Arsh Singh
Waste Water Treatment Plant Engineer
Snack Brands Australia
30-32, Bessemer Street
Blacktown, NSW, 2148

7/07/2017

Mitchell Royle
Environmental Health Officer
62 Flushcombe Road
Blacktown, NSW 2148

Dear Mitchell,

**Re: Emission Information Snack Brands Australia**

I refer to your visit and call regarding the complaint of smoke from stacks at Blacktown council have received from one of the residents. The stacks releases highly condense steam/water vapor, which are produced as a result of moisture extraction from the fryers. The steam/water vapor forms a trail, hence viewed from distance gives the illusion of smoke/carbon dioxide being released from the stacks, which I believe is the reason of complaint. Particularly in winter it's more visible. When temperature is low water vapor doesn't escape at same velocity, as they would have at higher temperatures, thus forming a trail/chain of steam/vapor. At higher temperature i.e. during summer, entropy of molecules is greater, thus trail is not observed. This answers that in the summer this phenomenon is rarely observed. We have also undertaken the emission testing and the results clearly states that both VOC and TSP released from the stacks are well below NSW Protection of Environment (Operations) (POEO) (Clean Air) Regulation 2010 Group 6 Scheduled Premises Emission limits. Please refer to attached report section 1.2 and 1.3 proving the same.

Please contact myself if further information is required. I can be reached at arsh.singh@snackbrands.com.au or 0450456144.

Thank you for your consideration.

Kind Regards,
Arsh Singh
Arshdeep Singh
*WWTP Engineer*
*Snack Brands Australia*
*30-32, Bessemer Street*
*Blacktown, NSW, 2148*

# Snack Brands Australia

## Snack Brands Odour Assessment
## Blacktown Odour Assessment

November 2019

# Executive summary

An odour assessment has been completed in support of the Snack Brands Australia application for an Environmental Protection License (EPL) for agricultural processing activities at the Blacktown snack production facility. A Level 3 odour assessment has been completed in accordance with the “Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW” (Department of Environment and Conservation (NSW), 2006).

With reference to the three-tiered assessment objective outlined in Section 3.5.1 the following are concluded:

- An analysis of complaints history has shown a single instance where a lodged complaint may be attributed to odorous emissions from the Site. As such it is concluded that the existing facility is not contributing to a significant loss of amenity at off-site receptors due to emission of unacceptable level of odours.
- Recent equipment upgrades have seen older equipment replaced with newer, pollution controlled equipment. This upgrade demonstrates SBA’s aim for continuous improvement in manufacturing processes and subsequently decreases in uncontrolled emissions from the facility.
- Dispersion modelling predictions exceed the 99$^{th}$ percentile, 2 OU impact assessment criteria used to assess new developments at receptors to the west and east of the Site. The maximum predicted odour concentration at a residential land use is approximately 2-4 OU, which is below the 7 OU threshold where individuals with standard sensitivity may consider that odour as ‘offensive’.

Whilst dispersion modelling predictions suggest an exceedance of the 2 OU criteria for a worst-case scenario, the Site’s performance against the objectives of the Technical Framework and the POEO are more appropriately assessed with consideration of the positive track record in the frequency of odour complaints alleged at the site (one complaint in 2017).

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# Appendices

# 1. Introduction

## 1.1 Background

Snack Brands Australia (SBA) has engaged GHD to conduct and odour assessment for routine operations of the Bessemer Street, Blacktown snack production facility ('the Site'). SBA have been operating at the Site since December 2000. The operations include the following key activities: receipt and processing of raw material (potatoes), cooking of product and packaging of product.

SBA are now seeking an Environmental Protection License (EPL) for agricultural processing activities at the Site. In response to the SBA EPL application, the NSW Environment Protection Authority (NSW EPA) outlined the following assessment requirement:

"An odour assessment must be undertaken in accordance with the "Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW", including the mitigation measures proposed to manage odour impacts".

## 1.2 Purpose of this report

The purpose of the report is to address the NSW EPA assessment requirement through presentation of the methodology and findings of a Level 3 odour assessment[1] and to provide recommendations for mitigation of predicted odour impacts where they are found to be above an acceptable level.

## 1.3 Scope and limitations

The GHD scope of works included key site and desktop works as described below:

- A site visit was conducted to identify primary odour sources and outline odour-sampling requirements.
- A subcontractor (Ektimo) was engaged to conduct odour sampling at six key odour sources where existing odour sampling data were not available.
- An inventory of expected odour emissions from the Blacktown site was developed using available sampling data (2010, 2017, 2019) as appropriate.
- Meteorological and air dispersion modelling was carried out using CALMET/CALPUFF model suite to predict offsite ground level odour concentrations.
- Assessment of predicted odour concentrations was made against the odour criteria outlined in the Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW.
- Conclusions are provided with respect to the Site's performance against the objectives for existing facilities as per the Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW. The Site's track record of complaints and commitment to continuous improvement are discussed.

[1] As per the Technical Framework: Assessment and management of odour from stationary sources in NSW (Department of Environment and Conservation (NSW), 2006)

*This report: has been prepared by GHD for Snack Brands Australia* and *may only be used and relied on by Snack Brands Australia for the purpose agreed between GHD and the Snack Brands Australia as set out in section 1.2 of this report.*

*GHD otherwise disclaims responsibility to any person other than Snack Brands Australia arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.*

*The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.*

*The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.*

*The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.*

*GHD has prepared this report on the basis of information provided by Snack Brands Australia and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.*

*The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.*

*Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.*

*Site conditions (including the presence of odours) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.*

# 2. Site and surrounds

The SBA Blacktown snack production facility at Bessemer Street is located at within the Blacktown Business Park and is shown in Figure 1.

The Site falls within Blacktown City boundaries and is located within planning zone B7 – Business Park as per the Blacktown Local Environmental Plan 2015. The surrounding sensitive land uses include:

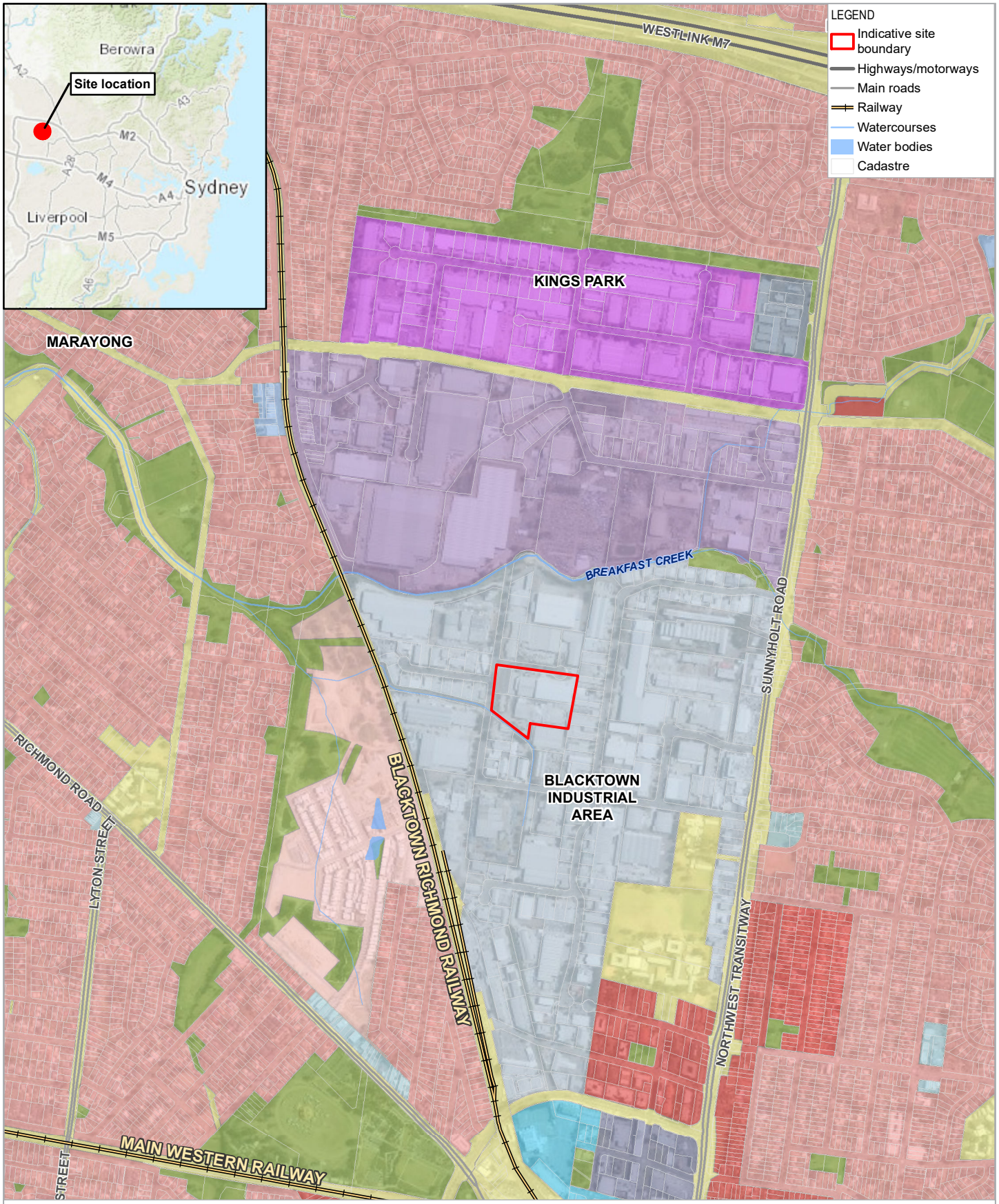
- To the west – R1 – General residential and R2 – Low density residential
- To the south - R2 – Low density residential and R3 – Medium density residential
- To the east - R2 – Low density residential and R3 – Medium density residential
- To the north - R2 – Low density residential

The SBA Site manufactures various brands of potato chips (traditional and Kettle chips). The typical potato production line consists of key processing activities including:

- Receipt and process of raw materials (sorting, washing, slicing)
- Cooking (frying)
- Seasoning
- Packaging and distribution
- Onsite wastewater treatment

The primary processing is split between a total of five processing units as described below.

  - 1 x PC 42 – traditional potato chips. Brands: Thins and generic house brands
  - 2 x KF –small batch kettle chip. Brands: Kettle generic and Kettle house brands.
  - 2 x UPC – large continuous Kettle chip. Brands: Kettle generic and Kettle house brands.




Land zoning

- B1, Neighbourhood Centre
- B2, Local Centre
- B3, Commercial Core
- B4, Mixed Use
- B5, Business Development
- B7, Business Park
- IN1, General Industrial
- IN2, Light Industrial
- R1, General Residential
- R2, Low Density Residential
- R3, Medium Density Residential
- R4, High Density Residential
- RE1, Public Recreation
- SP2, Infrastructure

Paper Size ISO A4

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

**Snack Brands Australia**
**Snackfoods Odour Assessment**
**Blacktown manufacturing plant**

Project No. **21-28298**
Revision No. **A**
Date **22/10/2019**

## Site and surrounds

# FIGURE 1

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# 3. Odour assessment

## 3.1 Assessment method

To achieve the NSW EPA requirement, a Level 3 odour assessment as carried out as per the Technical Framework (Department of Environment and Conservation (NSW), 2006). The assessment method is described below:

1. Emission inventory – an emission inventory is developed using site-specific odour sampling data. Odour emission rate data is available from sampling conducted at the Blacktown site in 2010, 2017 and 2019.
2. Meteorological modelling – A site-representative meteorological data file is developed using the CALMET diagnostic meteorological. Key inputs to the model are sourced from surrounding meteorological stations operated by both the Bureau of Meteorology (BOM) and Office of Environment and Heritage (OEH).
3. Dispersion modelling – Dispersion modelling was completed using emission inventory and meteorological data file to predict peak, 99$^{th}$ percentile odour ground level concentrations (GLCs) at the nearest sensitive land uses.
4. Assessment of predicted impacts – Dispersion modelling outputs are utilised to set the site-specific odour criteria, and subsequently the outputs are assessed for compliance against the criteria as prescribed in the Approved Methods.

## 3.2 Emission inventory

### 3.2.1 Source inventory

A site visit was conducted by GHD staff, which identified the following primary odour emission sources to be considered in the odour assessment:

#### Manufacturing building rooftop ventilation

Five, large ventilation units were observed during the site visit, which draw air from within the primary manufacturing building.

#### Fryer exhaust stacks

A total of five fryer exhaust stacks were identified as described below:

- UPC x 2
- PC42 x 1
- KF x 2 (as required during peak periods only)

#### Wastewater

A wastewater treatment plant (WWTP) is operated on site to treat process water prior to discharge from the site. The following primary odour sources were identified at the WWTP:

- Dissolved Air Flotaion tank (DAF)
- Settling tank x 3
- Agitation tank

### 3.2.2 Emission sampling

2010, 2017 and 2019 sampling reports are attached in Appendix A, Appendix B and Appendix C respectively. Odour sampling was conducted in accordance with/consideration of the relevant state and Australian standards for odour sampling as outlined in the sampling reports. A summary of relevant odour sampling results is provided in Table 3-1 below.

The 2017 sampling conducted by Stephenson was for particulates and VOC only, and as such the results presented/used are limited to the volumetric flow rate for the KF exhaust only.

**Table 3-1 Summary of odour sampling results**

| Source name | Odour concentration (OU) | Flow rate ($m^3$/min) | Odour emission rate (OU/min) | Odour flux (OU/$m^2$/min) |
|---|---|---|---|---|
| **29 June 2010 (ETC)** | | | | |
| PC-42 (*see note 1*) | 240 | 170 | 41000 | NA |
| | 180 | 170 | 31000 | |
| **2 & 23 May 2017 (Stephenson)** | | | | |
| KF | - | 31 | - | - |
| **27 August 2019 (Ektimo)** | | | | |
| PC-42 | 1700 | 240 | 410000 | NA |
| UPC-1 | 8800 | 42 | 370000 | |
| Roof vent | 810 | *See note 2* | | |
| **24 September 2019 (Ektimo)** | | | | |
| UPC-2 | 1900 | 125 | 240000 | NA |
| WWTP - Balance tank | 750 | NA | | 27 |
| WWTP - DAF | 800 | | | 29 |

1. Odour concentration at PC-42 during 2010 sampling round is significantly lesser than that measured during the 2019 sampling round. As such as a conservative measure, the 2010 sampling data is discarded in favour of the more recent 2019 data.
2. Flow rate measurements were not taken from this source. Flow rate measurements are to be estimated for each roof vent based on equipment supplier commissioning data.

### 3.2.1 Emission inventory

Modelled source parameters and emission rates are outlined in Table 3-2 and Table 3-3 for WWTP odour sources and stack/vent odour sources respectively. The following information was used to inform the data provided in each table:

- ETC, Ektimo sampling reports as described above.
- Data provided by SBA including stack heights, roof vent flow rates, WWTP source areas and building dimensions.

**Table 3-2 Source emission details – WWTP sources**

| Source name | Source ID | Area ($m^2$) | Odour flux ($OU/m^2/min$) | Emission rate (OU/min) | Comment |
|---|---|---|---|---|---|
| WWTP - Balance tank | W1 | 57 | 27 | 1,539 | - |
| WWTP - settling tank 1 | W2a | 6.2 | 27 | 167 | Assumption that odour flux rate from settling tanks is equivalent to that measured at the balance tank. |
| WWTP - settling tank 2 | W2b | 6.2 | 27 | 167 | |
| WWTP - settling tank 3 | W2c | 6.2 | 27 | 167 | |
| WWTP - DAF | W3 | 16 | 29 | 464 | Modelled as a volume source at DAF building with height 4.3 m. |

### Table 3-3 Source emission details – stack/vent sources

| Name | ID | Height (m) | Diameter (mm) | Temperature (C) | Velocity (m/s) | Emission Rate (OU/min) | Comment |
|---|---|---|---|---|---|---|---|
| UPC-1 Fryer Exhaust | UPC-1 | 11.5 | 500 | 91 | 4.8 | 370,000 | - |
| UPC-2 Fryer Exhaust | UPC-2 | 11.8 | 530 | 163 | 15 | 240,000 | Modelled with rain cap, vertical momentum = 0 |
| PC-42 Fryer Exhaust | PC-42 | 14.5 | 1090 | 144 | 6.6 | 410,000 | - |
| KF-3 Fryer Exhaust | KF-3 | 11.7 | 700 | 71 | 12 | 272,800 | Discharge parameters (flow rate, velocity, temperature) sourced from 2017 sampling report. The KF are an uncontrolled source and as such it is assumed that the discharge odour concentration will be similar to that measured from UPC-1 (8,800 OU), which is the highest measured concentration from the site. The odour emission rate for the KF exhaust is calculated through multiplication of the measured flow rate (31 $m^3$/min) and the assumed odour concentration (8,800 OU). |
| KF-4 Fryer Exhaust | KF-4 | 11.7 | 700 | 71 | 12 | 272,800 | |
| Roof vent, 1 | RV1 | 9.5 | 1000 | 30 | 5 | 243,000 | Emission rates calculated from odour concentration of 810 OU and volumetric flow rates of 300 $m^3$/min for RV1&RV2, 360 $m^3$/min for RV3 and 375 $m^3$/min for RV4&RV5 as per information provided by SBA. Roof vent sources modelled as point source with rain cap, vertical momentum = 0. Assumed temperature of 30C to represent warm air being drawn from building. Velocity of 5 m approximated from exit area (1 $m^3$) and volumetric flow estimates. Assume exit point is 0.5 m above roof level. |
| Roof vent, 2 | RV2 | 9.5 | 1000 | 30 | 5 | 243,000 | |
| Roof vent, 3 | RV3 | 9.5 | 1000 | 30 | 5 | 291,600 | |
| Roof vent, 4 | RV4 | 9.5 | 1000 | 30 | 5 | 303,750 | |
| Roof vent, 5 | RV5 | 9.5 | 1000 | 30 | 5 | 303,750 | |

## 3.3 Meteorological modelling

### 3.3.1 Model configuration

Key meteorological input data for the assessment were from the following sources:

- Prospect Air Quality Monitoring Station (AQMS) operated by NSW OEH – Approximately 4 km south of the site.
- BOM Horsley Park Equestrian Centre Automatic Weather Station (AWS) – Approximately 11 km south-southwest of the site.
- BOM Bankstown Airport AWS – Approximately 19 km south-southeast of the site.

Whilst the Prospect AQMS is the most proximate to site, additional observations from BOM sites are included into the model configuration to fill data gaps and provide key inputs such as cloud coverage which are not measured at the Prospect AQMS.

The CALMET diagnostic meteorological model was used to develop the 3D meteorological grid for subsequent use in dispersion modelling. CALMET was configured in 'Hybrid' mode, whereby surface observations were used in conjunction with coarse three-dimensional data developed using the prognostic meteorological model, The Air Pollution Model (TAPM). The model was run for the determined representative year of 1 January 2014-31 December 2014.

Model settings were selected with consideration of the New South Wales Office of Environment & Heritage (OEH) (OEH NSW, 2011) guidance documentation and modelling guidelines. The CALMET domain extended 6 km in each direction from the Site with a grid resolution of 250 m. Model settings used in TAPM and CALMET are provided in Table 3-4.

**Table 3-4 TAPM and CALMET model parameters**

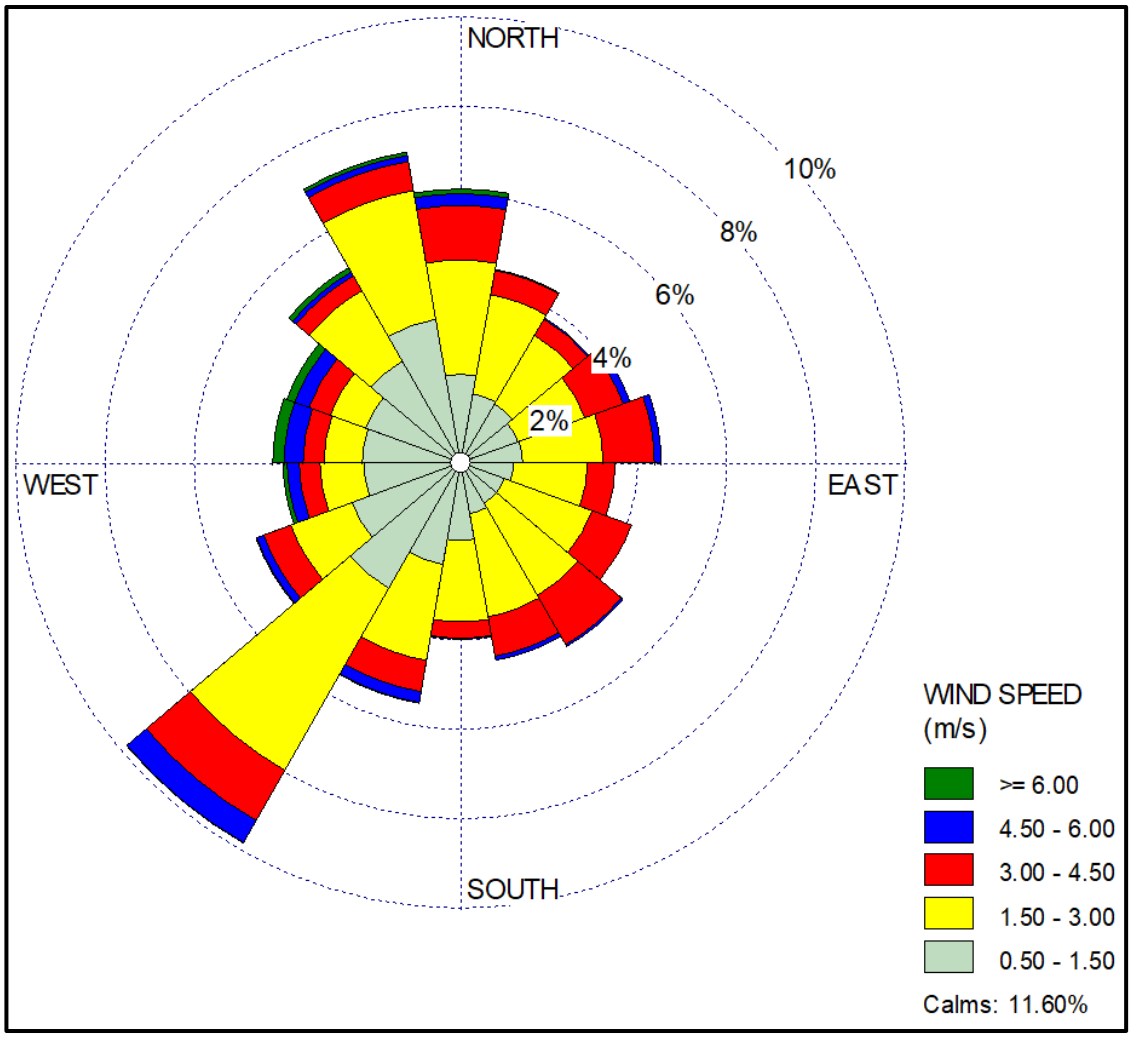
| Parameter | Value |
|---|---|
| **TAPM** | |
| Modelled Period | 01 January 2014 12:00 am – 31 December 2014 11:59 pm |
| Domain centre | Latitude =-33° 45.5'<br>Longitude = 150° 54.5' |
| Number of vertical levels | 25 |
| Number of Easting Grid Points | 25 |
| Number of Northing Grid Points | 25 |
| Outer Grid Spacing | 24,000 m x 24,000 m |
| **CALMET** | |
| Modelled Period | 01 January 2014 12:00 am – 31 December 2014 11:59 pm |
| Mode | Hybrid (NOOBS = 1) |
| UTM Zone | 56 |
| Domain Origin (South-West Corner) | Easting: 301.500km<br>Northing: 6257.500km |
| Domain Size | 50 x 50 at 0.20 km resolution<br>(10.0 km x 10.0 km) |
| Number of vertical levels | 10 |
| Vertical Levels (m) | 20, 40, 80, 160, 320, 640, 1200, 2000, 3000, 4000 |

### 3.3.2 Local wind field

The local meteorology largely determines the pattern of off-site air quality impact on receptors. The effect of wind on dispersion patterns can be examined using the wind distributions at the subject site. The winds at a site are most readily displayed by means of wind rose. Figure 2 shows the annual average wind rose for the site for the representative year, 2014.

- The average wind speed is 1.8 m/s
- The highest frequency of winds are from the south-west and north-west.
- Light winds (< 1.5 m/s) are most frequently observed from the south-west through north-west.
- The observed wind speed distribution indicates that the largest proportion of high wind speeds (> 6 m/s) are from the south-west, west and north.

**Figure 2 Wind rose**



## 3.4 Dispersion modelling

The air quality dispersion modelling was conducted in accordance with the Approved methods for modelling and assessment of air pollutants in NSW (Environment Protection Authority, 2016), using the US EPA regulatory Gaussian puff model CALPUFF Version 5. Details of model configuration are outlined below:

- Model: CALPUFF Version 5.8.
- The year 2014 was modelled.
- A Cartesian receptor grid was modelled with a 125 m nested grid resolution.
- Discrete sensitive receptors were included in the model. Receptors were selected in a fence line configuration around the Blacktown industrial precinct within which the site is located.
- Emission rates were modelled as constant throughout the model period. Normal operations would see day-to-day variability, with shutdowns and cleaning typically occurring on Sundays and Mondays and public holidays as well as downtime of key sources during non-peak production periods. These factors were not considered in the modelling, instead constant emission rates were used to capture worst-case emission rates through the period.
- Odour sources included in the modelling exercises were those identified as major sources only. Minor point/fugitive emission sources are not included in the model as it is expected that their contribution to off-site odour impacts will be negligible.
- CALPUFF settings selected with consideration of default model settings and the Generic guidance for modelling and assessment of air pollutants in New South Wales.
- Buildings were included in the model, with the BPIP algorithm utilised in consideration of building wake effects on point source discharges.
- Modelling was completed for a 1-hour time step. To assess against peak (nose-response time) concentrations, a peak-to-mean ratio of 2.3 was applied for all source types (volume, area and wake-affected point).
- The 99$^{th}$ percentile value (~rank 87) was extracted at each receptor location for assessment against the relevant criteria. The 99$^{th}$ percentile represents the level where the presented odour concentration is exceeded for 1% of the model duration, and as such represents the assessment of reasonably worst case impacts from the Site.

Source locations are shown in Figure 3.


Paper Size ISO A4

0 5 10 15 20

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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GHD

**Snack Brands Australia**
**Snackfoods Odour Assessment**
**Blacktown manufacturing plant**

Project No. **21-28298**
Revision No. **A**
Date **22/10/2019**

## Modelled emission source locations

**FIGURE 3**

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## 3.5 Assessment of predicted impacts

### 3.5.1 Established of project specific objective

For a Level 3 odour assessment, the Technical Framework outlines recommended assessment objectives based on the type of facility being assessed (new, existing, upgrading/expanding). For proposed/new facilities, the primary mechanism is the establishment of an odour concentration criteria, and subsequent assessment of predicted ground level odour concentrations against the relevant criteria level. However, once a facility is operational the benchmark for the facility is typically no longer the odour assessment criteria but whether the existing emission of odour is demonstrated to be:

- Not considered 'offensive' (for scheduled activities), or
- Being prevented or minimised using best management practices (for scheduled and non-scheduled activities).

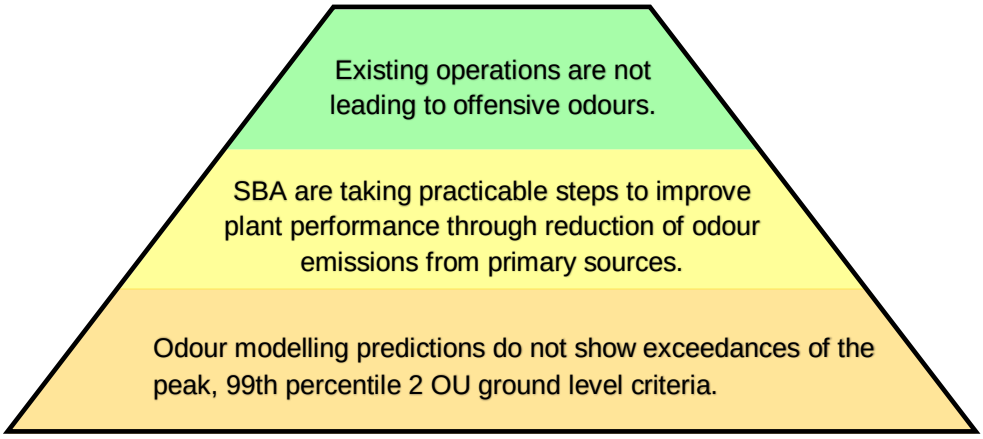
Additionally, operation of the facility should be in accordance with the Protection of the Environment Operations Act 1997 (POEO Act). The POEO Act requires that no occupier of any premises causes air pollution (including odour) through a failure to maintain or operate equipment or deal with materials in a proper and efficient manner. The operator must also take all practicable means to minimise and prevent air pollution (sections 124, 125, 126 and 128 of the POEO Act).

The POEO Act includes the concept of 'offensive odour' (section 129) and states it is an offence for scheduled activities to emit 'offensive odour'.

Nevertheless, comparison of the sites predicted performance against impact assessment criteria outlined in the Technical Framework is a valuable tool in understanding the spatial variation in potential off-site impacts, expected level of risk as well as providing a baseline for future plant modifications. The odour criteria range from 2 odour units (OU) for densely populated areas up to 7 OU for single isolated residences. Based on the density of residential receptors adjacent to the boundaries of the industrial precinct, a 2 OU objective is adopted for the assessment which represents the most stringent of the criteria values as outlined in the Technical Framework.

As a consequence of the above, this assessment objective will be three tiered, as shown in Figure 4.

**Figure 4 Assessment objectives**

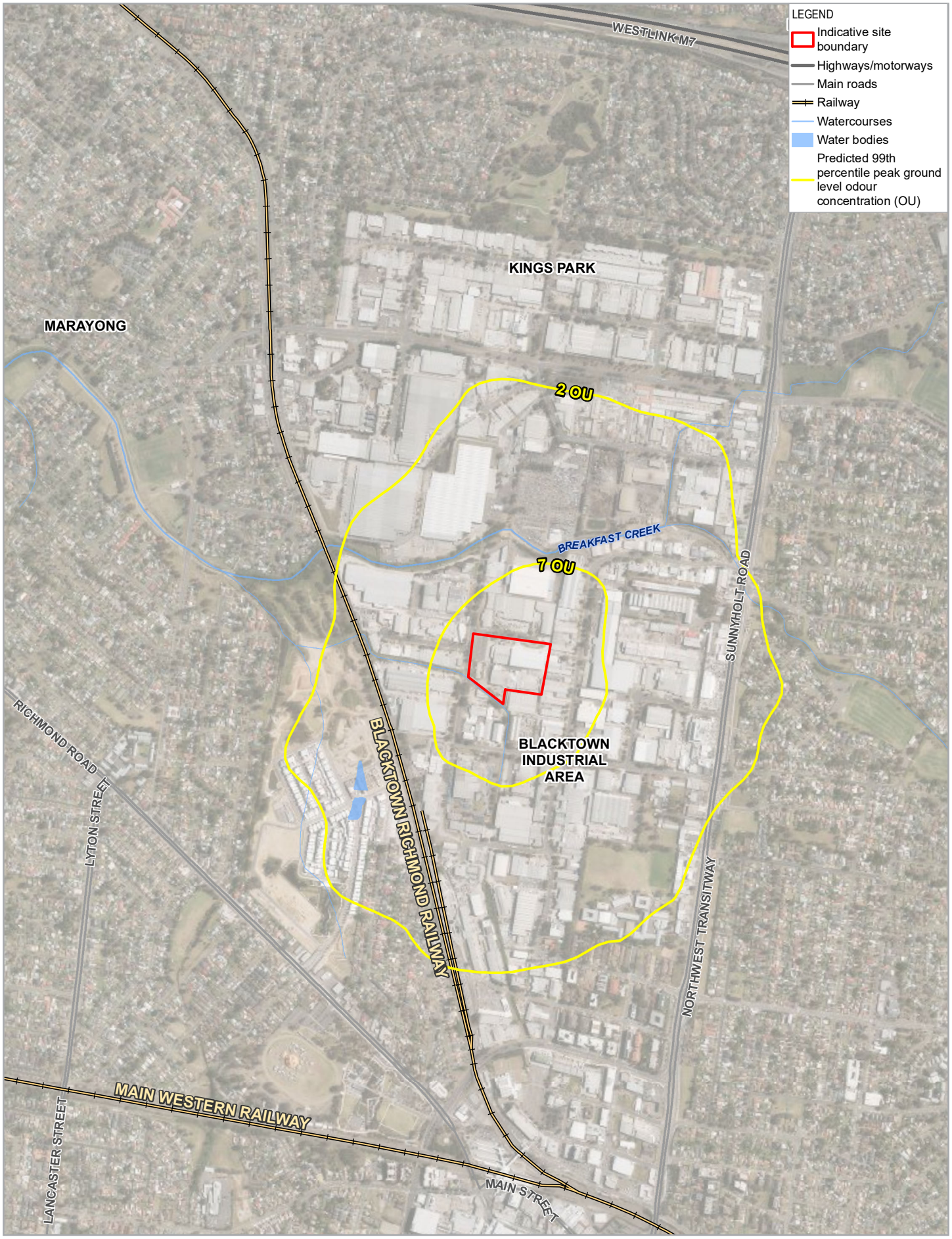


### 3.5.2 Predicted impacts

A contour plot of the predicted peak 99$^{th}$ percentile odour concentration is shown in Figure 5 below. The following observations are made:

- The 2 OU contour line is contained within the Blacktown Business Park in the north and southern sectors from the Site. The 2 OU impact assessment criteria is exceeded at a group of existing receptors/developments in the south-western sector from the site, on the western side of the railway line and a group of receptors to the east of the Site across Sunnyholt Rd.
- The 7 OU contour line is also presented in Figure 5. 7 OU contour line represents the least stringent odour criteria and is also considered in the Technical Frameworks as the odour concentration below which individuals with standard sensitivity should not consider that odour as 'offensive'. As such, the Technical Framework recommends that 'no individual be exposed to ambient odour levels greater than 7 OU'.

  The 7 OU contour as presented in Figure 5 is contained entirely within the Blacktown Business Park.
- The maximum 99$^{th}$ percentile concentration predicted within a residential land use is approximately 4 OU.




Paper Size ISO A4

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

**Snack Brands Australia**
**Snackfoods Odour Assessment**
**Blacktown manufacturing plant**

## Predicted ground level odour concentration

Project No. **21-28298**
Revision No. **A**
Date **25/10/2019**

# FIGURE 5

Data source: . Created by: sgerman

### 3.5.3 History of complaints regarding 'offensive odour'

SBA provided GHD with a record of complaints which had been provided to SBA by EPA. A total of nine complaints have been alleged against the SBA Blacktown site between 29/7/14 and 22/11/18. Note, any complaints outside of this range of dates have not been made available to GHD. The complaints are described below:

- Of the nine total complaints, only three make any reference to odour. Noise, 'smoke' and stormwater are the primary focus of the additional six complaints.
- Of the three complaints with any reference to odour, the following are noted:
    - The complaint lodged on 30/11/2015 was listed with sub category 'Odours Commercial Premises', however comment discusses a white residue settling on cars and makes no reference to odours. As such, this complaint is not considered as an odour complaint alleged against the Site.
    - The complaint lodged on 01/06/2016 was listed with sub category 'Odours Commercial Premises', and makes reference to a strong smell/smoke believed to originate at the Site. SBA has provided comment that the neighbouring resident cooks smoked meats and that this is likely the source of the odour. Further, the described odour characters from sampling (Appendix C) are primarily fat/oil rather than smoke related. As such, this complaint is not considered as an odour complaint alleged against the Site.
    - The complaint lodged on 14/07/2017 was listed with sub category 'Odours Commercial Premises', and makes reference to an 'Odour emission' believed to originate at the Site.

In summary, within the period of available records (> 4 years) a single odour complaint may be attributed to SBA operations at the Site.

### 3.5.4 Best practice

SBA has recently decommissioned two, older and uncontrolled fryer units and has commissioned a new, pollution controlled fryer unit. This upgrade demonstrates SBA's aim for continuous improvement in manufacturing processes and subsequently decreases in uncontrolled emissions from the facility. It is expected that future plant upgrades will follow a similar trend.

# 4. Conclusion

An odour assessment has been completed in support of the SBA application for an Environmental Protection License (EPL) for agricultural processing activities at the Blacktown snack production facility. A Level 3 odour assessment has been completed in accordance with the "Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW" (Department of Environment and Conservation (NSW), 2006).

Odour emission data and discharge parameters for key sources was made available from sampling campaigns conducted in 2010, 2017 and more recently 2019. Odour emission sampling was conducted for fryer exhaust stacks, manufacturing building ventilation points and WWTP sources. Odour sampling data was utilised in conjunction with a site-representative CALMET data file to complete odour dispersion modelling using CALPUFF.

With reference to the three-tiered assessment objective outlined in Section 3.5.1 the following are concluded:

- An analysis of complaints history has shown a single instance where a lodged complaint may be attributed to odorous emissions from the Site. As such it is concluded that the existing facility is not contributing to a significant loss of amenity at off-site receptors due to emission of unacceptable level of odours.
- Recent equipment upgrades have seen older equipment replaced with newer, pollution controlled equipment. This upgrade demonstrates SBA's aim for continuous improvement in manufacturing processes and subsequently decreases in uncontrolled emissions from the facility.
- Dispersion modelling predictions exceed the 99$^{th}$ percentile, 2 OU impact assessment criteria used to assess new developments at receptors to the west and east of the Site. The maximum predicted odour concentration at a residential land use is approximately 2-4 OU, which is below the 7 OU threshold where individuals with standard sensitivity may consider that odour as 'offensive'.

Whilst dispersion modelling predictions suggest an exceedance of the 2 OU criteria for a worst-case scenario, the Site's performance against the objectives of the Technical Framework and the POEO are more appropriately assessed with consideration of the positive track record in the frequency of odour complaints alleged at the site (one complaint in 2017).

# 5. References

Department of Environment and Conservation (NSW), 2006. *Technical framework: Assessment and management of odour from stationary sources in NSW.* Sydney: Department of Environment and Conservation (NSW).

Environment Protection Authority, 2016. *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.* Sydney: Environment Protection Authority.

OEH NSW, 2011. *Generic Guidance and Optimum Model Settings for the CALPUFF Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia',* Sydney: NSW Office of Environment and Heritage.

# Appendices

# **Appendix A** – 2010 Sampling Report (etc)

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**Date:** 10 August 2010

**Report No:** 100098r1



Heat and Control
407 Creek Road
Mt Gravatt QLD 4122

***Emission Testing – 29 June 2010***
*KleenHeat (KHX) Installation – Project Number 10802001*

Dear Mr Mick Walsh,

Tests were performed on 29 June 2010 to determine emissions to air from a KleenHeat (KHX) installation using burner model Weishaupt WKG50/2-A for Project Number 10802001. Efficiency of the system to remove odours, condensable particulate matter, solid particulate matter and volatile organic compounds (VOC's) was also determined.

As there was not a suitable sampling location prior to the oil mist eliminator pad a true inlet sample was not performed. Actual pollutant removal efficiencies of the system may be better than reported.

The KHX was operating on natural gas during the reported tests.



Yours faithfully
Emission Testing Consultants

**Matthew Heskin**
Managing Director

*mh@emission.com.au*

## DEFINITIONS

The following symbols and abbreviations are used in this test report:

| | |
|---|---|
| NTP | Normal temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified. |
| Disturbance | A flow obstruction or instability in the direction of the flow that may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter. |
| BSP | British standard pipe. |
| Odour unit | One odour unit (ou) is that concentration of odorant(s) at standard concentrations that elicits a physiological response from a panel (detection threshold) equivalent to that elicited by one Reference Odour Mass (ROM), evaporated in one cubic metre of neutral gas at standard conditions. |
| VOC | Any chemical compound based on carbon in the boiling range 36 to 126°C, with a vapour pressure of at least 0.010kPa at 25°C (or having a corresponding volatility under the particular conditions of use) that adsorb onto activated charcoal and desorb into $CS_2$, or that can be collected in a tedlar bag and be quantitatively recovered, and that are detected by GCMS. These compounds may contain oxygen, nitrogen and other elements, but specifically excluded are CO, $CO_2$, carbonic acid, metallic carbides and carbonate salts. |
| D | Duct diameter or equivalent duct diameter for rectangular ducts. |
| > | Greater than |
| < | Less than the minimum limit of detection using the specified method. |
| ~ | Approximately |
| NA | Not applicable |

## PLANT OPERATING CONDITIONS

Plant operating conditions were supplied by Heat and Control personnel.

Burner Model: Weishaupt WKG50/2-A

Production Rate was 1100kg/hr of potato chips. A normal fuel consumption of 261$m^3$/hr of natural gas was used in the thermal oxidiser and heating the cooking oil.

## SAMPLING PLANE REQUIREMENTS

*Criteria for Sampling Planes for compliance to Australian Standard (AS 4323.1-1995)*

***Table 1***

| *Type of flow disturbance* | *Minimum distance upstream from disturbance, diameters (D)* | *Minimum distance downstream from disturbance, diameters (D)* |
|---|---|---|
| *Bend, connection, junction, direction change, exit* | *> 2D* | *>6D* |
| *Louvre, butterfly damper (partially closed or closed)* | *>3D* | *>6D* |
| *Axial fan* | *>3D* | *>8D (see note)* |
| *Centrifugal fan* | *>3D* | *>6D* |

*Note: The plane should be selected as far as practicable from a fan. Flow straighteners may be required to ensure the position chosen meets the check criteria listed in items (a) to (f) below.*

*(a) The gas flow is basically in the same direction at all points along each sampling traverse.*

*(b) The gas velocity at all sampling points is greater than 3 m/sec.*

*(c) The gas flow profile at the sampling plane shall be steady, evenly distributed and not have a cyclonic component which exceeds an angle of 15° to the duct axis, when measured near the periphery of a circular sampling plane.*

*(d) The temperature difference between adjacent points of the survey along each sampling traverse is less than 10% of the absolute temperature, and the temperature at any point differs by less than 10% from the mean.*

*(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.*

*(f) The gas temperature at the sampling plane should preferably be above the dewpoint.*

## SAMPLING PLANE OBSERVATIONS

### Location 2 – Between mist eliminator (ME) pad and pollution fan

As there was only 1 sampling port available, the sampling plane was not in accordance with ***Table 3*** of **AS4323.1**. (This requires that ducts between 200mm and 1500mm have 2 sampling ports).

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

As the conditions of ***(a)*** to ***(f)*** of ***AS 4323.1*** have been met there is no effect on the validity of results.

### Location 3 –KHX Exhaust Exit

As there was only 1 sampling port available, the sampling plane was not in accordance with ***Table 3*** of **AS4323.1**. (This requires that ducts between 200mm and 1500mm have 2 sampling ports).

The sampling plane was in accordance with ***Table 1*** of **AS4323.1** and the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

## TEST METHODS

The following methods are accredited with the National Association of Testing Authorities (NATA) and are approved for the sampling and analysis of gases. Specific details of the methods are available on request.

All parameters are reported adjusted to dry NTP conditions unless otherwise stated.

**On site sampling guidelines:** according to ETC method 1.

**Sampling plane criteria:** according to AS 4323.1-1995. Selection of sampling positions.

**Flow rate and velocity:** according to US EPA Method 2, using a pitot tube and differential manometer. Temperature determined using a calibrated thermocouple and digital pyrometer.

**Moisture content:** according to US EPA method Alt008, by gravimetry.

**Odour:** according to AS4323.3, by dynamic olfactometry (forced-choice technique). Analysis performed under subcontract by The Odour Unit Pty Ltd (NATA accreditation number 14974), report number PER20100630, dated 30/6/2010. Concentrations reported on a wet NTP basis.

**Odour character:** by direct observations of the odour samples by the panellist following quantification of the samples. Analysis performed under subcontract by The Odour Unit Pty Ltd (NATA accreditation number 14974), report number PER20100630, dated 30/6/2010.

*Odour character 'results' are observations (i.e. the opinions of the odour panellists) and are therefore not covered by Emission Testing Consultants' terms of NATA accreditation.*

**Dry gas density/molecular weight of stack gases:** according to US EPA method 3 using an electrochemical cell $O_2$ analyser and an NDIR $CO_2$ analyser in conjunction with an electronic cooler unit. Calibration against a certified gas standard of $CO_2$ in $N_2$ and ambient air.

**Oxygen:** according to US EPA method 3A, using an electrochemical cell $O_2$ analyser. Calibration against ambient air.

**Carbon dioxide:** according to US EPA method 3A, using a NDIR $CO_2$ analyser. Calibration against a certified gas standard of $CO_2$ in $N_2$.

**Carbon monoxide:** according to US EPA method 10, using an electrochemical cell CO analyser. Calibration against a certified gas standard of CO in $N_2$.

**Nitrogen oxides (NO and $NO_2$) as $NO_2$:** according to US EPA method 7E, using a electrochemical cell NOx analyser. Calibration against a certified gas standard of NO in $N_2$.

**Particulate matter:** according to US EPA method 17. Determination of total particulate matter - isokinetic manual sampling - Gravimetric method, using the 47mm in-line filter holder, in the in-stack configuration with back-up impingers to capture condensable particulates.

**Condensable particulate matter:** according to US EPA method 202. Determination of condensable total particulate matter - isokinetic manual sampling - Gravimetric method, using the 47mm in-line filter holder, in the in-stack configuration with back-up impingers to capture condensable particulates.

**Volatile organic compounds (VOC):** sampled onsite according to Vic EPA method 4230 (**Similar method to US EPA Method 18**) onto a sorbent tube. Subsequent laboratory analysis by solvent desorption and GCMS. Where possible the ten major organic compounds were identified, quantified and reported. Analysis performed under subcontract by SGS Environmental Services (NATA accreditation number 2562); report number SE79640 dated 15/07/2010.

## RESULTS

# Location 1 – Below Oil ME Pad

***29 June 2010***

***No sampling was performed at point 1 as there was no suitable location to set up sampling equipment. Fryer temperature observed are outlined below***

| Position | | °C |
|---|---|---|
| Start of Fryer | Observation Port 1 | 154 |
| Middle of Fryer | Observation Port 2 | 111 |
| End of Fryer | Observation Port 3 | 107 |

# Location 2 – Between Oil ME Pad and Pollution Fan

## *29 June 2010*

| Sampling Plane Details | afterburner inlet 100098 |
|---|---|
| Distance upstream from disturbance: | > 1 D from bend |
| Distance downstream from disturbance: | > 5 D from bend |
| Discharge to air: | Vertical |
| Size and number of ports: | 1 x 4 inch BSP |
| Access to ports: | stairs to roof |
| Conformance with AS 4323.1 Table 1: | No* |
| Non conformance with these items of AS 4323.1: | Conforms with all items |
| **Sampling points increased as per the requirements of AS4323.1 -1995* | |

**No Photo Taken**

| Flow Results | | Afterburner Inlet 100098 | |
|---|---|---|---|
| Time of flow test | | 1005 & 1140 | hrs |
| Stack dimensions at sampling plane | | 700 | mm |
| Stack dimensions at sampling plane | | 28 | inches |
| Velocity at sampling plane | | 7.6 | m/s |
| Velocity at sampling plane | | 25 | ft/sec |
| Average temperature | | 100 | °C |
| Average temperature | | 212 | °F |
| Moisture content | Alt008 | 62 | % v/v |
| Flow rate at discharge conditions | | 180 | m³/min |
| Flow rate at discharge conditions | | 6,200 | SCFM |
| Flow rate at wet NTP conditions | | 130 | m³/min |
| Flow rate at wet NTP conditions | | 4,600 | SCFM |
| Flow rate at dry NTP conditions | | 49 | m³/min |
| Flow rate at dry NTP conditions | | 1,700 | SCFM |

| Continuous Analyser Results | Afterburner Inlet 100098 49 | Sampling Times | Concentration at NTP | | Concentration at NTP | | Rate | | Mass rate | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Oxygen** (dry basis) | | 1030-1130 | 209,000 | ppm | 20.9 | % v/v | | | - | |
| **Carbon dioxide** (dry basis) | | 1030-1130 | < 3,000 | ppm | < 0.3 | % v/v | < 281 | lbs/MMBtu | < 20 | kg/hour |
| **Dry gas density** | | 1030-1130 | - | | 1.3 | kg/m³ | - | | - | |
| **Molecular weight of stack gas,** dry basis | | 1030-1130 | - | | 29 | g/g-mole | - | | - | |
| **Nitrogen oxides** as $NO_2$ | | 1030-1130 | 2.2 | ppm | 4.6 | mg/m³ | 0.003 | lbs/MMBtu | 0.23 | g/min |
| **Carbon monoxide** as CO | | 1030-1130 | < 2 | ppm | < 2 | mg/m³ | < 0.0014 | lbs/MMBtu | < 0.10 | g/min |

Refer to "**SAMPLING PLANE OBSERVATIONS**" on page 3.

# Location 2 – Between Oil ME Pad and Pollution Fan

## *29 June 2010*

| Isokinetic Sampling Results - A (Afterburner Inlet 100098 49) | Sampling Times | Concentration at NTP | Concentration at NTP | Rate | Mass rate |
|---|---|---|---|---|---|
| Particulate matter (filterable) | 1050-1135 | 35 mg/m³ | 0.015 grain/ft³ | 0.024 lbs/MMBtu | 1.7 g/min |
| Particulate matter (condensable) | 1050-1135 | 12 mg/m³ | 0.0052 grain/ft³ | 0.0080 lbs/MMBtu | 0.57 g/min |
| Particulate matter (total) | 1050-1135 | 47 mg/m³ | 0.021 grain/ft³ | 0.032 lbs/MMBtu | 2.3 g/min |

| Isokinetic Sampling Results - B (Afterburner Inlet 100098 49) | Sampling Times | Concentration at NTP | Concentration at NTP | Rate | Mass rate |
|---|---|---|---|---|---|
| Particulate matter (filterable) | 1050-1135 | 34 mg/m³ | 0.015 grain/ft³ | 0.024 lbs/MMBtu | 1.7 g/min |
| Particulate matter (condensable) | 1050-1135 | 13 mg/m³ | 0.0057 grain/ft³ | 0.0087 lbs/MMBtu | 0.62 g/min |
| Particulate matter (total) | 1050-1135 | 46 mg/m³ | 0.020 grain/ft³ | 0.032 lbs/MMBtu | 2.3 g/min |

All percent isokinetic variation is between 90 and 110% unless noted otherwise.

| Odour Results - A (Afterburner Inlet 100098 49) | Sampling Times | Concentration at NTP Wet | Mass rate (ou/m³) | Character |
|---|---|---|---|---|
| Odour | 1050-1055 | 4,900 ou | 630,000 ouv/min | Greasy/cooking fat |

| Odour Results - B (Afterburner Inlet 100098 49) | Sampling Times | Concentration at NTP Wet | Mass rate (ou/m³) | Character |
|---|---|---|---|---|
| Odour | 1100-1105 | 5,300 ou | 690,000 ouv/min | Greasy/cooking fat |

# Location 2 – Between Oil ME Pad and Pollution Fan

## *29 June 2010*

| Volatile Organic Compound (VOC) Results - A | Afterburner Inlet 100098 4,600 | Sampling Times | Concentration at NTP | Detection Limit | Mass rate |
|---|---|---|---|---|---|
| **Acetone** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Propylene Oxide** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Acrylonitrile** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Methylethylketone (MEK)** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Hexane** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Ethylacetate** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **1,2-Dichloroethane** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Benzene** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Carbon tetrachloride** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Cyclohexane** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Ethyl acrylate** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Trichloroethene** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **1,4-Dioxane** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Epichlorohydrin** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Methylisobutylketone (MIBK)** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Toluene** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Butylacetate** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Tetrachloroethene** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Chlorobenzene** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Ethylbenzene** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **m&p-Xylene** | | 1030-1110 | ***Below detectable limit*** | < 0.8 mg/m³ | < 0.04 g/min |
| **Cylcohexanone** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Styrene** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **o-Xylene** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Nonane** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Isopropylbenzene** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Diisobutylketone (DIBK)** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **a-Methylstyrene** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Benzyl chloride** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Decane** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Benzoylchloride** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Naphthalene** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Dodecane** | | 1030-1110 | ***Below detectable limit*** | < 0.4 mg/m³ | < 0.02 g/min |
| **Total VOC (as n-Hexane)** | | 1030-1110 | **9.2** mg/m³ | < 1 mg/m³ | **0.45** g/min |

# Location 2 – Between Oil ME Pad and Pollution Fan

## *29 June 2010*

| Volatile Organic Compound (VOC) Results - B | Afterburner Inlet 100098 4,600 | Sampling Times | Concentration at NTP | Detection Limit | Mass rate |
|---|---|---|---|---|---|
| **Acetone** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Propylene Oxide** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Acrylonitrile** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Methylethylketone (MEK)** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Hexane** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Ethylacetate** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **1,2-Dichloroethane** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Benzene** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Carbon tetrachloride** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Cyclohexane** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Ethyl acrylate** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Trichloroethene** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **1,4-Dioxane** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Epichlorohydrin** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Methylisobutylketone (MIBK)** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Toluene** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Butylacetate** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Tetrachloroethene** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Chlorobenzene** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Ethylbenzene** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **m&p-Xylene** | | 1030-1110 | ***Below detectable limit*** | < 1 mg/m³ | < 0.06 g/min |
| **Cylcohexanone** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Styrene** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **o-Xylene** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Nonane** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Isopropylbenzene** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Diisobutylketone (DIBK)** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **a-Methylstyrene** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Benzyl chloride** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Decane** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Benzoylchloride** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Naphthalene** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Dodecane** | | 1030-1110 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Total VOC (as n-Hexane)** | | 1030-1110 | **6.6** mg/m³ | 2 mg/m³ | **0.33** g/min |

# Location 3 – KHX Exhaust Exit

## *29 June 2010*

| Sampling Plane Details | Afterburner Outlet 780C 100098 |
|---|---|
| Distance upstream from disturbance: | > 2 D from bend |
| Distance downstream from disturbance: | > 6 D from bend |
| Discharge to air: | Vertical |
| Size and number of ports: | 1 x 4 inch BSP |
| Access to ports: | stairs to roof |
| Conformance with AS 4323.1 Table 1: | Yes |
| Non conformance with these items of AS 4323.1: | Conforms with all items |

**No Photo Taken**

| Flow Results | | Afterburner Outlet 780C 100098 | |
|---|---|---|---|
| Time of flow test | | 1200 & 1420 | hrs |
| Stack dimensions at sampling plane | | 700 | mm |
| Stack dimensions at sampling plane | | 28 | inches |
| Velocity at sampling plane | | 11 | m/s |
| Velocity at sampling plane | | 37 | ft/sec |
| Average temperature | | 150 | °C |
| Average temperature | | 302 | °F |
| Moisture content | Alt008 | 67 | % v/v |
| Flow rate at discharge conditions | | 260 | m³/min |
| Flow rate at discharge conditions | | 9,200 | SCFM |
| Flow rate at wet NTP conditions | | 170 | m³/min |
| Flow rate at wet NTP conditions | | 6,000 | SCFM |
| Flow rate at dry NTP conditions | | 56 | m³/min |
| Flow rate at dry NTP conditions | | 2,000 | SCFM |

| Continuous Analyser Results (Afterburner Outlet 780C 100098 56) | Sampling Times | Concentration at NTP | Concentration at 3% O2 | Concentration at NTP | Rate | Mass rate |
|---|---|---|---|---|---|---|
| **Oxygen** (dry basis) | 1225-1325 | 117,000 ppm | - | 11.7 % v/v | | - |
| **Carbon dioxide** (dry basis) | 1225-1325 | 51,200 ppm | - | 5.1 % v/v | 4719 lbs/MMBtu | 340 kg/hour |
| **Dry gas density** | 1225-1325 | - | - | 1.3 kg/m³ | - | - |
| **Molecular weight of stack gas,** dry basis | 1225-1325 | - | - | 29 g/g-mole | - | - |
| **Nitrogen oxides** as $NO_2$ | 1225-1325 | 38 ppm | 75 ppm | 79 mg/m³ | 0.062 lbs/MMBtu | 4.4 g/min |
| **Carbon monoxide** as CO | 1225-1325 | 7.3 ppm | 14 ppm | 9.1 mg/m³ | 0.0071 lbs/MMBtu | 0.51 g/min |

Refer to "**SAMPLING PLANE OBSERVATIONS**" on page 3.

# Location 3 – KHX Exhaust Exit

## *29 June 2010*

| Isokinetic Sampling Results - A (Afterburner Outlet 780C 100098 56) | Sampling Times | Concentration at NTP | Concentration at NTP | Concentration at 3% O2 | Concentration at 3% O2 | Rate | Mass rate |
|---|---|---|---|---|---|---|---|
| Particulate matter (filterable) | 1210-1300 | < 2 mg/m³ | < 0.0009 grain/ft³ | < 3 mg/m³ | < 0.001 grain/ft³ | < 0.001 lbs/MMBtu | < 0.09 g/min |
| Particulate matter (condensable) | 1210-1300 | < 2 mg/m³ | < 0.0009 grain/ft³ | < 3 mg/m³ | < 0.001 grain/ft³ | < 0.001 lbs/MMBtu | < 0.09 g/min |
| Particulate matter (total) | 1210-1300 | < 3 mg/m³ | < 0.001 grain/ft³ | < 6 mg/m³ | < 0.003 grain/ft³ | < 0.003 lbs/MMBtu | < 0.2 g/min |

Particulate removal efficiency based on concentration = **>93%**

| Isokinetic Sampling Results - B (Afterburner Outlet 780C 100098 56) | Sampling Times | Concentration at NTP | Concentration at NTP | Concentration at 3% O2 | Concentration at 3% O2 | Rate | Mass rate |
|---|---|---|---|---|---|---|---|
| Particulate matter (filterable) | 1210-1300 | < 2 mg/m³ | < 0.0009 grain/ft³ | < 3 mg/m³ | < 0.001 grain/ft³ | < 0.001 lbs/MMBtu | < 0.09 g/min |
| Particulate matter (condensable) | 1210-1300 | < 2 mg/m³ | < 0.0009 grain/ft³ | < 3 mg/m³ | < 0.001 grain/ft³ | < 0.001 lbs/MMBtu | < 0.09 g/min |
| Particulate matter (total) | 1210-1300 | < 3 mg/m³ | < 0.001 grain/ft³ | < 6 mg/m³ | < 0.003 grain/ft³ | < 0.003 lbs/MMBtu | < 0.2 g/min |

Particulate removal efficiency based on concentration = **>93%**

All percent isokinetic variation is between 90 and 110% unless noted otherwise.

| Odour Results - A (Afterburner Outlet 780C 100098 56) | Sampling Times | Concentration at NTP Wet | Mass rate (ou/m³) | Character |
|---|---|---|---|---|
| Odour | 1300-1310 | 240 ou | 41,000 ouv/min | Light chlorine-pool odour/slight greasy |

Odour removal efficiency based on concentration = **95.1%**

| Odour Results - B (Afterburner Outlet 780C 100098 56) | Sampling Times | Concentration at NTP Wet | Mass rate (ou/m³) | Character |
|---|---|---|---|---|
| Odour | 1315-1325 | 180 ou | 31,000 ouv/min | Light chlorine-pool odour/slight greasy |

Odour removal efficiency based on concentration = **96.6%**

# Location 3 – KHX Exhaust Exit

## Operating Temperature – 780°C

### *29 June 2010*

| Volatile Organic Compound (VOC) Results - A (Afterburner Outlet 780C 100098 56) | Sampling Times | Concentration at NTP | Detection Limit | Mass rate |
|---|---|---|---|---|
| **Acetone** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Propylene Oxide** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Acrylonitrile** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Methylethylketone (MEK)** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Hexane** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Ethylacetate** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **1,2-Dichloroethane** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Benzene** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Carbon tetrachloride** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Cyclohexane** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Ethyl acrylate** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Trichloroethene** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **1,4-Dioxane** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Epichlorohydrin** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Methylisobutylketone (MIBK)** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Toluene** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Butylacetate** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Tetrachloroethene** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Chlorobenzene** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Ethylbenzene** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **m&p-Xylene** | 1230-1330 | ***Below detectable limit*** | < 0.6 mg/m³ | < 0.03 g/min |
| **Cylcohexanone** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Styrene** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **o-Xylene** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Nonane** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Isopropylbenzene** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Diisobutylketone (DIBK)** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **a-Methylstyrene** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Benzyl chloride** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Decane** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Benzoylchloride** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Naphthalene** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Dodecane** | 1230-1330 | ***Below detectable limit*** | < 0.3 mg/m³ | < 0.02 g/min |
| **Total VOC (as n-Hexane)** | 1230-1330 | ***Below detectable limit*** | < 0.7 mg/m³ | < 0.04 g/min |

VOC removal efficiency based on concentration = **>92%**

# Location 3 – KHX Exhaust Exit

## Operating Temperature – 780°C

### *29 June 2010*

| Volatile Organic Compound (VOC) Results - B | Afterburner Outlet 780C 100098 56 | Sampling Times | Concentration at NTP | Detection Limit | Mass rate |
|---|---|---|---|---|---|
| **Acetone** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Propylene Oxide** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Acrylonitrile** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Methylethylketone (MEK)** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Hexane** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Ethylacetate** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **1,2-Dichloroethane** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Benzene** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Carbon tetrachloride** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Cyclohexane** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Ethyl acrylate** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Trichloroethene** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **1,4-Dioxane** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Epichlorohydrin** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Methylisobutylketone (MIBK)** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Toluene** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Butylacetate** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Tetrachloroethene** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Chlorobenzene** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Ethylbenzene** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **m&p-Xylene** | | 1230-1330 | ***Below detectable limit*** | < 0.9 mg/m³ | < 0.05 g/min |
| **Cylcohexanone** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Styrene** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **o-Xylene** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Nonane** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Isopropylbenzene** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Diisobutylketone (DIBK)** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **a-Methylstyrene** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Benzyl chloride** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Decane** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Benzoylchloride** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Naphthalene** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Dodecane** | | 1230-1330 | ***Below detectable limit*** | < 0.5 mg/m³ | < 0.03 g/min |
| **Total VOC (as n-Hexane)** | | 1230-1330 | ***Below detectable limit*** | < 1 mg/m³ | < 0.06 g/min |

VOC removal efficiency based on concentration = >**82%**

# Location 3 – KHX Exhaust Exit

## Operating Temperature – 700°C

### *29 June 2010*

| Odour Results - A (Afterburner Outlet 700C 100098 55) | Sampling Times | Concentration at NTP Wet | Mass rate | Character |
|---|---|---|---|---|
| **Odour** | 1350-1400 | 230 ou | 40,000 ouv/min | Light chlorine-pool odour/slight greasy |

Odour removal efficiency based on concentration = **95.2%**

| Volatile Organic Compound (VOC) Results - A (Afterburner Outlet 700C 100098 55) | Sampling Times | Concentration at NTP | Concentration at NTP | Mass rate |
|---|---|---|---|---|
| **Acetone** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Propylene Oxide** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Acrylonitrile** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Methylethylketone (MEK)** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Hexane** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Ethylacetate** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **1,2-Dichloroethane** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Benzene** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Carbon tetrachloride** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Cyclohexane** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Ethyl acrylate** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Trichloroethene** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **1,4-Dioxane** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Epichlorohydrin** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Methylisobutylketone (MIBK)** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Toluene** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Butylacetate** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Tetrachloroethene** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Chlorobenzene** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Ethylbenzene** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **m&p-Xylene** | 1345-1415 | *Below detectable limit* | < 0.9 mg/m³ | < 0.05 g/min |
| **Cylcohexanone** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Styrene** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **o-Xylene** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Nonane** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Isopropylbenzene** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Diisobutylketone (DIBK)** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **a-Methylstyrene** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Benzyl chloride** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Decane** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Benzoylchloride** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Naphthalene** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Dodecane** | 1345-1415 | *Below detectable limit* | < 0.4 mg/m³ | < 0.02 g/min |
| **Total VOC (as n-Hexane)** | 1345-1415 | *Below detectable limit* | < 1 mg/m³ | < 0.06 g/min |

VOC removal efficiency based on concentration = **>88%**

# **Appendix B** – 2017 Sampling Report (Stephenson)

APPENDIX 5.

Stephenson

Environmental Management Australia

Peter W Stephenson & Associates Pty Ltd
ACN 002 600 526 (Incorporated in NSW)
ABN 75 002 600 526

52A Hampstead Road
Auburn NSW 2144
Tel: (02) 9737 9991
E-Mail: info@stephensonenv.com.au

# EMISSION TEST REPORT NO. 5721A

## STACK EMISSION SURVEY

## SNACKBRANDS AUSTRALIA

**PROJECT NO.:** 5721A/S24416A/17

**DATE OF SURVEY:** 2 & 23 MAY 2017

**DATE OF FINAL ISSUE:** 3 JULY 2017

NATA
WORLD RECOGNISED ACCREDITATION

NATA accredited laboratory number 15043.
Accredited for Compliance with ISO/IEC 17025

# 1 EMISSION TEST REPORT NO. 5721A

**The sampling and analysis was commissioned by:**

| | |
|---|---|
| **Client**: | Snackbrands Australia |
| Contact: | Arsh Singh |
| Address: | 30 Bessemer St. Blacktown, NSW 2148 |
| Telephone: | 02 9831 9200 |
| Email: | Arsh.Singh@snackbrands.com.au |
| Project Number: | 5721A/S24416A/17 |
| Test Date(s): | 2 & 23 May 2017 |
| Production Conditions: | Normal operating conditions during emission testing. |
| Analysis Requested: | Dry gas density, flow, moisture, molecular weight of stack gases, temperature, oxygen, stack pressure, Total Solid Particulates (TSP) and Volatile Organic Compounds |
| Sample Locations: | Fryer PC-42, Fryer UPC and Fryer KF |
| Sample ID Nos.: | See Table 1.3 for TSP sample IDs; Attachment A for VOCs and 726218 (UPC ), 726219 (PC42 ) and 726271 (KF ). |

| | |
|---|---|
| Identification | The samples are labelled individually. Each label recorded the testing laboratory, sample number, sampling location (or Identification) sampling date and time and whether further analysis is required. |

| *Test* | *Test Method Number for Sampling and Analysis* | *NATA Laboratory Analysis By: NATA Accreditation No. & Report No.* |
|---|---|---|
| Dry Gas Density | NSW TM-23, USEPA M3 | SEMA, Accreditation No. 15043, Emission Test Report No. 5721A |
| Flow | NSW TM-2, USEPA M2 | SEMA, Accreditation No. 15043, Emission Test Report No. 5721A |
| Moisture | NSW TM-22, USEPA M4 | SEMA, Accreditation No. 15043, Emission Test Report No. 5721A |
| Molecular Weight of Stack Gases | NSW TM-23, USEPA M3 | SEMA, Accreditation No. 15043, Emission Test Report No. 5721A |
| Oxygen | NSW TM-25, USEPA M3A, | SEMA, Accreditation No. 15043, Emission Test Report No. 5721A |
| Stack Pressure | NSW TM-2, USEPA M2 | SEMA, Accreditation No. 15043, Emission Test Report No. 5721A |
| Stack Temperature | NSW TM-2, USEPA M2 | SEMA, Accreditation No. 15043, Emission Test Report No. 5721A |
| Total Solid Particulates | NSW TM-15, AS4323.2 | SEMA, Accreditation No. 15043, Particle Test Report No. 2040, & 2043 |
| Velocity | NSW TM-2, USEPA M2 | SEMA, Accreditation No. 15043, Emission Test Report No. 5721A |
| Volatile Organic Compounds | NSW TM-34, USEPA M18 | TestSafe Australia, Accreditation No. 3726, Report No 2017-2041 & 2017-2433 |

| | |
|---|---|
| **Deviations from Test Methods** | Nil |
| **Sampling Times** | NSW - As per Test Method requirements or if not specified in the Test Method then as per Protection of the Environment Operations (Clean Air) Regulations Part 2. |
| **Reference Conditions** | NSW – As per<br>(1) Environment Protection Licence conditions, or<br>(2) Part 3 of the Protection of the Environment Operations (Clean Air) Regulations |

All associated NATA endorsed Test Reports/Certificates of Analysis are provided separately in Attachment A.

Final Issue Date
3 July 2017

Peter Stephenson
Managing Director

## 1.1 PRODUCTION CONDITIONS

Snackbrands personnel considered the plant was operating under typical conditions on the days of testing. Details of production conditions prevailing during the emission survey are available on request.

## 1.2 DETECTED VOC EMISSION TEST RESULTS

| Compound | Concentration (normal) (mg/m³) | | | Concentration as n-Propane Equivalent (mg/m³) | | | Concentration (ppm) | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample ID No. | PC-42 726219 | UPC 726218 | KF 726271 | PC-42 | UPC | KF | PC-42 | UPC | KF |
| n-Pentane | -- | 6.46 | 3.40 | -- | 2.94 | 2.07 | -- | 2.00 | 1.06 |
| n-Heptane | -- | 4.56 | -- | -- | 2.00 | -- | -- | 1.02 | -- |
| n-Octane | -- | 4.56 | 0.89 | -- | 1.75 | 0.34 | -- | 0.89 | 0.18 |
| total | -- | 15.57 | 4.29 | -- | 7.69 | 2.41 | -- | 3.92 | 1.24 |
| **POEO (Clean Air) Regulation Group 6 Limit -40 mg/m³ as n-Propane equivalent for total VOCs** | | | | | | | | | |

**Key to Tables 1.2 and 1.3**

| | | |
|---|---|---|
| POEO(CleanAir) | = | NSW Protection of Environment (Operations) (Clean Air) Regulation 2010 Group 6 Scheduled Premise Emission Limit |
| VOC | = | Volatile organic compound |
| TSP | = | Total solid particles |
| mg/m³ | = | milligrams per cubic metre at 0°C and 101.3 kilopascals (kPa) |
| ppm | = | parts per million |
| -- | = | not detected, below the limit of detection for the analytical method |
| hrs | = | hours |
| °C | = | degrees Celsius |
| m² | = | square metres |
| m/s | = | metres per second |
| am³/min | = | Actual cubic metres per min |
| m³/min | = | dry cubic metre per minute 0°C and 101.3 kilopascals (kPa) |
| m³/sec | = | dry cubic metre per second 0°C and 101.3 kilopascals (kPa) |
| kPa | = | kilo Pascals |
| mg | = | milligrams |
| am³ | = | Actual cubic metres |
| g/s | = | grams per second |
| % | = | percentage |
| g/g mole | = | grams per gram mole |
| kg/m³ | = | kilograms per cubic metre |

Abbreviations of Personnel:

| | | |
|---|---|---|
| PWS | = | Peter Stephenson |
| JW | = | Jay Weber |

## 1.3 DETAILED EMISSION TEST RESULTS –TOTAL SOLID PARTICULATE MATTER (TSP)

| **Emission Test Results** | **TSP** | **TSP** | **TSP** |
|---|---|---|---|
| Project Number | 5721A | 5721A | 5721A |
| Project Name | Snackbrands | Snackbrands | Snackbrands |
| Test Location | **PC-42** | **UPC** | **KF** |
| Date | 2-May-17 | 2-May-17 | 23-May-17 |
| Sample Start Time (hrs) | 14:46 | 11:58 | 10:56 |
| Sample Finish Time (hrs) | 16:06 | 12:58 | 11:56 |
| Sample Location (Inlet/Exhaust) | Exhaust | Exhaust | Exhaust |
| Stack Temperature (°C) | 141 | 96 | 71 |
| Stack Cross-Sectional area ($m^2$) | 0.933 | 0.139 | 0.066 |
| Average Stack Gas Velocity (m/s) | 6 | 5 | 12 |
| Actual Gas Flow Volume ($am^3$/min) | 340 | 44 | 49 |
| Total Normal Gas Flow Volume ($m^3$/min) | 110 | 11 | 31 |
| Total Normal Gas Flow Volume ($m^3$/sec) | 1.8 | 0.19 | 0.51 |
| Total Stack Pressure (kPa) | 101.7 | 101.3 | 102.4 |
| **Analysis** | **TSP** | **TSP** | **TSP** |
| Method | TM-15 | TM-15 | TM-15 |
| SEMA Lab Number | 726224 | 726223 | 726270 |
| Mass In Sample (mg) | < 0.1 | 13.15 | 3.84 |
| Air Volume Sampled ($am^3$) | 1.190 | 0.723 | 0.829 |
| Normal Sample Volume ($m^3$) | 1.1 | 0.669 | 0.78 |
| **Concentration at Stack $O_2$ ($mg/m^3$)** | **<0.1** | **19.6** | **4.92** |
| Mass Emission Rate (g/s) | < 0.00017 | 0.00365 | 0.00253 |
| Moisture Content (% by volume) | 51 | 66 | 22 |
| Molecular Weight Dry Stack Gas (g/g-mole) | 29.4 | 28.8 | 28.8 |
| Dry Gas Density ($kg/m^3$) | 1.31 | 1.29 | 1.29 |
| **Clean Air Regulations Limit 2010 Group 6 ($mg/m^3$)** | **50** | **50** | **50** |
| Isokinetic Sampling Rate (%) | 93 | 110 | 90 |
| Sample Storage Period | 3 months | 3 months | 3 months |
| Sampling Performed by | JW, PWS | JW, PWS | JW, PWS |
| Sample Analysed by (Laboratory) | SEMA | SEMA | SEMA |
| Calculations Entered by | JW | JW | JW |
| Calculations Checked by | PWS | PWS | PWS |

## 1.4 ESTIMATED UNCERTAINTY OF MEASUREMENT

| Pollutant | Methods | Uncertainty |
|---|---|---|
| Moisture | AS4323.2, NSW TM-22, USEPA 4 | 25% |
| Oxygen and Carbon Dioxide | NSW TM-24, TM-25, USEPA 3A, NSW CEM-3, USEPA PS-3 | 1% actual |
| Particulate > 20 mg/m$^3$ | NSW TM-15, AS4323.2, USEPA 5 & 17, USEPA PS-11 | 15% |
| Particulate < 20 mg/m$^3$ | NSW TM-15, AS4323.2, USEPA 5 & 17, USEPA PS-11 | 50% |
| Velocity | AS4323.1, NSW TM-2, USEPA 2, NSW CEM-6, USEPA PS-6 | 5% |
| Volatile Organic Compounds (adsorption tube) | NSW TM-34, USEPA 18 | 25% |

Key:

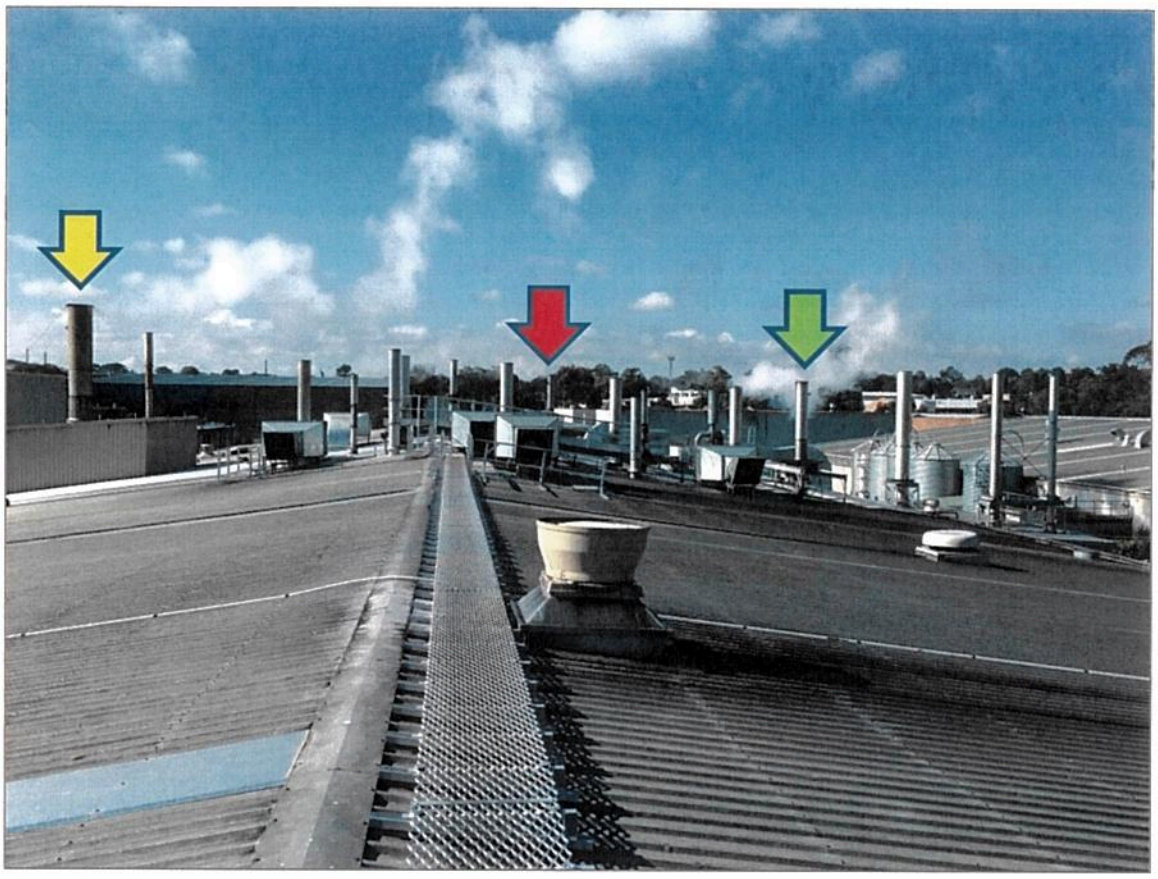
Unless otherwise indicated the uncertainties quoted have been determined @ 95% level of Confidence level (i.e. by multiplying the repeatability standard deviation by a co-efficient equal to 1.96) (Source - Measurement Uncertainty)

Sources: *Measurement Uncertainty - implications for the enforcement of emission limits by Maciek Lewandowski (Environment Agency) & Michael Woodfield (AEAT) UK*

*Technical Guidance Note (Monitoring) M2 Monitoring of stack emissions to air Environment Agency Version 3.1 June 2005.*

*Note: ISO 9096 is for 20-1000 mg/m$^3$ which AS4323.2 is based on. Note DSEN 13284-1 testing for < 5 mg/m$^3$ correlates to 5 mg/m$^3$ with most quoted uncertainties of ± 5.3 mg/m$^3$ @ 6.4 mg/m$^3$. From Clean Air Engineering in the United States the lowest practical limit of USEPA M5 is 5 mg/m$^3$ under lab conditions.*

## 1.5 PHOTOGRAPH OF EMISSION EXHAUST STACKS



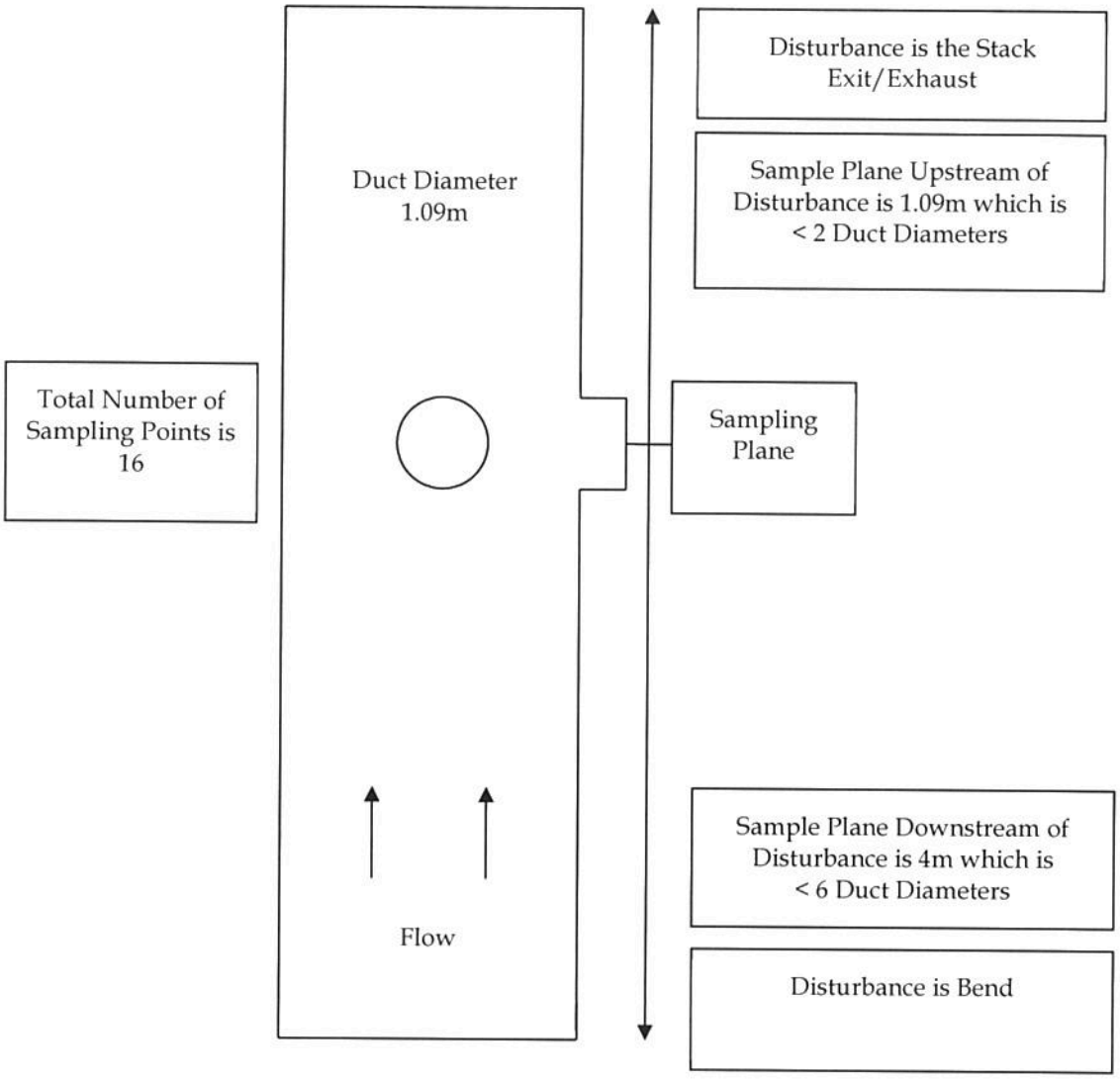
Key:

PC-42 stack

KF stack

UPC stack

## 1.6 SAMPLING LOCATION – PC-42

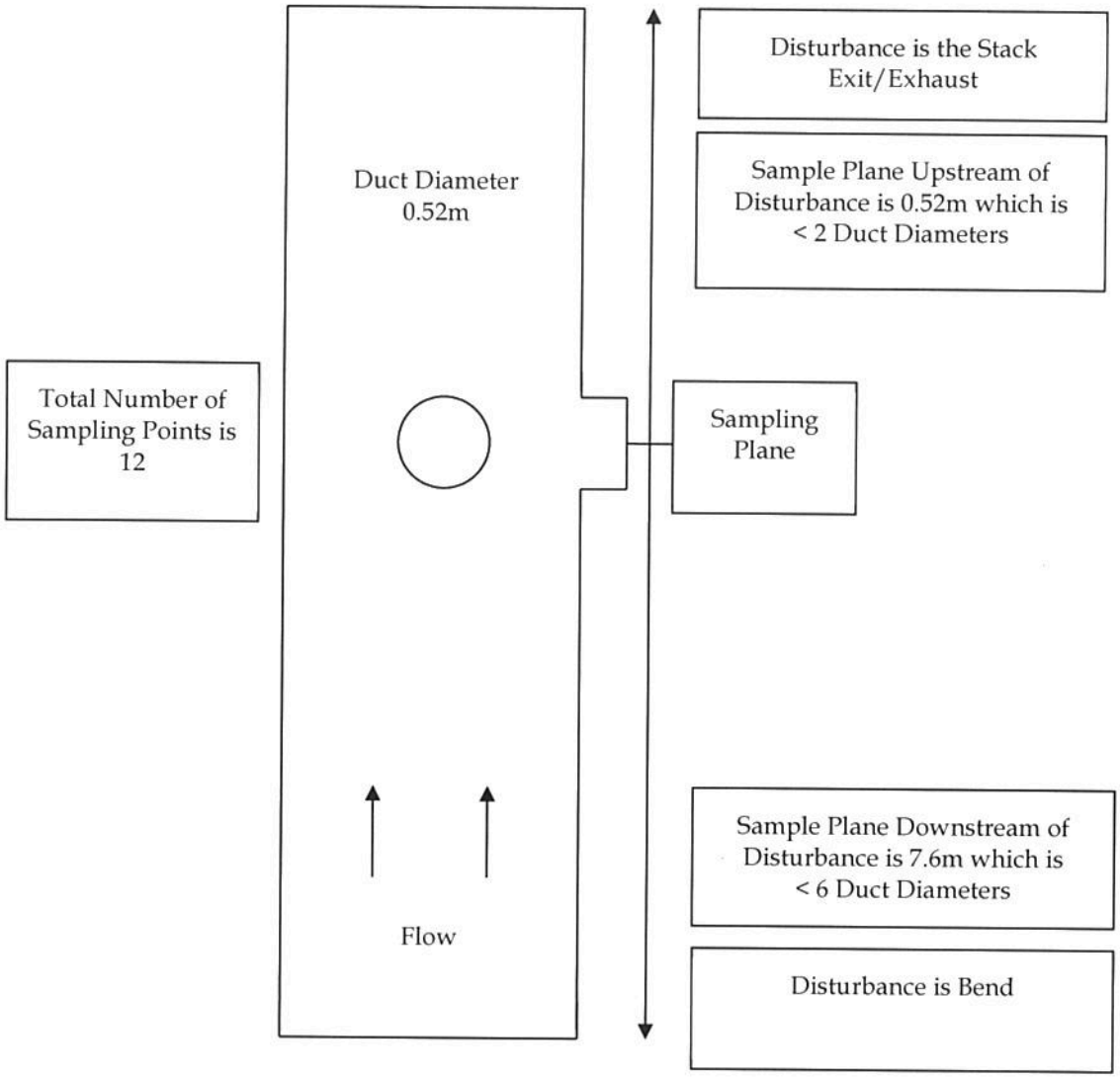



In the absence of cyclonic flow activity ideal sampling plane conditions will be found to exist at 6-8 duct diameters downstream and 2-3 duct diameters upstream from a flow disturbance. The sampling plane does not meet this criterion. Additional sample points were used in compliance with AS4323.1 as the sampling plane was non-ideal.

The sample plane however does meet the minimum sampling plane conditions; sampling plane conditions will be found to exist at 2 duct diameters downstream and 0.5 duct diameters upstream from a flow disturbance.

The location of the sampling plane complies with AS4323.1 temperature, velocity and gas flow profile criteria for sampling.

## 1.7 SAMPLING LOCATION – UPC

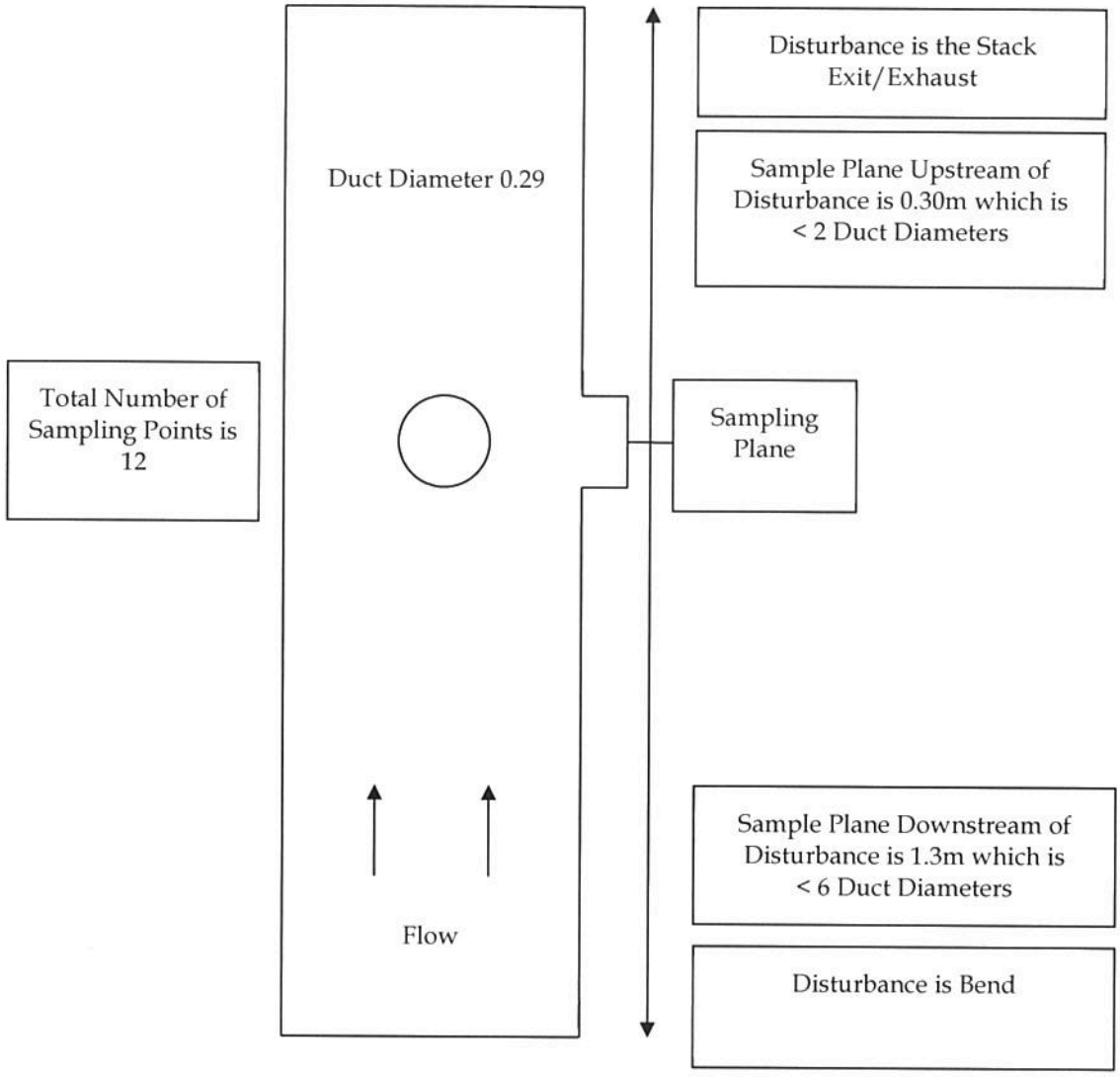



In the absence of cyclonic flow activity ideal sampling plane conditions will be found to exist at 6-8 duct diameters downstream and 2-3 duct diameters upstream from a flow disturbance. The sampling plane does not meet this criterion. Additional sample points were used in compliance with AS4323.1 as the sampling plane was non-ideal.

The sample plane however does meet the minimum sampling plane conditions; sampling plane conditions will be found to exist at 2 duct diameters downstream and 0.5 duct diameters upstream from a flow disturbance.

The location of the sampling plane complies with AS4323.1 temperature, velocity and gas flow profile criteria for sampling.

## 1.8 SAMPLING LOCATION – KF




In the absence of cyclonic flow activity ideal sampling plane conditions will be found to exist at 6-8 duct diameters downstream and 2-3 duct diameters upstream from a flow disturbance. The sampling plane does not meet this criterion. Additional sample points were used in compliance with AS4323.1 as the sampling plane was non-ideal.

The sample plane however does meet the minimum sampling plane conditions; sampling plane conditions will be found to exist at 2 duct diameters downstream and 0.5 duct diameters upstream from a flow disturbance.

The location of the sampling plane complies with AS4323.1 temperature, velocity and gas flow profile criteria for sampling.

## 1.9 INSTRUMENT CALIBRATION DETAILS

| SEMA Asset No. | Equipment Description | Date Last Calibrated | Calibration Due Date |
|---|---|---|---|
| 647 | Stopwatch | 18-Jan-17 | 18-Jul-17 |
| 872 | Gas Meter | 21-Mar-17 | 21-Mar-18 |
| 859 | Digital Temperature Reader | 17-Jan-17 | 17-Jul-17 |
| 894 | Thermocouple | 17-Jan-17 | 17-Jul-17 |
| 428 | Nozzle TSP Swagelok 3 | 09-Mar-17 | 09-Mar-18 |
| 427 | Nozzle TSP Swagelok 2 | 09-Mar-17 | 09-Mar-18 |
| 885 | Digital Manometer | 23-Feb-17 | 23-Feb-18 |
| 613 | Barometer | 23-Feb-17 | 23-Feb-18 |
| 726 | Pitot | 03-Jun-16 | 03-Jun-2017<br>Visually inspected<br>On-Site before use |
| 937 | Nozzle PM10 Head | 18-Jan-17 | 18-Jan-18 |
| 929 | Calibrated Site Mass | 22-Mar-17 | 22-Mar-18 |
| 946 | Combustion analyzer | 17-Feb-17 | 17-Aug-17 |
| 834 | Personal Sampler | 22-Mar-17 | 22-Mar-18 |
| **Gas Mixtures used for Analyser Span Response** | | | |
| **Conc.** | **Mixture** | **Cylinder No.** | **Expiry Date** |
| 902 ppm<br>9.8%<br>10.4% | Carbon Monoxide<br>Carbon Dioxide<br>Oxygen In Nitrogen | ALSB 4980 | 07-Feb-18 |

# ATTACHMENT A – NATA CERTIFICATES OF ANALYSIS

**Stephenson**
Environmental Management Australia

Peter W Stephenson & Associates Pty Ltd
ACN 002 600 526 (Incorporated in NSW)
ABN 75 002 600 526

52A Hampstead Road
Auburn NSW 2144 Australia
Tel: (02) 9737 9991
E-Mail: info@stephensonenv.com.au

# Particle Test Report No. 2040

**The analysis was commissioned by SEMA on behalf of:**

| | | |
|---|---|---|
| Client | Organisation: | Snackbrands Australia<br>The Real McCoy Snackfood Co PTY LTD |
| | Contact: | Arsh Singh |
| | Address: | 30 Bessemer St. Blacktown NSW 2148 |
| | Telephone: | 02 9831 9200 , 0429 773 874 |
| | Email: | Arsh.Singh@snackbrands.com.au |
| | Project Number: | 5721/S24416A/17 |
| | Analysis Requested: | TM-15 |
| | Chain of Custody Number | S24710 |
| | Date Analysis Completed: | 9 May 2017 |
| | No. of Samples Tested: | 2 |
| | Sample Locations: | UPC, PC-42 |
| | Sample ID Nos.: | 726223, 726224 |
| | Filter ID Nos.: | 14902, 14903 |



NATA accredited laboratory number 15043
Accredited for Compliance with ISO/IEC 17025

Identification — The filters are labelled individually. Each label recorded the testing laboratory, sample number, sampling location (or Identification) sampling date and time and whether further analysis is required.

| *Test* | *Analysis Test Method* |
|---|---|
| TSP | AS4323.2-1995 (R2014)<br>(NSW TM-15) |

Deviations from Test Methods: Nil

Issue Date
9 May 2017

Peter Stephenson
Managing Director

## Gravimetric Results – Test Report No. 2040

| Sample Location | Sample ID No. | Filter ID No | Sampling Date | Analysis Date (Completed) | Sample Mass (g) |
|---|---|---|---|---|---|
| UPC | 726223 | 14902 | 2/5/2017 | 9/5/2017 | 0.01315 |
| PC-42 | 726224 | 14903 | 2/5/2017 | 9/5/2017 | <0.00010 |

Key:
g = grams

**Stephenson**
Environmental Management Australia

Peter W Stephenson & Associates Pty Ltd
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ABN 75 002 600 526

52A Hampstead Road
Auburn NSW 2144 Australia
Tel: (02) 9737 9991
E-Mail: info@stephensonenv.com.au

# Particle Test Report No. 2043

**The analysis was commissioned by SEMA on behalf of:**

| | | |
|---|---|---|
| Client | Organisation: | Snackbrands Australia<br>The Real McCoy Snackfood Co PTY LTD |
| | Contact: | Arsh Singh |
| | Address: | 30 Bessemer St. Blacktown NSW 2148 |
| | Telephone: | 02 9831 9200 , 0429 773 874 |
| | Email: | Arsh.Singh@snackbrands.com.au |
| | Project Number: | 5721/S24416A/17 |
| | Analysis Requested: | TM-15 |
| | Chain of Custody Number | S24729 |
| | Date Analysis Completed: | 31 May 2017 |
| | No. of Samples Tested: | 1 |
| | Sample Locations: | KF |
| | Sample ID Nos.: | 726270 |
| | Filter ID Nos.: | 14846 |



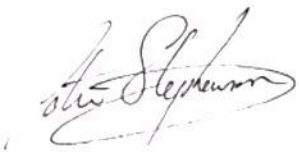
NATA accredited laboratory number 15043
Accredited for Compliance with ISO/IEC 17025

| | |
|---|---|
| Identification | The filters are labelled individually. Each label recorded the testing laboratory, sample number, sampling location (or Identification) sampling date and time and whether further analysis is required. |

| *Test* | *Analysis Test Method* |
|---|---|
| TSP | AS4323.2-1995 (R2014)<br>(NSW TM-15) |

| | |
|---|---|
| Deviations from Test Methods | Nil |

Issue Date
31 May 2017



Peter Stephenson
Managing Director

## Gravimetric Results – Test Report No. 2043

| Sample Location | Sample ID No. | Filter ID No | Sampling Date | Analysis Date (Completed) | Sample Mass (g) |
|---|---|---|---|---|---|
| KF | 726270 | 14846 | 23/5/2017 | 31/5/2017 | 0.00387 |

Key:
g = grams

NSW GOVERNMENT | SafeWork NSW

Test Safe AUSTRALIA

Jay Weber
Stephenson Environmental Management Australia
PO Box 6398
SILVERWATER NSW 1811

**Lab. Reference:** 2017-2041

**SAMPLE ORIGIN:** 5721

**DATE OF INVESTIGATION:** 2/5/2017

**DATE RECEIVED:** 9/05/17

**ANALYSIS REQUIRED:** VOC screen

## REPORT OF ANALYSIS

See attached sheet(s) for sample description and test results.

The results of this report have been approved by the signatory whose signature appears below.

For all administrative or account details please contact the Laboratory.

Increment and total pagination can be seen on the following pages.

Martin Mazereeuw
Manager

**Date:** 16/05/17

**TestSafe Australia – Chemical Analysis Branch**
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ABN 81 913 830 179



ilac-MRA NATA
Accreditation No. 3726
Accredited for compliance with ISO/IEC 17025

NSW GOVERNMENT | SafeWork NSW

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## *Analysis of Volatile Organic Compounds in Workplace Air by GC/MS*

Client : Jay Weber
Sample ID : 726218

Sample : 2017-2041-1

| No | Compounds | CAS No | Front µg/section | Back µg/section | No | Compounds | CAS No | Front µg/section | Back µg/section |
|---|---|---|---|---|---|---|---|---|---|
| | **Aliphatic hydrocarbons** (LOD = 5µg/compound/section) | | | | | **Aromatic hydrocarbons** (LOD = 1µg/compound/section) | | | |
| 1 | 2-Methylbutane | 78-78-4 | ND | ND | 39 | Benzene | 71-43-2 | ND | ND |
| 2 | n-Pentane | 109-66-0 | 34 | ND | 40 | Ethylbenzene | 100-41-4 | ND | ND |
| 3 | 2-Methylpentane | 107-83-5 | ND | ND | 41 | Isopropylbenzene | 98-82-8 | ND | ND |
| 4 | 3-Methylpentane | 96-14-0 | ND | ND | 42 | 1,2,3-Trimethylbenzene | 526-73-8 | ND | ND |
| 5 | Cyclopentane | 287-92-3 | ND | ND | 43 | 1,2,4-Trimethylbenzene | 95-63-6 | ND | ND |
| 6 | Methylcyclopentane | 96-37-7 | ND | ND | 44 | 1,3,5-Trimethylbenzene | 108-67-8 | ND | ND |
| 7 | 2,3-Dimethylpentane | 565-59-3 | ND | ND | 45 | Styrene | 100-42-5 | ND | ND |
| 8 | n-Hexane | 110-54-3 | ND | ND | 46 | Toluene | 108-88-3 | ND | ND |
| 9 | 3-Methylhexane | 589-34-4 | ND | ND | 47 | p-Xylene &/or m-Xylene | 106-42-3 / 108-38-3 | ND | ND |
| 10 | Cyclohexane | 110-82-7 | ND | ND | 48 | o-Xylene | 95-47-6 | ND | ND |
| 11 | Methylcyclohexane | 108-87-2 | ND | ND | | **Ketones** (LOD #49, #54 & #55 =5µg/c/s, #50, #51, #52 & #53 =25µg/c/s) | | | |
| 12 | 2,2,4-Trimethylpentane | 540-84-1 | ND | ND | 49 | Acetone | 67-64-1 | ND | ND |
| 13 | n-Heptane | 142-82-5 | 24 | ND | 50 | Acetoin | 513-86-0 | ND | ND |
| 14 | n-Octane | 111-65-9 | 24 | ND | 51 | Diacetone alcohol | 123-42-2 | ND | ND |
| 15 | n-Nonane | 111-84-2 | ND | ND | 52 | Cyclohexanone | 108-94-1 | ND | ND |
| 16 | n-Decane | 124-18-5 | ND | ND | 53 | Isophorone | 78-59-1 | ND | ND |
| 17 | n-Undecane | 1120-21-4 | ND | ND | 54 | Methyl ethyl ketone (MEK) | 78-93-3 | ND | ND |
| 18 | n-Dodecane | 112-40-3 | ND | ND | 55 | Methyl isobutyl ketone (MIBK) | 108-10-1 | ND | ND |
| 19 | n-Tridecane | 629-50-5 | ND | ND | | **Alcohols** (LOD = 25µg/compound/section) | | | |
| 20 | n-Tetradecane | 629-59-4 | ND | ND | 56 | Ethyl alcohol | 64-17-5 | ND | ND |
| 21 | α-Pinene | 80-56-8 | ND | ND | 57 | n-Butyl alcohol | 71-36-3 | ND | ND |
| 22 | β-Pinene | 127-91-3 | ND | ND | 58 | Isobutyl alcohol | 78-83-1 | ND | ND |
| 23 | D-Limonene | 138-86-3 | ND | ND | 59 | Isopropyl alcohol | 67-63-0 | ND | ND |
| | **Chlorinated hydrocarbons** (LOD = 5µg/compound/section) | | | | 60 | 2-Ethyl hexanol | 104-76-7 | ND | ND |
| 24 | Dichloromethane | 75-09-2 | ND | ND | 61 | Cyclohexanol | 108-93-0 | ND | ND |
| 25 | 1,1-Dichloroethane | 75-34-3 | ND | ND | | **Acetates** (LOD = 25µg/compound/section) | | | |
| 26 | 1,2-Dichloroethane | 107-06-2 | ND | ND | 62 | Ethyl acetate | 141-78-6 | ND | ND |
| 27 | Chloroform | 67-66-3 | ND | ND | 63 | n-Propyl acetate | 109-60-4 | ND | ND |
| 28 | 1,1,1-Trichloroethane | 71-55-6 | ND | ND | 64 | n-Butyl acetate | 123-86-4 | ND | ND |
| 29 | 1,1,2-Trichloroethane | 79-00-5 | ND | ND | 65 | Isobutyl acetate | 110-19-0 | ND | ND |
| 30 | Trichloroethylene | 79-01-6 | ND | ND | | **Ethers** (LOD = 25µg/compound/section) | | | |
| 31 | Carbon tetrachloride | 56-23-5 | ND | ND | 66 | Ethyl ether | 60-29-7 | ND | ND |
| 32 | Perchloroethylene | 127-18-4 | ND | ND | 67 | *tert*-Butyl methyl ether (MTBE) | 1634-04-4 | ND | ND |
| 33 | 1,1,2,2-Tetrachloroethane | 79-34-5 | ND | ND | 68 | Tetrahydrofuran (THF) | 109-99-9 | ND | ND |
| 34 | Chlorobenzene | 108-90-7 | ND | ND | | **Glycols** (LOD = 25µg/compound/section) | | | |
| 35 | 1,2-Dichlorobenzene | 95-50-1 | ND | ND | 69 | PGME | 107-98-2 | ND | ND |
| 36 | 1,4-Dichlorobenzene | 106-46-7 | ND | ND | 70 | Ethylene glycol diethyl ether | 629-14-1 | ND | ND |
| | **Miscellaneous** (LOD #37= 5µg & #38=25µg/compound/section) | | | | 71 | PGMEA | 108-65-6 | ND | ND |
| 37 | Acetonitrile | 75-05-8 | ND | ND | 72 | Cellosolve acetate | 111-15-9 | ND | ND |
| 38 | n-Vinyl-2-pyrrolidinone | 88-12-0 | ND | ND | 73 | DGMEA | 112-15-2 | ND | ND |
| | | | | | | | | | |
| | **Total VOCs** (LOD =50µg/compound/section) | | 90 | ND | | Worksheet check | | YES | YES |

2017-2041.xlsx

Page 2 of 4

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ilac-MRA NATA

Accreditation No. 3726

Accredited for compliance with ISO/IEC 17025

SW08051 1215

NSW GOVERNMENT | SafeWork NSW

Test Safe AUSTRALIA

## *Analysis of Volatile Organic Compounds in Workplace Air by GC/MS*

Client : Jay Weber
Sample ID : 726219

Sample : 2017-2041-2

| No | Compounds | CAS No | Front | Back | No | Compounds | CAS No | Front | Back |
|---|---|---|---|---|---|---|---|---|---|
| | | | µg/section | | | | | µg/section | |
| | **Aliphatic hydrocarbons** (LOD = 5µg/compound/section) | | | | | **Aromatic hydrocarbons** (LOD = 1µg/compound/section) | | | |
| 1 | 2-Methylbutane | 78-78-4 | ND | ND | 39 | Benzene | 71-43-2 | ND | ND |
| 2 | n-Pentane | 109-66-0 | ND | ND | 40 | Ethylbenzene | 100-41-4 | ND | ND |
| 3 | 2-Methylpentane | 107-83-5 | ND | ND | 41 | Isopropylbenzene | 98-82-8 | ND | ND |
| 4 | 3-Methylpentane | 96-14-0 | ND | ND | 42 | 1,2,3-Trimethylbenzene | 526-73-8 | ND | ND |
| 5 | Cyclopentane | 287-92-3 | ND | ND | 43 | 1,2,4-Trimethylbenzene | 95-63-6 | ND | ND |
| 6 | Methylcyclopentane | 96-37-7 | ND | ND | 44 | 1,3,5-Trimethylbenzene | 108-67-8 | ND | ND |
| 7 | 2,3-Dimethylpentane | 565-59-3 | ND | ND | 45 | Styrene | 100-42-5 | ND | ND |
| 8 | n-Hexane | 110-54-3 | ND | ND | 46 | Toluene | 108-88-3 | ND | ND |
| 9 | 3-Methylhexane | 589-34-4 | ND | ND | 47 | p-Xylene & or m-Xylene | 106-42-3 & 108-38-3 | ND | ND |
| 10 | Cyclohexane | 110-82-7 | ND | ND | 48 | o-Xylene | 95-47-6 | ND | ND |
| 11 | Methylcyclohexane | 108-87-2 | ND | ND | | **Ketones** (LOD 849, 854 & 855 =5µg/cc; 850, 851, 852 & 853 =25µg/cc) | | | |
| 12 | 2,2,4-Trimethylpentane | 540-84-1 | ND | ND | 49 | Acetone | 67-64-1 | ND | ND |
| 13 | n-Heptane | 142-82-5 | ND | ND | 50 | Acetoin | 513-86-0 | ND | ND |
| 14 | n-Octane | 111-65-9 | ND | ND | 51 | Diacetone alcohol | 123-42-2 | ND | ND |
| 15 | n-Nonane | 111-84-2 | ND | ND | 52 | Cyclohexanone | 108-94-1 | ND | ND |
| 16 | n-Decane | 124-18-5 | ND | ND | 53 | Isophorone | 78-59-1 | ND | ND |
| 17 | n-Undecane | 1120-21-4 | ND | ND | 54 | Methyl ethyl ketone (MEK) | 78-93-3 | ND | ND |
| 18 | n-Dodecane | 112-40-3 | ND | ND | 55 | Methyl isobutyl ketone (MIBK) | 108-10-1 | ND | ND |
| 19 | n-Tridecane | 629-50-5 | ND | ND | | **Alcohols** (LOD = 25µg/compound/section) | | | |
| 20 | n-Tetradecane | 629-59-4 | ND | ND | 56 | Ethyl alcohol | 64-17-5 | ND | ND |
| 21 | α-Pinene | 80-56-8 | ND | ND | 57 | n-Butyl alcohol | 71-36-3 | ND | ND |
| 22 | β-Pinene | 127-91-3 | ND | ND | 58 | Isobutyl alcohol | 78-83-1 | ND | ND |
| 23 | D-Limonene | 138-86-3 | ND | ND | 59 | Isopropyl alcohol | 67-63-0 | ND | ND |
| | **Chlorinated hydrocarbons** (LOD = 5µg/compound/section) | | | | 60 | 2-Ethyl hexanol | 104-76-7 | ND | ND |
| 24 | Dichloromethane | 75-09-2 | ND | ND | 61 | Cyclohexanol | 108-93-0 | ND | ND |
| 25 | 1,1-Dichloroethane | 75-34-3 | ND | ND | | **Acetates** (LOD = 25µg/compound/section) | | | |
| 26 | 1,2-Dichloroethane | 107-06-2 | ND | ND | 62 | Ethyl acetate | 141-78-6 | ND | ND |
| 27 | Chloroform | 67-66-3 | ND | ND | 63 | n-Propyl acetate | 109-60-4 | ND | ND |
| 28 | 1,1,1-Trichloroethane | 71-55-6 | ND | ND | 64 | n-Butyl acetate | 123-86-4 | ND | ND |
| 29 | 1,1,2-Trichloroethane | 79-00-5 | ND | ND | 65 | Isobutyl acetate | 110-19-0 | ND | ND |
| 30 | Trichloroethylene | 79-01-6 | ND | ND | | **Ethers** (LOD = 25µg/compound/section) | | | |
| 31 | Carbon tetrachloride | 56-23-5 | ND | ND | 66 | Ethyl ether | 60-29-7 | ND | ND |
| 32 | Perchloroethylene | 127-18-4 | ND | ND | 67 | *tert*-Butyl methyl ether (MTBE) | 1634-04-4 | ND | ND |
| 33 | 1,1,2,2-Tetrachloroethane | 79-34-5 | ND | ND | 68 | Tetrahydrofuran (THF) | 109-99-9 | ND | ND |
| 34 | Chlorobenzene | 108-90-7 | ND | ND | | **Glycols** (LOD = 25µg/compound/section) | | | |
| 35 | 1,2-Dichlorobenzene | 95-50-1 | ND | ND | 69 | PGME | 107-98-2 | ND | ND |
| 36 | 1,4-Dichlorobenzene | 106-46-7 | ND | ND | 70 | Ethylene glycol diethyl ether | 629-14-1 | ND | ND |
| | **Miscellaneous** (LOD 837= 5µg & 838=25µg/compound/section) | | | | 71 | PGMEA | 108-65-6 | ND | ND |
| 37 | Acetonitrile | 75-05-8 | ND | ND | 72 | Cellosolve acetate | 111-15-9 | ND | ND |
| 38 | n-Vinyl-2-pyrrolidinone | 88-12-0 | ND | ND | 73 | DGMEA | 112-15-2 | ND | ND |
| | **Total VOCs** (LOD =50µg/compound/section) | | ND | ND | | Worksheet check | | YES | YES |

2017-2041.xlsx

Page 3 of 4

**TestSafe Australia – Chemical Analysis Branch**
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ilac-MRA NATA

Accreditation No. 3726

Accredited for compliance with ISO/IEC 17025

SW08051 1215

NSW GOVERNMENT | SafeWork NSW

Test Safe AUSTRALIA

## *Analysis of Volatile Organic Compounds in Workplace Air by GC/MS*

**Client : Jay Weber**
**Sample ID : 726219**

**Sample : 2017-2041-2**

| No | Compounds | CAS No | Front | Back | No | Compounds | CAS No | Front | Back |
|---|---|---|---|---|---|---|---|---|---|
| | | | µg/section | | | | | µg/section | |
| | **Aliphatic hydrocarbons** (LOD = 5µg/compound/section) | | | | | **Aromatic hydrocarbons** (LOD = 1µg/compound/section) | | | |
| 1 | 2-Methylbutane | 78-78-4 | ND | ND | 39 | Benzene | 71-43-2 | ND | ND |
| 2 | n-Pentane | 109-66-0 | ND | ND | 40 | Ethylbenzene | 100-41-4 | ND | ND |
| 3 | 2-Methylpentane | 107-83-5 | ND | ND | 41 | Isopropylbenzene | 98-82-8 | ND | ND |
| 4 | 3-Methylpentane | 96-14-0 | ND | ND | 42 | 1,2,3-Trimethylbenzene | 526-73-8 | ND | ND |
| 5 | Cyclopentane | 287-92-3 | ND | ND | 43 | 1,2,4-Trimethylbenzene | 95-63-6 | ND | ND |
| 6 | Methylcyclopentane | 96-37-7 | ND | ND | 44 | 1,3,5-Trimethylbenzene | 108-67-8 | ND | ND |
| 7 | 2,3-Dimethylpentane | 565-59-3 | ND | ND | 45 | Styrene | 100-42-5 | ND | ND |
| 8 | n-Hexane | 110-54-3 | ND | ND | 46 | Toluene | 108-88-3 | ND | ND |
| 9 | 3-Methylhexane | 589-34-4 | ND | ND | 47 | p-Xylene &/or m-Xylene | 106-42-3 & 108-38-3 | ND | ND |
| 10 | Cyclohexane | 110-82-7 | ND | ND | 48 | o-Xylene | 95-47-6 | ND | ND |
| 11 | Methylcyclohexane | 108-87-2 | ND | ND | | **Ketones** (LOD #49, #51 & #55 =5µg/c/s; #50, #54, #52 & #53 =25µg/c/s) | | | |
| 12 | 2,2,4-Trimethylpentane | 540-84-1 | ND | ND | 49 | Acetone | 67-64-1 | ND | ND |
| 13 | n-Heptane | 142-82-5 | ND | ND | 50 | Acetoin | 513-86-0 | ND | ND |
| 14 | n-Octane | 111-65-9 | ND | ND | 51 | Diacetone alcohol | 123-42-2 | ND | ND |
| 15 | n-Nonane | 111-84-2 | ND | ND | 52 | Cyclohexanone | 108-94-1 | ND | ND |
| 16 | n-Decane | 124-18-5 | ND | ND | 53 | Isophorone | 78-59-1 | ND | ND |
| 17 | n-Undecane | 1120-21-4 | ND | ND | 54 | Methyl ethyl ketone (MEK) | 78-93-3 | ND | ND |
| 18 | n-Dodecane | 112-40-3 | ND | ND | 55 | Methyl isobutyl ketone (MIBK) | 108-10-1 | ND | ND |
| 19 | n-Tridecane | 629-50-5 | ND | ND | | **Alcohols** (LOD = 25µg/compound/section) | | | |
| 20 | n-Tetradecane | 629-59-4 | ND | ND | 56 | Ethyl alcohol | 64-17-5 | ND | ND |
| 21 | α-Pinene | 80-56-8 | ND | ND | 57 | n-Butyl alcohol | 71-36-3 | ND | ND |
| 22 | β-Pinene | 127-91-3 | ND | ND | 58 | Isobutyl alcohol | 78-83-1 | ND | ND |
| 23 | D-Limonene | 138-86-3 | ND | ND | 59 | Isopropyl alcohol | 67-63-0 | ND | ND |
| | **Chlorinated hydrocarbons** (LOD = 5µg/compound/section) | | | | 60 | 2-Ethyl hexanol | 104-76-7 | ND | ND |
| 24 | Dichloromethane | 75-09-2 | ND | ND | 61 | Cyclohexanol | 108-93-0 | ND | ND |
| 25 | 1,1-Dichloroethane | 75-34-3 | ND | ND | | **Acetates** (LOD = 25µg/compound/section) | | | |
| 26 | 1,2-Dichloroethane | 107-06-2 | ND | ND | 62 | Ethyl acetate | 141-78-6 | ND | ND |
| 27 | Chloroform | 67-66-3 | ND | ND | 63 | n-Propyl acetate | 109-60-4 | ND | ND |
| 28 | 1,1,1-Trichloroethane | 71-55-6 | ND | ND | 64 | n-Butyl acetate | 123-86-4 | ND | ND |
| 29 | 1,1,2-Trichloroethane | 79-00-5 | ND | ND | 65 | Isobutyl acetate | 110-19-0 | ND | ND |
| 30 | Trichloroethylene | 79-01-6 | ND | ND | | **Ethers** (LOD = 25µg/compound/section) | | | |
| 31 | Carbon tetrachloride | 56-23-5 | ND | ND | 66 | Ethyl ether | 60-29-7 | ND | ND |
| 32 | Perchloroethylene | 127-18-4 | ND | ND | 67 | *tert*-Butyl methyl ether (MTBE) | 1634-04-4 | ND | ND |
| 33 | 1,1,2,2-Tetrachloroethane | 79-34-5 | ND | ND | 68 | Tetrahydrofuran (THF) | 109-99-9 | ND | ND |
| 34 | Chlorobenzene | 108-90-7 | ND | ND | | **Glycols** (LOD = 25µg/compound/section) | | | |
| 35 | 1,2-Dichlorobenzene | 95-50-1 | ND | ND | 69 | PGME | 107-98-2 | ND | ND |
| 36 | 1,4-Dichlorobenzene | 106-46-7 | ND | ND | 70 | Ethylene glycol diethyl ether | 629-14-1 | ND | ND |
| | **Miscellaneous** (LOD #37= 5µg & #38=25µg/compound/section) | | | | 71 | PGMEA | 108-65-6 | ND | ND |
| 37 | Acetonitrile | 75-05-8 | ND | ND | 72 | Cellosolve acetate | 111-15-9 | ND | ND |
| 38 | n-Vinyl-2-pyrrolidinone | 88-12-0 | ND | ND | 73 | DGMEA | 112-15-2 | ND | ND |
| | **Total VOCs** (LOD =50µg/compound/section) | | ND | ND | | Worksheet check | | YES | YES |

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**TestSafe Australia – Chemical Analysis Branch**
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ilac-MRA NATA

Accreditation No. 3726

Accredited for compliance with ISO/IEC 17025

SW08051 1215

NSW GOVERNMENT | SafeWork NSW

Test Safe AUSTRALIA

Ali Naghizadeh
Stephenson Environmental Management Australia
PO Box 6398
SILVERWATER NSW 1811

**Lab. Reference:** 2017-2433

**SAMPLE ORIGIN:** 5721

**DATE OF INVESTIGATION:** 23/5/2017 **DATE RECEIVED:** 25/05/17

**ANALYSIS REQUIRED:** VOC

## REPORT OF ANALYSIS

See attached sheet(s) for sample description and test results.

The results of this report have been approved by the signatory whose signature appears below.

For all administrative or account details please contact the Laboratory.

Increment and total pagination can be seen on the following pages.

Martin Mazereeuw
Manager

**Date:** 1/06/17

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## *Analysis of Volatile Organic Compounds in Workplace Air by GC/MS*

Client : Jay Weber
Sample ID : 726271

Sample : 2017-2433-1

| No | Compounds | CAS No | Front | Back | No | Compounds | CAS No | Front | Back |
|---|---|---|---|---|---|---|---|---|---|
| | | | µg/section | | | | | µg/section | |
| | **Aliphatic hydrocarbons** (LOD = 5µg/compound/section) | | | | | **Aromatic hydrocarbons** (LOD = 1µg/compound/section) | | | |
| 1 | 2-Methylbutane | 78-78-4 | ND | ND | 39 | Benzene | 71-43-2 | ND | ND |
| 2 | n-Pentane | 109-66-0 | 19 | ND | 40 | Ethylbenzeae | 100-41-4 | ND | ND |
| 3 | 2-Methylpentane | 107-83-5 | ND | ND | 41 | Isopropylbenzene | 98-82-8 | ND | ND |
| 4 | 3-Methylpentane | 96-14-0 | ND | ND | 42 | 1,2,3-Trimethylbenzene | 526-73-8 | ND | ND |
| 5 | Cyclopentane | 287-92-3 | ND | ND | 43 | 1,2,4-Trimethylbenzene | 95-63-6 | ND | ND |
| 6 | Methylcyclopentane | 96-37-7 | ND | ND | 44 | 1,3,5-Trimethylbenzene | 108-67-8 | ND | ND |
| 7 | 2,3-Dimethylpentane | 565-59-3 | ND | ND | 45 | Styrene | 100-42-5 | ND | ND |
| 8 | n-Hexane | 110-54-3 | ND | ND | 46 | Toluene | 108-88-3 | ND | ND |
| 9 | 3-Methylhexane | 589-34-4 | ND | ND | 47 | p-Xylene &/or m-Xylene | 106-42-3 / 108-38-3 | ND | ND |
| 10 | Cyclohexane | 110-82-7 | ND | ND | 48 | o-Xylene | 95-47-6 | ND | ND |
| 11 | Methylcyclohexane | 108-87-2 | ND | ND | | **Ketones** (LOD #49, #54 & #55 =5µg/c/s, #50, #51, #52 & #53 =25µg/c/s) | | | |
| 12 | 2,2,4-Trimethylpentane | 540-84-1 | ND | ND | 49 | Acetone | 67-64-1 | ND | ND |
| 13 | n-Heptane | 142-82-5 | ND | ND | 50 | Acetoin | 513-86-0 | ND | ND |
| 14 | n-Octane | 111-65-9 | 5 | ND | 51 | Diacetone alcohol | 123-42-2 | ND | ND |
| 15 | n-Nonane | 111-84-2 | ND | ND | 52 | Cyclohexanone | 108-94-1 | ND | ND |
| 16 | n-Decane | 124-18-5 | ND | ND | 53 | Isophorone | 78-59-1 | ND | ND |
| 17 | n-Undecane | 1120-21-4 | ND | ND | 54 | Methyl ethyl ketone (MEK) | 78-93-3 | ND | ND |
| 18 | n-Dodecane | 112-40-3 | ND | ND | 55 | Methyl isobutyl ketone (MIBK) | 108-10-1 | ND | ND |
| 19 | n-Tridecane | 629-50-5 | ND | ND | | **Alcohols** (LOD = 25µg/compound/section) | | | |
| 20 | n-Tetradecane | 629-59-4 | ND | ND | 56 | Ethyl alcohol | 64-17-5 | ND | ND |
| 21 | α-Pinene | 80-56-8 | ND | ND | 57 | n-Butyl alcohol | 71-36-3 | ND | ND |
| 22 | β-Pinene | 127-91-3 | ND | ND | 58 | Isobutyl alcohol | 78-83-1 | ND | ND |
| 23 | D-Limonene | 138-86-3 | ND | ND | 59 | Isopropyl alcohol | 67-63-0 | ND | ND |
| | **Chlorinated hydrocarbons** (LOD = 5µg/compound/section) | | | | 60 | 2-Ethyl hexanol | 104-76-7 | ND | ND |
| 24 | Dichloromethane | 75-09-2 | ND | ND | 61 | Cyclohexanol | 108-93-0 | ND | ND |
| 25 | 1,1-Dichloroethane | 75-34-3 | ND | ND | | **Acetates** (LOD = 25µg/compound/section) | | | |
| 26 | 1,2-Dichloroethane | 107-06-2 | ND | ND | 62 | Ethyl acetate | 141-78-6 | ND | ND |
| 27 | Chloroform | 67-66-3 | ND | ND | 63 | n-Propyl acetate | 109-60-4 | ND | ND |
| 28 | 1,1,1-Trichloroethane | 71-55-6 | ND | ND | 64 | n-Butyl acetate | 123-86-4 | ND | ND |
| 29 | 1,1,2-Trichloroethane | 79-00-5 | ND | ND | 65 | Isobutyl acetate | 110-19-0 | ND | ND |
| 30 | Trichloroethylene | 79-01-6 | ND | ND | | **Ethers** (LOD = 25µg/compound/section) | | | |
| 31 | Carbon tetrachloride | 56-23-5 | ND | ND | 66 | Ethyl ether | 60-29-7 | ND | ND |
| 32 | Perchloroethylene | 127-18-4 | ND | ND | 67 | *tert*-Butyl methyl ether (MTBE) | 1634-04-4 | ND | ND |
| 33 | 1,1,2,2-Tetrachloroethane | 79-34-5 | ND | ND | 68 | Tetrahydrofuran (THF) | 109-99-9 | ND | ND |
| 34 | Chlorobenzene | 108-90-7 | ND | ND | | **Glycols** (LOD = 25µg/compound/section) | | | |
| 35 | 1,2-Dichlorobenzene | 95-50-1 | ND | ND | 69 | PGME | 107-98-2 | ND | ND |
| 36 | 1,4-Dichlorobenzene | 106-46-7 | ND | ND | 70 | Ethylene glycol diethyl ether | 629-14-1 | ND | ND |
| | **Miscellaneous** (LOD #37= 5µg & #38=25µg/compound/section) | | | | 71 | PGMEA | 108-65-6 | ND | ND |
| 37 | Acetonitrile | 75-05-8 | ND | ND | 72 | Cellosolve acetate | 111-15-9 | ND | ND |
| 38 | n-Vinyl-2-pyrrolidinone | 88-12-0 | ND | ND | 73 | DGMEA | 112-15-2 | ND | ND |
| | **Total VOCs (LOD =50µg/compound/section)** | | ND | ND | | Worksheet check | | YES | YES |

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Test Safe AUSTRALIA

## *Analysis of Volatile Organic Compounds in Workplace Air by GC/MS*

**Client : Jay Weber**

**Stephenson Environmental Management Australia**

ND = Not Detected
VOCs = Volatile Organic Compounds
All compounds numbered 1-73 are included of this analysis in the scope of NATA accreditation. Any additional compounds annotated with * are not covered by NATA accreditation.

Method : Analysis of Volatile Organic Compounds in Workplace Air by Gas Chromatography Mass Spectrometry
Method Number : WCA 207
Detection Limit : 5µg/section, 25µg/section for oxygenated hydrocarbons except acetone, MEK and MIBK at 5µg/section and aromatic hydrocarbon at 1µg/section.
Brief Description : Volatile organic compounds are trapped from the workplace air onto charcoal tubes by the use of a personal air monitoring pump. The volatile organic compounds are then desorbed from the charcoal in the laboratory with $CS_2$. An aliquot of the desorbant is analysed by capillary gas chromatography with mass spectrometry detection.

Total Volatile Organic Compounds (TVOC) test result in µg/section is calculated by comparison to the average mass detector response of the 73 quantified compounds. The response of a mass detector is dependent on the fragmentation of the molecule. Therefore, the TVOC test result should be interpreted as a semi-quantitative guide to the amount of VOCs present. If the TVOC test result is less than the addition of the total amount of the 73 quantified compounds then the TVOC result is of little value other than for comparative purposes. If the TVOC test result is greater than the addition of all the compounds quantified then this can indicate that there are additional compounds present other than the 73 quantified compounds reported.

PGME : Propylene Glycol Monomethyl Ether
PGMEA : Propylene Glycol Monomethyl Ether Acetate
DGMEA : Diethylene Glycol Monoethyl Ether Acetate

Measurement Uncertainty
The measurement uncertainty is an estimate that characterises the range of values within which the true value is asserted to be. The uncertainty estimate is an expanded uncertainty using a coverage factor of 2, which gives a level of confidence of approximately 95%. The estimate is compliant with the "ISO Guide to the Expression of Uncertainty in Measurement" and is a full estimate based on in-house method validation and quality control data.

Quality Assurance
In order to ensure the highest degree of accuracy and precision in our analytical results, we undertake extensive intra- and inter-laboratory quality assurance (QA) activities. Within our own laboratory, we analyse laboratory and field blanks and perform duplicate and repeat analysis of samples. Spiked QA samples are also included routinely in each run to ensure the accuracy of the analyses. WorkCover Laboratory Services has participated for many years in several national and international inter-laboratory comparison programs listed below:-

- Workplace Analysis Scheme for Proficiency (WASP) conducted by the Health & Safety Executive UK;
- Quality Management in Occupational and Environmental Medicine QA Program, conducted by the Institute for Occupational, Social and Environmental Medicine, University of Erlangen – Nuremberg, Germany;
- Quality Control Technologies QA Program, Australia;
- Royal College of Pathologists QA Program, Australia.

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ilac-MRA NATA

Accreditation No. 3726

Accredited for compliance with ISO/IEC 17025

SW08051 1215

# **Appendix C** – 2019 Sampling Report (Ektimo)

Ektimo

REPORT NUMBER R008085

# Emission Testing Report
# Snack Brands Australia, Blacktown

**Prepared for GHD Pty Ltd**

## Document Information

| | |
|---|---|
| Client Name: | GHD Pty Ltd |
| Report Number: | R008085 |
| Date of Issue: | 28 October 2019 |
| Attention: | Danny Craggs |
| Address: | 380 Lonsdale Street<br>SYDNEY NSW 3000 |
| Testing Laboratory: | Ektimo Pty Ltd, ABN 86 600 381 413 |

## Report Authorisation

NATA Accredited Laboratory
No. 14601

**Steven Cooper**
**Client Manager**

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC mutual recognition arrangement for the mutual recognition of the equivalence of testing, calibration and inspection reports.

## Table of Contents

# 1 EXECUTIVE SUMMARY

## 1.1 *Background*

Ektimo was engaged by GHD Pty Ltd to perform odour emission testing at the Blacktown plant of Snack Brands Australia (SBA).

SBA are currently applying for an Environmental Protection Licence which requires an odour assessment to be conducted in accordance with the NSW EPA document; *Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW,* November 2006. To achieve the recommended Level 2 Type Impact Assessment, it was recommended by GHD Pty Ltd that odour sampling be conducted at key on-site odour sources.

## 1.2 *Project objectives*

The objectives of the project were to conduct a monitoring programme to quantify emissions from 6 discharge points to facilitate GHD Pty Ltd with data to complete the Level 2 Type Impact Assessment at the SBA Blacktown premises.

Monitoring was performed as outlined below;

| Location | Test Date | Test Parameters[1] |
|---|---|---|
| PC-42 | 27 August 2019 | Odour and character |
| UPC 1 | | |
| Roof Vent[2] | | |
| UPC 2 | 24 September 2019 | |
| WWTP - Tank | | |
| WWTP - DAF | | |

1 - Flow rate, velocity, temperature and moisture were also determined.

2 – Flow rate, velocity and moisture were not determined.

All results are reported on a dry basis at STP (except odour wet – STP).

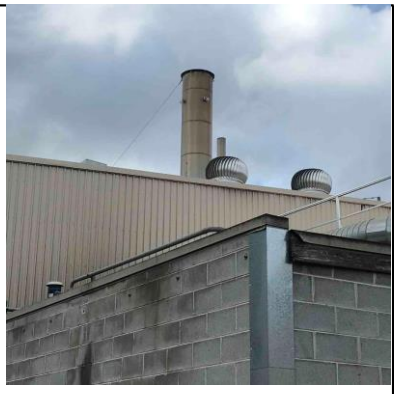
Plant operating conditions have been noted in the report.

# 2 RESULTS

## 2.1 *PC-42*

| | | | |
|---|---|---|---|
| **Date** | 27/08/2019 | **Client** | GHD / Snackbrands |
| **Report** | R008085 | **Stack ID** | PC-42 |
| **Licence No.** | N/A | **Location** | Blacktown |
| **Ektimo Staff** | Steven Cooper & Hamish Proust | **State** | NSW |
| **Process Conditions** | Please refer to client records. | | *190926* |

| **Sampling Plane Details** | |
|---|---|
| Sampling plane dimensions | 1090 mm |
| Sampling plane area | 0.933 m² |
| Sampling port size, number | 2" Flange (x2) |
| Access | Elevated work platform |
| Duct orientation & shape | Vertical Circular |
| Downstream disturbance | Exit 1 D |
| Upstream disturbance | Change in diameter 6 D |
| No. traverses & points sampled | 2 16 |
| Sample plane compliance to AS4323.1 | Compliant but non-ideal |



**Comments**
The discharge is assumed to be composed of dry air and moisture

**The sampling plane is deemed to be non-ideal due to the following reasons:**
The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D

| **Stack Parameters** | | |
|---|---|---|
| Moisture content, %v/v | 50 | |
| Gas molecular weight, g/g mole | 23.5 (wet) | 29.0 (dry) |
| Gas density at STP, kg/m³ | 1.05 (wet) | 1.29 (dry) |
| | | |
| **Gas Flow Parameters** | | |
| Flow measurement time(s) (hhmm) | 1020 & 1052 | |
| Temperature, °C | 144 | |
| Temperature, K | 417 | |
| Velocity at sampling plane, m/s | 6.6 | |
| Volumetric flow rate, actual, m³/s | 6.2 | |
| Volumetric flow rate (wet STP), m³/s | 4.1 | |
| Volumetric flow rate (dry STP), m³/s | 2 | |
| Mass flow rate (wet basis), kg/hour | 15000 | |
| Velocity difference, % | <1 | |

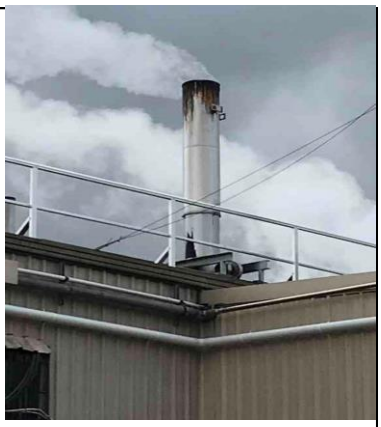
| **Odour** | Results | |
|---|---|---|
| Sampling time | 1030 - 1045 | |
| | Concentration ou | Mass Rate oum³/min |
| **Results** | 1700 | 410000 |
| Lower uncertainty limit | 780 | |
| Upper uncertainty limit | 3700 | |
| Hedonic tone | Very unpleasant | |
| Odour character | Cooked fat | |
| Analysis date & time | 28/08/19, 1400-1830 | |
| Holding time | 28 hours | |
| Dilution factor | 13 | |
| Bag material | Nalophan | |
| | | |
| Butanol threshold (ppb) | 34.1 | |
| Laboratory temp (℃) | 22.45 | |
| Last calibration date | October 2018 | |

## 2.2 *UPC 1*

| | | | |
|---|---|---|---|
| **Date** | 27/08/2019 | **Client** | GHD / Snackbrands |
| **Report** | R008085 | **Stack ID** | UPC 1 |
| **Licence No.** | N/A | **Location** | Blacktown |
| **Ektimo Staff** | Steven Cooper & Hamish Proust | **State** | NSW |
| **Process Conditions** | Please refer to client records. | | *190926* |

**Sampling Plane Details**

| | |
|---|---|
| Sampling plane dimensions | 500 mm |
| Sampling plane area | 0.196 m² |
| Sampling port size, number | 2" Flange (x2) |
| Access | Elevated work platform |
| Duct orientation & shape | Vertical Circular |
| Downstream disturbance | Exit 1 D |
| Upstream disturbance | Bend >6 D |
| No. traverses & points sampled | 2 12 |
| Sample plane compliance to AS4323.1 | Compliant but non-ideal |



**Comments**
The discharge is assumed to be composed of dry air and moisture

**The sampling plane is deemed to be non-ideal due to the following reasons:**
The gas temperature of the sampling plane is below the dew point
The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D

**Stack Parameters**

| | | |
|---|---|---|
| Moisture content, %v/v | 69 (saturated) | |
| Gas molecular weight, g/g mole | 21.4 (wet) | 29.0 (dry) |
| Gas density at STP, kg/m³ | 0.96 (wet) | 1.29 (dry) |

**Gas Flow Parameters**

| | |
|---|---|
| Flow measurement time(s) (hhmm) | 1115 & 1140 |
| Temperature, °C | 91 |
| Temperature, K | 364 |
| Velocity at sampling plane, m/s | 4.8 |
| Volumetric flow rate, actual, m³/s | 0.94 |
| Volumetric flow rate (wet STP), m³/s | 0.71 |
| Volumetric flow rate (dry STP), m³/s | 0.22 |
| Mass flow rate (wet basis), kg/hour | 2400 |
| Velocity difference, % | <1 |

| **Odour** | Results | |
|---|---|---|
| Sampling time | 1117 - 1132 | |
| | Concentration ou | Mass Rate oum³/min |
| **Results** | 8800 | 370000 |
| Lower uncertainty limit | 4000 | |
| Upper uncertainty limit | 19000 | |
| Hedonic tone | Very unpleasant | |
| Odour character | Grease, cooking oil | |
| Analysis date & time | 28/08/19, 1400-1830 | |
| Holding time | 27 hours | |
| Dilution factor | 12 | |
| Bag material | Nalophan | |
| Butanol threshold (ppb) | 34.1 | |
| Laboratory temp (℃) | 22.45 | |
| Last calibration date | October 2018 | |

## 2.3 *Roof Vent*

| | | | |
|---|---|---|---|
| **Date** | 27/08/2019 | **Client** | GHD / Snackbrands |
| **Report** | R008085 | **Stack ID** | Roof Vent |
| **Licence No.** | N/A | **Location** | Blacktown |
| **Ektimo Staff** | Steven Cooper & Hamish Proust | **State** | NSW |
| **Process Conditions** | Please refer to client records. | | |

| **Sampling Plane Details** | |
|---|---|
| Sampling plane dimensions | 1000 x 1000 mm |
| Sampling plane area | 1 m² |
| Sampling port size, number | nil |
| Access | Stairs |
| Duct orientation & shape | Horizontal Rectangular |
| Downstream disturbance | Exit 0 D |
| Upstream disturbance | Exit 0 D |
| No. traverses & points sampled | 0 0 |
| Sample plane compliance to AS4323.1 | Non-compliant |

**Comments**

Sampled from the 2nd vent encountered along the rooftop walkway
The number of traverses sampled is less than the requirement
The number of points sampled is less than the requirement
The discharge is assumed to be composed of dry air and moisture

**The sampling plane is deemed to be non-compliant due to the following reasons:**

The downstream disturbance is <1D from the sampling plane
The upstream disturbance is <2D from the sampling plane
The stack or duct does not have the required number of access holes (ports)

| **Odour** | Results |
|---|---|
| Sampling time | 1348 - 1403 |
| | Concentration |
| | ou |
| **Results** | 810 |
| Lower uncertainty limit | 370 |
| Upper uncertainty limit | 1800 |
| Hedonic tone | Mildly unpleasant |
| Odour character | Cooked fat |
| Analysis date & time | 28/08/19, 1400-1830 |
| Holding time | 24 hours |
| Dilution factor | 1 |
| Bag material | Nalophan |
| | |
| Butanol threshold (ppb) | 34.1 |
| Laboratory temp (℃) | 22.45 |
| Last calibration date | October 2018 |

## 2.4 *UPC 2*

| | | | |
|---|---|---|---|
| **Date** | 24/09/2019 | **Client** | GHD / Snackbrands |
| **Report** | R008085 | **Stack ID** | UPC 2 |
| **Licence No.** | N/A | **Location** | Blacktown |
| **Ektimo Staff** | Steven Cooper, Hannah Martin & Hamish Proust | **State** | NSW |
| **Process Conditions** | Please refer to client records. | | *190909* |

| **Sampling Plane Details** | |
|---|---|
| Sampling plane dimensions | 530 mm |
| Sampling plane area | 0.221 m² |
| Sampling port size, number | 4" BSP (x4) |
| Access | Stairs |
| Duct orientation & shape | Vertical Circular |
| Downstream disturbance | Exit 2 D |
| Upstream disturbance | Bend 6 D |
| No. traverses & points sampled | 2 8 |
| Sample plane compliance to AS4323.1 | Ideal |

| **Stack Parameters** | | |
|---|---|---|
| Moisture content, %v/v | 49 | |
| Gas molecular weight, g/g mole | 23.8 (wet) | 29.5 (dry) |
| Gas density at STP, kg/m³ | 1.06 (wet) | 1.32 (dry) |
| | | |
| **Gas Flow Parameters** | | |
| Flow measurement time(s) (hhmm) | 1305 & 1430 | |
| Temperature, °C | 163 | |
| Temperature, K | 436 | |
| Velocity at sampling plane, m/s | 15 | |
| Volumetric flow rate, actual, m³/s | 3.3 | |
| Volumetric flow rate (wet STP), m³/s | 2.1 | |
| Volumetric flow rate (dry STP), m³/s | 1.1 | |
| Mass flow rate (wet basis), kg/hour | 8000 | |
| Velocity difference, % | 1 | |

| **Odour** | Results | |
|---|---|---|
| Sampling time | 1340 - 1400 | |
| | Concentration ou | Mass Rate oum³/min |
| **Results** | 1900 | 240000 |
| Lower uncertainty limit | 890 | |
| Upper uncertainty limit | 4200 | |
| Hedonic tone | Neutral | |
| Odour character | Fat, cooking oil | |
| Analysis date & time | 25/09/19, 1400-1615 | |
| Holding time | 24 hours | |
| Dilution factor | 1 | |
| Bag material | Nalophan | |
| | | |
| Butanol threshold (ppb) | 39.6 | |
| Laboratory temp (℃) | 19.4 | |
| Last calibration date | October 2018 | |

## 2.5 *WWTP – Tank*

| | | | |
|---|---|---|---|
| **Client** | GHD Pty Ltd | **Test Location** | WWTP - Agitation Tank |
| **Date** | 24/09/2019 | **Plant/Site** | Snackbrands |
| **Report No.** | R008085 | | Blacktown, NSW |
| **Ektimo Staff** | Steven Cooper & Hannah Martin | | ***190521*** |

| | |
|---|---|
| **Test Location Details** | |
| Surface Description | Waste water |
| Area Classification | Industrial |
| Sampling Method | AS4323.4 (Flux) |
| **Sampling Results** | Test 1 |
| Sampling time, hrs | 1101 - 1113 |
| Sample dilution | 1 |
| Odour concentration, ou | 750 |
| Hedonic tone | Mildly unpleasant |
| Odour character | Musty, stagnant water |
| **Average Odour Concentration, ou** | **750** |
| **Odour Flux Rate, ou/m²/min** | **27** |
| **Flux Testing Parameters** | |
| Equilibration time, hrs | 1037 - 1101 |
| Sweep Rate @ STP, L/min | 4.69 |
| Penetration Depth, mm | 5 |
| Ambient temperature, °C | 20 |

## 2.6 *WWTP - DAF*

| | | | |
|---|---|---|---|
| **Client** | GHD Pty Ltd | **Test Location** | WWTP - DAF |
| **Date** | 24/09/2019 | **Plant/Site** | Snackbrands |
| **Report No.** | R008085 | | Blacktown, NSW |
| **Ektimo Staff** | Steven Cooper & Hannah Martin | | ***190521*** |

| | |
|---|---|
| **Test Location Details** | |
| Surface Description | Waste water |
| Area Classification | Industrial |
| Sampling Method | AS4323.4 (Flux) |
| **Sampling Results** | Test 1 |
| Sampling time, hrs | 1152 - 1204 |
| Sample dilution | 1 |
| Odour concentration, ou | 800 |
| Hedonic tone | Very unpleasant |
| Odour character | Fat, musty, fish |
| **Average Odour Concentration, ou** | **800** |
| **Odour Flux Rate, ou/m²/min** | **29** |
| **Flux Testing Parameters** | |
| Equilibration time, hrs | 1128 - 1152 |
| Sweep Rate @ STP, L/min | 4.68 |
| Penetration Depth, mm | 5 |
| Ambient temperature, °C | 21 |

## 3 PLANT OPERATING CONDITIONS

SBA operating times for each location are summarised in the table below. All sampling occurred on 2 separate Tuesdays in August and September 2019 during normal operating conditions.

| Discharge Point | Operating Times |
|---|---|
| PC-42 | Monday 3am -3pm Sanitation/ Cleandowns<br><br>Monday 3pm to Friday 11pm Operation (24hours per day) |
| UPC1 | Monday 3am -3pm Sanitation/Cleandowns<br><br>Monday 3pm to Saturday 11pm Operation (24 hours per day)<br><br>Sunday in peak periods if required 12-18 times a year going forward |
| UPC2 | Monday 3am -3pm Sanitation/Cleandowns<br><br>Monday 3pm to Saturday 11pm Operation (24 hours per day)<br><br>Sunday in peak periods if required 12-18 times a year going forward |
| KF | As Required during Peak periods |

## 4 TEST METHODS

All sampling and analysis was performed by Ektimo unless otherwise specified. Specific details of the methods are available upon request.

| Parameter | Sampling Method | Analysis Method | Uncertainty* | NATA Accredited | |
|---|---|---|---|---|---|
| | | | | Sampling | Analysis |
| Sample plane criteria | NSW TM-1 | NA | NA | ✓ | NA |
| Flow rate, temperature and velocity | NA | NSW TM-2 | 8%, 2%, 7% | NA | ✓ |
| Moisture content | NSW TM-22 | NSW TM-22 | 8% | ✓ | ✓ |
| Molecular weight | NA | NSW TM-23 | not specified | NA | ✓ |
| Odour | NSW OM-7 | NSW OM-7¥ | Refer to results | ✓ | ✓ |
| Odour Characterisation | NA | direct observation | NA | NA | × |
| Odour from diffuse sources | NSW OM-8 | AS4323.3¥ | Refer to results | ✓ | ✓ |

*190624*

* Uncertainty values cited in this table are calculated at the 95% confidence level (coverage factor = 2)

¥ Odour analysis conducted at the Unanderra, NSW laboratory, by forced choice olfactometry, NATA accreditation number 14601. Results were reported to Ektimo on 25 & 28 September 2019 in report number OV-00185 & OV-00148.

## 5 QUALITY ASSURANCE/QUALITY CONTROL INFORMATION

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA's website www.nata.com.au.

Ektimo is accredited by NATA (National Association of Testing Authorities) to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Director.

NATA is a member of APLAC (Asia Pacific Laboratory Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through the mutual recognition arrangements with both of these organisations, NATA accreditation is recognised worldwide.

## 6 DEFINITIONS

The following symbols and abbreviations may be used in this test report:

| | |
|---|---|
| % v/v | Volume to volume ratio, dry or wet basis |
| ~ | Approximately |
| < | Less than |
| > | Greater than |
| ≥ | Greater than or equal to |
| APHA | American public health association, Standard Methods for the Examination of Water and Waste Water |
| AS | Australian Standard |
| BSP | British standard pipe |
| CARB | Californian Air Resources Board |
| CEM | Continuous Emission Monitoring |
| CEMS | Continuous Emission Monitoring System |
| CTM | Conditional test method |
| D | Duct diameter or equivalent duct diameter for rectangular ducts |
| $D_{50}$ | 'Cut size' of a cyclone defined as the particle diameter at which the cyclone achieves a 50% collection efficiency ie. half of the particles are retained by the cyclone and half are not and pass through it to the next stage. The $D_{50}$ method simplifies the capture efficiency distribution by assuming that a given cyclone stage captures all of the particles with a diameter equal to or greater than the $D_{50}$ of that cyclone and less than the $D_{50}$ of the preceding cyclone. |
| DECC | Department of Environment & Climate Change (NSW) |
| Disturbance | A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter. |
| DWER | Department of Water and Environmental Regulation (WA) |
| DEHP | Department of Environment and Heritage Protection (QLD) |
| EPA | Environment Protection Authority |
| FTIR | Fourier Transform Infra-red |
| ISC | Intersociety committee, Methods of Air Sampling and Analysis |
| ISO | International Organisation for Standardisation |
| Lower Bound | Defines values reported below detection as equal to zero. |
| Medium Bound | Defines values reported below detection are equal to half the detection limit. |
| NA | Not applicable |
| NATA | National Association of Testing Authorities |
| NIOSH | National Institute of Occupational Safety and Health |
| NT | Not tested or results not required |
| OM | Other approved method |
| OU | The number of odour units per unit of volume. The numerical value of the odour concentration is equal to the number of dilutions to arrive at the odour threshold (50% panel response). |
| $PM_{10}$ | Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 10 microns (µm). |
| $PM_{2.5}$ | Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 2.5 microns (µm). |
| PSA | Particle size analysis |
| RATA | Relative Accuracy Test Audit |
| Semi-quantified VOCs | Unknown VOCs (those not matching a standard compound), are identified by matching the mass spectrum of the chromatographic peak to the NIST Standard Reference Database (version 14.0), with a match quality exceeding 70%. An estimated concentration will be determined by matching the integrated area of the peak with the nearest suitable compound in the analytical calibration standard mixture. |
| STP | Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified. |
| TM | Test Method |
| TOC | The sum of all compounds of carbon which contain at least one carbon to carbon bond, plus methane and its derivatives. |
| USEPA | United States Environmental Protection Agency |
| VDI | Verein Deutscher Ingenieure (Association of German Engineers) |
| Velocity Difference | The percentage difference between the average of initial flows and afterflows. |
| Vic EPA | Victorian Environment Protection Authority |
| VOC | Any chemical compound based on carbon with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the particular conditions of use. These compounds may contain oxygen, nitrogen and other elements, but specifically excluded are carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts. |
| XRD | X-ray Diffractometry |
| Upper Bound | Defines values reported below detection are equal to the detection limit. |
| 95% confidence interval | Range of values that contains the true result with 95% certainty. This means there is a 5% risk that the true result is outside this range. |

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2128298-70517/https://projects.ghd.com/oc/sydney3/snackfoodsodourasses/Delivery/Documents/2128298-REP-0_SBA Blacktown Odour Assessment.docx

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