested qualitative approach is identified in Section 3.4.

# Appendix A - Air Quality Glossary

| APPENDIX A: GLOSSARY OF AIR QUALITY TERMINOLOGY | |
|---|---|
| Conversion of ppm to $mg/m^3$ | Where R is the ideal gas constant; T, the temperature in Kelvin (273.16 + T°C); and P, the pressure in mm Hg, the conversion is as follows:<br>$mg\ m^{-3} = (P/RT) \times Molecular\ weight \times (concentration\ in\ ppm)$<br>$= \frac{P \times Molecular\ weight \times (concentration\ in\ ppm)}{62.4 \times (273.2 + T°C)}$ |
| g/s | Grams per second |
| $mg/m^3$ | Milligrams ($10^{-3}$) per cubic metre. |
| $\mu g/m^3$ | Micrograms ($10^{-6}$) per cubic metre. |
| ppb | Parts per billion. |
| ppm | Parts per million. |
| $PM_{10}$, $PM_{2.5}$, $PM_1$ | Fine particulate matter with an equivalent aerodynamic diameter of less than 10, 2.5 or 1 micrometres respectively. Fine particulates are predominantly sourced from combustion processes. Vehicle emissions are a key source in urban environments. |
| 50th percentile | The value exceeded for 50 % of the time. |
| $NO_x$ | Oxides of nitrogen – a suite of gaseous contaminants that are emitted from road vehicles and other sources. Some of the compounds can react in the atmosphere and, in the presence of other contaminants, convert to different compounds (eg, NO to $NO_2$). |
| VOC | Volatile Organic Compounds. These compounds can be both toxic and odorous. |

# Appendix B – Site Audit Photos

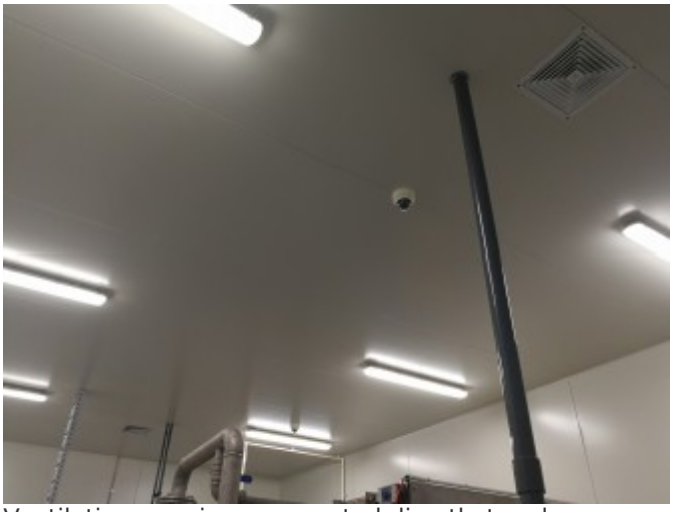
View of waste oil area (foreground) and organics building (background) with roller doors closed

Rear view of organics building with roller doors closed


Odour control unit on top of DAF building in background

Weather station with 10 m high mast

DAF unit inside enclosed room



Ventilation openings connected directly to odour control unit

Roof of DAF building – ceiling vent connect directly to odour control unit ducting

Roof of DAF building – second ceiling vent connected directly to odour control unit ducting

Odour Control Unit

Sampling port to OCU outlet with extended ducting for qualitative observations

Ducting above sealed organic waste tanks connected to OCU

All tank ducts combine to a single point which passes through the OCU

1 of 8 rooftop mechanical exhaust fans (nearest to OCU outlet)

2 of 8 rooftop fans (southern and central portion of building roof)

Exhaust fan – looking east from OCU location

Exhaust fans on rooftop – looking north-east

Spill kit inside organics building – outside DAF room

Spill kit outside organics building


Drain to inground sump in organics building

Bunding separating unloading area from organic tanks

View of area around organics tank – well maintained and clean

View of area around organics tank – well maintained and clean


Unloading – connection point with truck

Wiping down any minor spills and rear of truck after unloading

View of unloading area – well maintained and clean


Spill kit provided on trucks


Odour neutraliser spray used as required


Roller door opened to allow truck to enter

View of waste oil receivals area

Unloading of waste oil – area well maintained and clean

Bunding around waste oil tanks

View of waste oil tank area

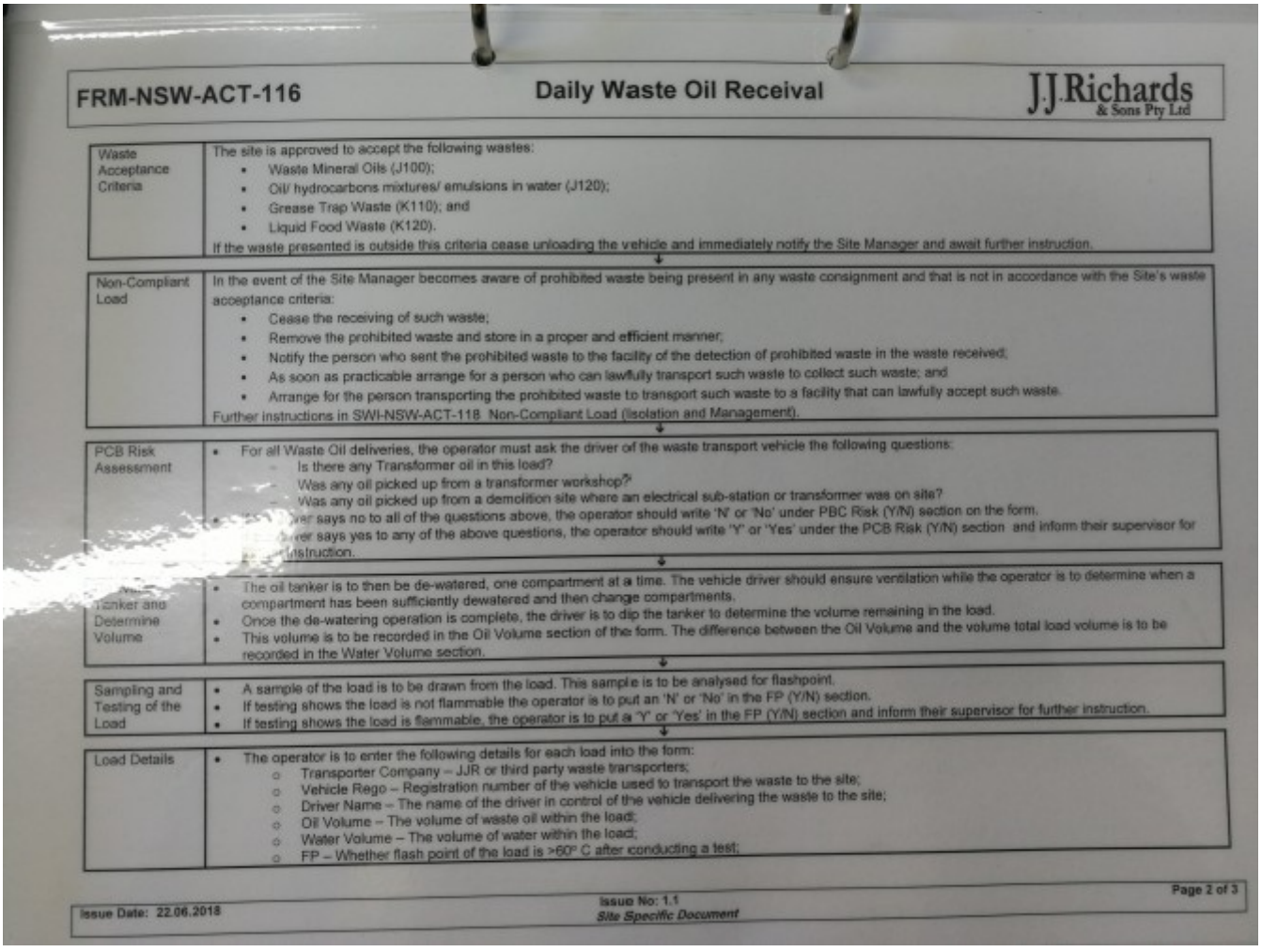
Oil filters

Collection trays below oil filters

Cleaning equipment for spills – residual layer of waste oil shown in top of image (due to oil filter cleaning)

Short-term oily water transfer container

Clothes for cleaning and spills

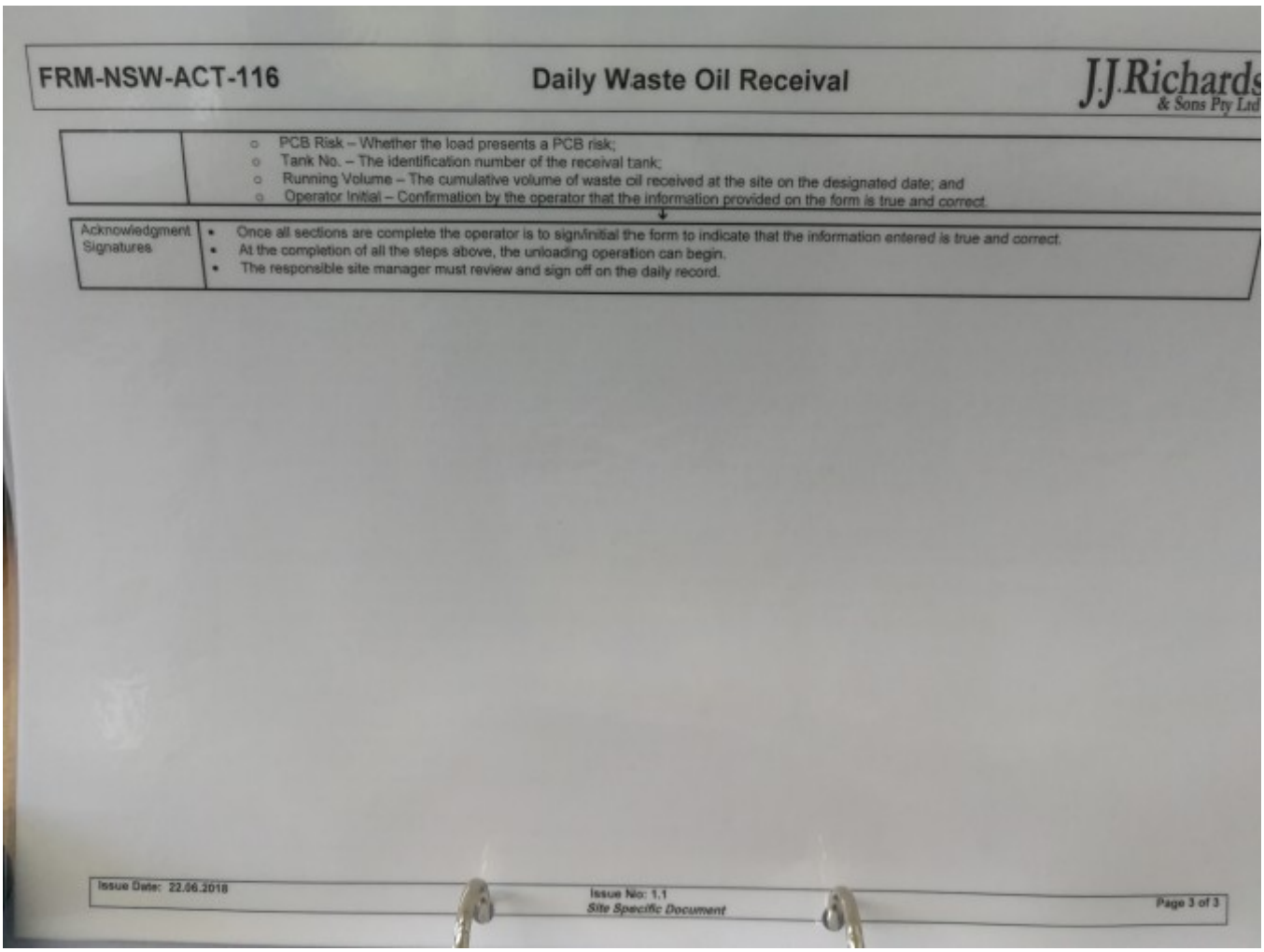


FRM-NSW-ACT-116 **Daily Waste Oil Receival** J.J.Richards & Sons Pty Ltd

| | |
|---|---|
| Waste Acceptance Criteria | The site is approved to accept the following wastes:<br>• Waste Mineral Oils (J100);<br>• Oil/ hydrocarbons mixtures/ emulsions in water (J120);<br>• Grease Trap Waste (K110); and<br>• Liquid Food Waste (K120).<br>If the waste presented is outside this criteria cease unloading the vehicle and immediately notify the Site Manager and await further instruction. |
| Non-Compliant Load | In the event of the Site Manager becomes aware of prohibited waste being present in any waste consignment and that is not in accordance with the Site's waste acceptance criteria:<br>• Cease the receiving of such waste;<br>• Remove the prohibited waste and store in a proper and efficient manner;<br>• Notify the person who sent the prohibited waste to the facility of the detection of prohibited waste in the waste received;<br>• As soon as practicable arrange for a person who can lawfully transport such waste to collect such waste; and<br>• Arrange for the person transporting the prohibited waste to transport such waste to a facility that can lawfully accept such waste.<br>Further instructions in SWI-NSW-ACT-118 Non-Compliant Load (Isolation and Management). |
| PCB Risk Assessment | • For all Waste Oil deliveries, the operator must ask the driver of the waste transport vehicle the following questions:<br>– Is there any Transformer oil in this load?<br>– Was any oil picked up from a transformer workshop?<br>– Was any oil picked up from a demolition site where an electrical sub-station or transformer was on site?<br>• [illegible] says no to all of the questions above, the operator should write 'N' or 'No' under PBC Risk (Y/N) section on the form.<br>• [illegible] says yes to any of the above questions, the operator should write 'Y' or 'Yes' under the PCB Risk (Y/N) section and inform their supervisor for further instruction. |
| [illegible] Tanker and Determine Volume | • The oil tanker is to then be de-watered, one compartment at a time. The vehicle driver should ensure ventilation while the operator is to determine when a compartment has been sufficiently dewatered and then change compartments.<br>• Once the de-watering operation is complete, the driver is to dip the tanker to determine the volume remaining in the load.<br>• This volume is to be recorded in the Oil Volume section of the form. The difference between the Oil Volume and the volume total load volume is to be recorded in the Water Volume section. |
| Sampling and Testing of the Load | • A sample of the load is to be drawn from the load. This sample is to be analysed for flashpoint.<br>• If testing shows the load is not flammable the operator is to put an 'N' or 'No' in the FP (Y/N) section.<br>• If testing shows the load is flammable, the operator is to put a 'Y' or 'Yes' in the FP (Y/N) section and inform their supervisor for further instruction. |
| Load Details | • The operator is to enter the following details for each load into the form:<br>○ Transporter Company – JJR or third party waste transporters;<br>○ Vehicle Rego – Registration number of the vehicle used to transport the waste to the site;<br>○ Driver Name – The name of the driver in control of the vehicle delivering the waste to the site;<br>○ Oil Volume – The volume of waste oil within the load;<br>○ Water Volume – The volume of water within the load;<br>○ FP – Whether flash point of the load is >60° C after conducting a test; |

Issue Date: 22.06.2018 Issue No: 1.1 *Site Specific Document* Page 2 of 3

Waste oil receival procedure



FRM-NSW-ACT-116 Daily Waste Oil Receival J.J.Richards & Sons Pty Ltd

- PCB Risk – Whether the load presents a PCB risk;
- Tank No. – The identification number of the receival tank;
- Running Volume – The cumulative volume of waste oil received at the site on the designated date; and
- Operator Initial – Confirmation by the operator that the information provided on the form is true and correct.

Acknowledgment Signatures

- Once all sections are complete the operator is to sign/initial the form to indicate that the information entered is true and correct.
- At the completion of all the steps above, the unloading operation can begin.
- The responsible site manager must review and sign off on the daily record.

Issue Date: 22.06.2018 Issue No: 1.1 *Site Specific Document* Page 3 of 3

Waste oil receival procedure

# Appendix C – Emissions Testing Report

Air Noise Environment
Environmental Monitoring and Assessment

# Emissions Monitoring: JJ Richards & Sons, Glendenning

## Duggan and Hede

**Duggan and Hede**
**PO Box 496**
**Clayfield**
**QLD 4011**

**Sampling Date: 28 August 2018**

**Issued: 14 September 2018**

**Prepared by:**
**Air Noise Environment**
**ABN: 13 081 834 513**

NATA
WORLD RECOGNISED
ACCREDITATION

*Accredited for Compliance with ISO/IEC 17025 – Testing*

This document is issued in accordance with NATA's accreditation requirements.
NATA Accreditation Number: 15841

Accredited for compliance with ISO/IEC 17025 – Testing

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

Should you have any queries regarding the contents of this document, please contact Air Noise Environment.

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# DOCUMENT CONTROL SHEET

## Document Details

| | |
|---|---|
| Project Reference: | 4022.3AirEmissionsReport01.odt |
| Document Title: | Emissions Monitoring: JJ Richards & Sons, Glendenning |
| Client: | Duggan and Hede |
| Document Reference: | /Network/Projects/4022.3/Reporting/4022.3AirEmissionsReport01.odt |

## Version Number

| Version: | Issue Date: | Prepared by: | Description: | Approved by: | Signature: |
|---|---|---|---|---|---|
| 00 | 14/09/18 | Sam Wong | Internal Draft | - | - |
| 01 | 14/09/18 | Sam Wong | Final | Gary Hall |  |

## Revision History

| Revision: | Issue Date: | Approved by: | Signature: | Details of Revision: |
|---|---|---|---|---|
| 01.1 | | | | |
| 01.2 | | | | |



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This document has been prepared with all due care and attention by professional environmental practitioners according to accepted practices and techniques. This document is issued in confidence and is relevant only to the issues pertinent to the subject matter contained herein. Air Noise Environment Pty Ltd holds no responsibility for misapplication or misinterpretation by third parties of the contents of this document. If the revision history does not state that a Final version of the document has been issued, then it remains a draft. Draft versions of this document should not be relied upon for any purpose by the client, regulatory agencies or other interested parties.

Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s).

The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Air Noise Environment Pty Ltd for the purposes of this project is both complete and accurate.

# Table of Contents



# Index of Tables

# 1 Introduction

Duggan and Hede commissioned Air Noise Environment Pty Ltd to conduct monitoring of air emissions from the JJ Richards and Sons Glendenning Facility as part of a post commissioning odour audit.

Table 1.1 details the monitoring locations and the monitoring performed at each location. The monitoring was completed on 28 August 2018.

Table 1.1: Monitoring Locations and Parameters

| Compound | Release Point | | | |
|---|---|---|---|---|
| | Scrubber Inlet | Scrubber Outlet | Mineral Oil Storage | Internal Roof Extraction Vent |
| Velocity and Flowrate | x | x | x | x |
| Moisture Content | x | - | - | - |
| Speciated Organic Compounds | x | x | - | - |
| Odour | x | x | x | x |

The monitoring of air emissions at the Glendenning Facility was completed during normal operating conditions. Any factors that may have affected the monitoring results were not observed by, or brought to the notice of Air Noise Environment (ANE) staff except where noted in this report.

# 2 Methodology

## 2.1 Emission Testing

Table 2.1 below lists the Methods used when undertaking emission monitoring at the Glendenning Facility.

All air quality monitoring undertaken by the Company has been undertaken in accordance with the methods identified in Table 2.1 below unless as specified in Section 2.3.

Table 2.1: Summary Of Emission Monitoring Methods

| Measurement Parameter | Location | Method Equivalency | NATA Accredited |
|---|---|---|---|
| Sampling Positions | Scrubber Inlet | **AS4323.1-1995** Method 1: selection of sampling positions | Yes |
| Velocity, Flowrate and Temperature | Scrubber Inlet | **AS 4323.2-1995** "Stationary Source Emissions Method 2: Determination of Total Particulate Matter - Isokinetic Manual Sampling - Gravimetric Method"<br>**TM-2** USEPA (2000) Method 2 | Yes |
| Velocity | Mineral Oil Tanker Vents | Flow rate provided by tanker pump filling meter. | No |
| Moisture Content | Scrubber Inlet | **USEPA Method 4** Determination of Moisture Content in Stack Gases | Yes |
| Speciated Organic Compounds | Scrubber Inlet, Scrubber Outlet | **NIOSH Method 1500** Sampling onto carbon tubes with analysis by Gas Chromatograph | Yes |
| Odour | Scrubber Inlet, Scrubber Outlet, Oil Taker, Roof Vent | **AS/NZS 4323.3:2001** Stationary Source Emissions - Determination of Odour Concentration by Dynamic Olfactometry<br>NSW (**OM-7**) | Yes |

## 2.2 Laboratory Analysis

Table 2.2 Provides a list of the NATA accredited laboratories that performed the applicable analysis, NATA accreditation number, and report number.

Table 2.2: Table of NATA Accredited Laboratories with NATA Accreditation Number

| Measurement Parameter | NATA Accreditation Number | Report Number |
|---|---|---|
| Moisture Content (gravimetric) | AIr Noise Environment Pty Ltd - 15841 | - |
| Speciated Organic Compounds | National Measurement Institute - 198 | RN1207345 |
| Odour (dynamic olfactometry) | The Odour Unit Pty Ltd - 14974 | 20180829_057 |

## 2.3 Deviation from Methods

None

# 3 Results

## 3.1 Introduction

The following sections present a summary of results for each sampling location.

## 3.2 Scrubber Inlet and Outlet

### 3.2.1 Process Conditions

Sampling at the scrubber was conducted during normal operations. During the odour and speciated organic compound sampling, trucks were observed offloading waste product into the storage tanks.

### 3.2.2 Monitoring Results

Velocity, flow rates and moisture content was sampled from the duct leading into the scrubber inlet. As the scrubber system is a closed system, it is assumed that the flow rates from the outlet match the inlet. Results of emissions monitoring for the Scrubber inlet are provided in Table 3.1 and Table 3.2 below for emissions monitoring completed on 28 August 2018.

Table 3.1: Flow and Sample Characteristics for the Scrubber

| Parameter | Monitoring Result | Units |
|---|---|---|
| Run Start Time (Moisture Test) | 9:30 | hh:mm |
| Run Stop Time (Moisture Test) | 11:20 | hh:mm |
| Meter Calibration Factor | 0.989 | - |
| Pitot Tube Coefficient | 0.84 | - |
| Total Meter Volume | 0.620 | $m^3$ |
| Average Meter Temperature | 20 | °C |
| Average Stack Temperature | 12 | °C |
| Barometric Pressure | 766.79 | mm Hg |
| Stack Static Pressure | 23.8 | mm $H_2O$ |
| Average Stack Gas Velocity | 5.6 | m/s |
| Average Stack Gas Velocity at Exit (m) | 12.6 | m/s |
| Stack Diameter at sampling plane (inlet) | 0.3 | m |
| Stack diameter at exit (estimated) | 0.2 | |
| Actual Stack Flow Rate | 24 | $m^3$/min |
| Dry Standard Stack Flow Rate | 23 | $Nm^3$/min |

Table 3.2: Odour Emissions Monitoring Results for Scrubber

| Compound | Scrubber Inlet | Scrubber Outlet |
|---|---|---|
| Odour concentration (average duplicate samples) (OU) | 2,670 | 73 |
| Odour emission rate (average duplicate samples) (OU.m$^3$/min) | 61,631 | 1,673 |
| Odour emission rate (average duplicate samples) (OU.m$^3$/s) | 1,027.2 | 27.9 |

Table 3.3: Speciated Organic Compounds Emissions Monitoring Results for Scrubber

| Compound | Scrubber Inlet | Scrubber Outlet |
|---|---|---|
| Speciated Organic compounds (average duplicate samples) Test 1 (mg/m$^3$) | <0.2 | <0.2 |
| Speciated Organic compounds (average duplicate samples) Test 2 (mg/m$^3$) | <0.3 | <0.3 |
| Speciated Organic compounds (average duplicate samples) Test 3 (mg/m$^3$) | <0.2 | <0.2 |
| Speciated Organic compounds (average duplicate samples) Test 1 (g/s) | <0.00008 | <0.00008 |
| Speciated Organic compounds (average duplicate samples) Test 2 (g/s) | <0.0001 | <0.0001 |
| Speciated Organic compounds (average duplicate samples) Test 3 (g/s) | <0.00009 | <0.00009 |
| **No Speciated volatile compounds were detected in the analysis. The following list of compounds was analysed for:** Benzene, Toluene, Ethylbenzene, m&p-Xylenes, o-Xylene, Styrene, Isopropylbenzene, n-Propylbenzene, 1,3,5-Trimethylbenzene, tert-Butylbenzene, 1,2,4-Trimethylbenzene, sec-Butylbenzene, 4-Isopropyltoluene, n-Butylbenzene, Dichlorodifluoromethane, Chloromethane, Vinylchloride, Bromomethane, Chloroethane, Trichlorofluoromethane, 1,1-Dichloroethane, Dichloromethane, trans-1,2-Dichloroethene, 1,1-Dichloroethene, 2,2-Dichloropropane, cis-1,2-Dichloroethene, Bromochloromethane, 1,1,1-Trichloroethane, Carbon tetrachloride, 1,1-Dichloropropene, 1,2-Dichloroethane, Trichloroethene, 1,2-Dichloropropane, Dibromomethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene, 1,1,2-Trichloroethane, Tetrachloroethene, 1,3-Dichloropropane, 1,2-Dibromoethane, 1,1,1,2-Tetrachloroethane, 1,1,2,2-Tetrachloroethane, 1,2,3-Trichloropropane, 1,2-Dibromo-3-chloropropane, Hexachlorobutadiene, Chlorobenzene, Bromobenzene, 2-Chlorotoluene, 4-Chlorotoluene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 1,2-Dichlorobenzene, 1,2,4-Trichlorobenzene, 1,2,3-Trichlorobenzene, Trihalomethanes, Chloroform, Bromodichloromethane, Dibromochloromethane, Bromoform, Naphthalene | | |

## 3.3 Mineral Oil Tanks

### 3.3.1 Process Conditions

Sampling at the mineral oil vent was not possible due to restricted access to the building roof. Sampling was conducted under worst case scenario conditions from the vent of the Tanker truck during filling of the tanker. Sampling for odour was conducted from the Tanker vent pipe only during filling. The flow rate of air emissions from the tanker was determined from the rate at which waste oil was pumped into the tanker. The oil flow rate was provided by JJ Richards staff from the flow meter on the waste oil transfer pump.

### 3.3.2 Monitoring Results

Results of odour emissions monitoring for the Mineral oil tanks are provided in Table 3.4 and Table 3.5 below for emissions monitoring completed on 28 August 2018.

Table 3.4: Flow and Sample Characteristics for the Scrubber

| Parameter | Monitoring Result | Units |
|---|---|---|
| Test 1 start time | 10:49 | hh:mm |
| Test 1 flow rate (actual) | 0.877 | $m^3$/min |
| Test 1 flow rate (wet) | 0.839 | $m^3$/min |
| Average Stack Temperature | 14.8 | °C |
| Test 2 start time | 11:24 | hh:mm |
| Test 2 flow rate (actual) | 0.886 | $m^3$/min |
| Test 2 flow rate (wet) | 0.848 | $m^3$/min |
| Average Stack Temperature | 14.8 | °C |
| Barometric Pressure | 766.79 | mm Hg |
| Diameter at sampling plane (vent outlet) | 0.1 | m |

Table 3.5: Odour Emissions Monitoring Results for Mineral Oil Tank vent

| Compound | Sample 1 | Sample 2 |
|---|---|---|
| Sample Time | 10:49 | 11:24 |
| Odour concentration (average duplicate samples) (OU) | 7,095 | 7,215 |
| Odour emission rate (average duplicate samples) (OU.$m^3$/min) | 5,953 | 6,120 |
| Odour emission rate (average duplicate samples) (OU.$m^3$/s) | 99.2 | 102 |

## 3.4 Internal Roof Extraction Vent

### 3.4.1 Process Conditions

Sampling for odour was conducted for a point approximately 10 cm from the internal roof extraction vent. A sample tube was raised to the roof attached to a long pole. The odour samples were collected from inside the building at the extraction fan cowling before release to the external atmosphere.

### 3.4.2 Monitoring Results

Results of odour emissions monitoring for the extraction vents are provided in and Table 3.6 below for emissions monitoring completed on 28 August 2018.

Table 3.6: Odour Emissions Monitoring Results for Mineral Oil Tank vent

| Compound | Sample |
|---|---|
| Sample time | 13:00 |
| Odour concentration (average duplicate samples) (OU) | 51.5 |

# Appendix A – Glossary of Terms

| APPENDIX A: GLOSSARY OF TERMS | |
|---|---|
| < | The analytes tested for was not detected, the value stated is the reportable limit of detection |
| µg | Micrograms ($10^{-6}$grams) |
| AS | Australian Standard |
| dscm | dry standard cubic meters (at 0°C and 1 atmosphere) |
| g | grams |
| kg | kilograms |
| m | metres |
| $m^3$ | Cubic Metres, actual gas volume in cubic metres as measured. |
| mg | Milligrams |
| min | Minute |
| $mg/m^3$ | Milligrams ($10^{-3}$) per cubic metre. |
| $mmH_2O$ | Millimetres of water |
| Mole | SI Unit defined as an amount of a substance that contains as many elementary entities (e.g. atoms, molecules, ions, electrons) as there are atoms in 12 grams of pure Carbon-12 ($^{12}C$) |
| N/A | Not Applicable |
| ng | Nanograms ($10^{-9}$ grams) |
| $Nm^3$ | Normalised Cubic Metres - Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa). |
| ou | Odour Units |
| °C | Degrees Celsius |
| $µg/m^3$ | Micrograms ($10^{-6}$) per cubic metre. Conversions from $µg/m^3$ to parts per volume concentrations (ie, ppb) are calculated at 25 °C. |
| ppb / ppm | Parts per billion / million. |
| PM | Particulate Matter. |
| $PM_{10}$, $PM_{2.5}$, $PM_1$ | Fine particulate matter with an equivalent aerodynamic diameter of less than 10, 2.5 or 1 micrometres respectively. Fine particulates are predominantly sourced from combustion processes. Vehicle emissions are a key source in urban environments. |
| sec | Second |
| $Sm^3$ | Standardised Cubic Metres - Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa) and corrected to a standardised value ( e.g. 7% $O_2$). |

| APPENDIX A: GLOSSARY OF TERMS | |
|---|---|
| STP | Standard Temperature and Pressure (0°C and 101.3 kPa). |
| TVOC | Total Volatile Organic Compounds. These compounds can be both toxic and odorous. |
| USEPA | United States Environmental Protection Agency |