# Air Discharges AEE

**Date:** 31 January 2019

**To:** Greater Wellington Regional Council

**From:** Rhys Kevern

**Subject:** Assessment of Environmental Effects of Air Discharges From NCI Packaging Can Manufacturing Facility

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# 1 Introduction

NCI Packaging (NZ) Limited (NCI) currently operate a metal packaging (tinplate and aluminium Cans) manufacturing factory at 62-66 Montgomery Crescent, Clouston Park in Upper Hutt. The discharges to air are authorised by discharge permit number WGN110219 issued by the Greater Wellington Regional Council (GWRC) which expires on 2 August 2019. The air discharge permit relates predominantly to the production and coating of aluminium aerosol Cans.

This assessment has been carried out in accordance with the Fourth Schedule of the Resource Management Act 1991 (RMA), which specifies matters that should be considered in an assessment of effects on the environment.

## 2 Site Description

### 2.1 Site Location

The site is located at 62-66 Montgomery Crescent, Upper Hutt. A location map and a layout of the site and boundaries are provided in Figures 2-1 and 2-3 respectively. The site zoning map is presented in Figure 2-2. The site is mainly surrounded by other industries and commercial activities. However, there are residences on the northern boundary of the NCI site off Mountbatten Grove.

A feature of the terrain in the vicinity of the site is the proximity of the Kingsley Height Hills (see Figure 2-1) which rise up on the southern side of the Rail road beyond Montgomery Crescent, 500 m from the site.

**Figure 2-1 Site Location**

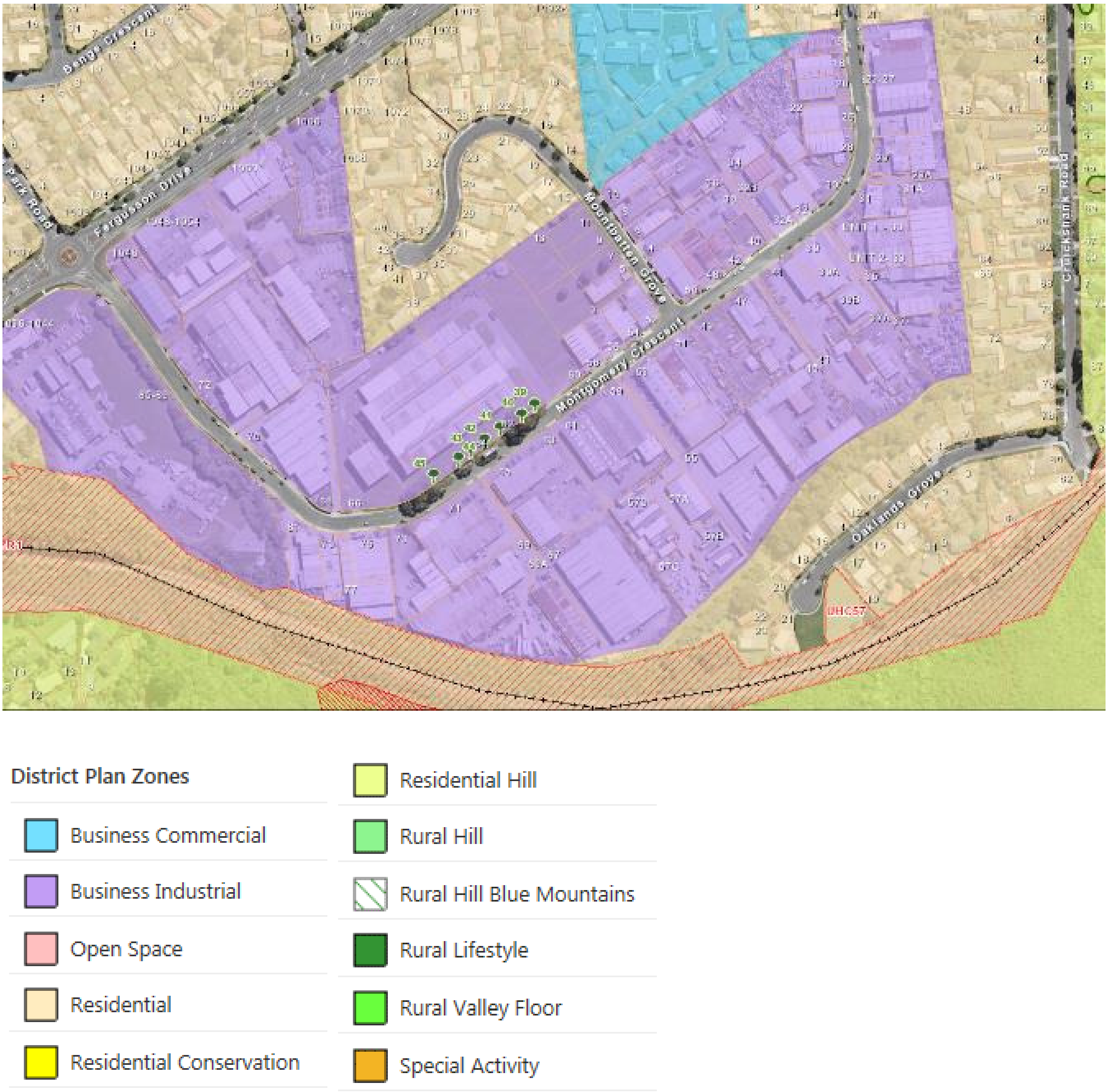
### 2.2 Site Zoning

### 2.2.1 District Zoning

The site is zoned “Business Industrial Area” in the Operative City of Upper Hutt District Plan (UHDP). Specific activities are not scheduled in the UHDP therefore in order for NCI’s activities to be a permitted activity in this area they need to meet all of the permitted criteria conditions. It is noted that rule 6.3.3 in the UHDP stipulates “*The avoidance, remedying, or mitigation of the adverse effects of business activities on the amenity of surrounding neighbourhoods*”. These District Council provisions are considered throughout this report. As the site has been established for a significant period, taking into account the previous manufacturing business, the activities may be allowed by existing use rights. One of the anticipated environmental results for the Business industrial zone is accommodation of a mix of both industrial and non industrial activities.

The nature of uses in the surrounding area is a mix of commercial and industrial business and some residential housing in Mountbatten Grove.

**Figure 2-2 Surrounding Zoning**



### 2.3 Address, Legal Description and Map Reference

The specific site details are:

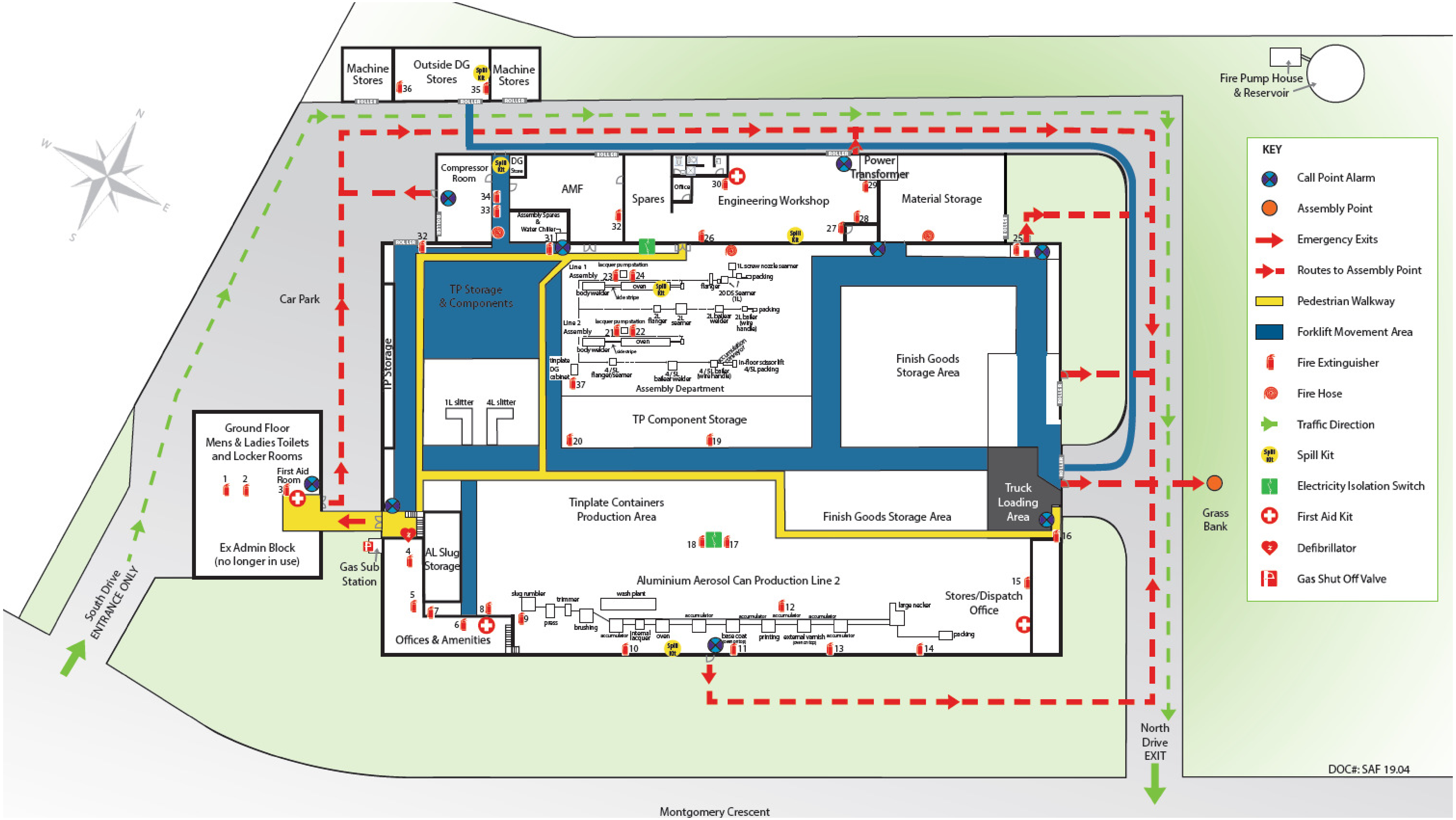
**Contact:** Rhys Kevern, NCI Packaging (NZ) Limited, 62-66 Montgomery Crescent, Upper Hutt, Wellington 5018.

09 914 9447, rhys.kevern@ncipackaging.com

**Legal Description:** Lot 1 DP 30717, Lot 1 DP 28552 and Lots 11-14 & 16 DP 30232.

**Map Reference:** NZGD 2000: 1775133 mE, 5445745 mN

**Figure 2-3** **Site Layout**



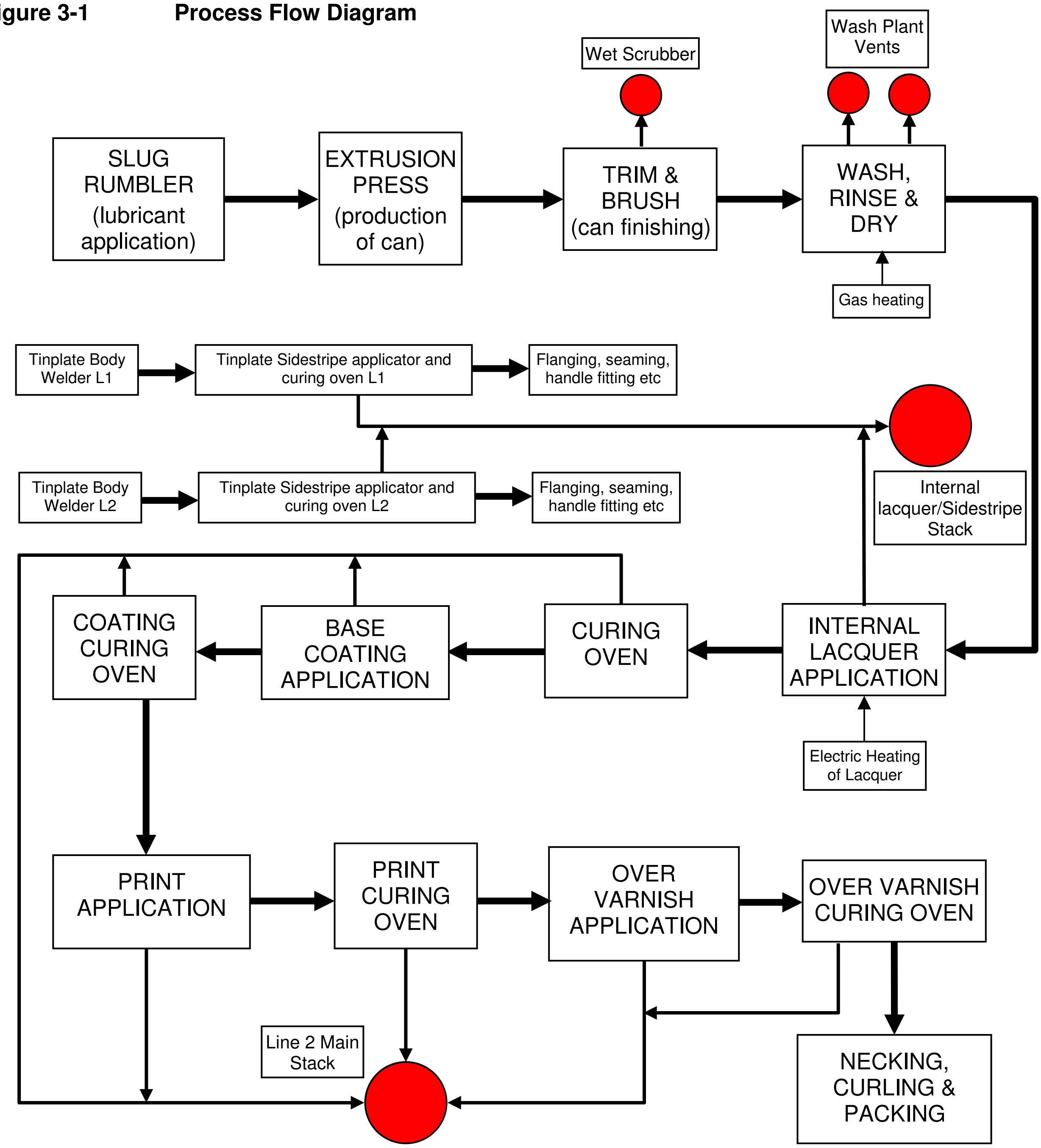
## 3 Process Description

There are three main operations carried out at the NCI plant. These are:

- Drawing Aluminium Cans
- Printing and Lacquer Application
- Forming Steel Paint Cans

The main discharges to air come from the printing and lacquer application processes, which are discussed in detail in the following sections. Figure 3-1 shows the process flow diagram of the NCI plant operations and Figure 3-2 identifies the location of the discharge points.

**Figure 3-1 Process Flow Diagram**




### 3.1 Drawing Aluminium Cans

The process of manufacturing aluminium cans consists of striking a lubricated disc of aluminium with enough force to plasticise it whereby the aluminium is forced up the sides of a die to produce a one ended cylinder (tube). The top edge of the can is trimmed and for some products the sides are brushed to create a distinct texture. A wet scrubber is used to collect aluminium dust from the brushing operation. To allow the coatings to be applied in later stages, the drawing lubricant is washed off in the Wash Plant and the Can dried. The washing plant is heated by a natural gas fired burner and there is a separate stack for discharging water vapour.

### 3.2 Printing and Lacquer Application

The dried aluminium cans are sprayed with an internal coating of solvent based lacquer to protect the metal from the intended material to be stored in the can. Following this, a solvent based external basecoat, print and external lacquer is applied by rollers. At each stage the coatings are dried in an oven prior to the next coat.

Previously NCI had two coating and printing lines however now only Line 2 is used. Line 2 internal lacquer emissions, and emissions from the tinplate sidestripe ovens, are discharge from the main ventilation stack of Line 1 which is fully decommissioned. The Line 1 main stack (450 mm dia., 325 mm exit dia.) extends 25 metres above floor level. One main extraction fan and ducting system collects the emissions from the curing ovens and coating and lacquering processes of Line 2. These are discharged via a 450 mm diameter flue (325 mm exit dia) which also terminates at 25 m above ground level.

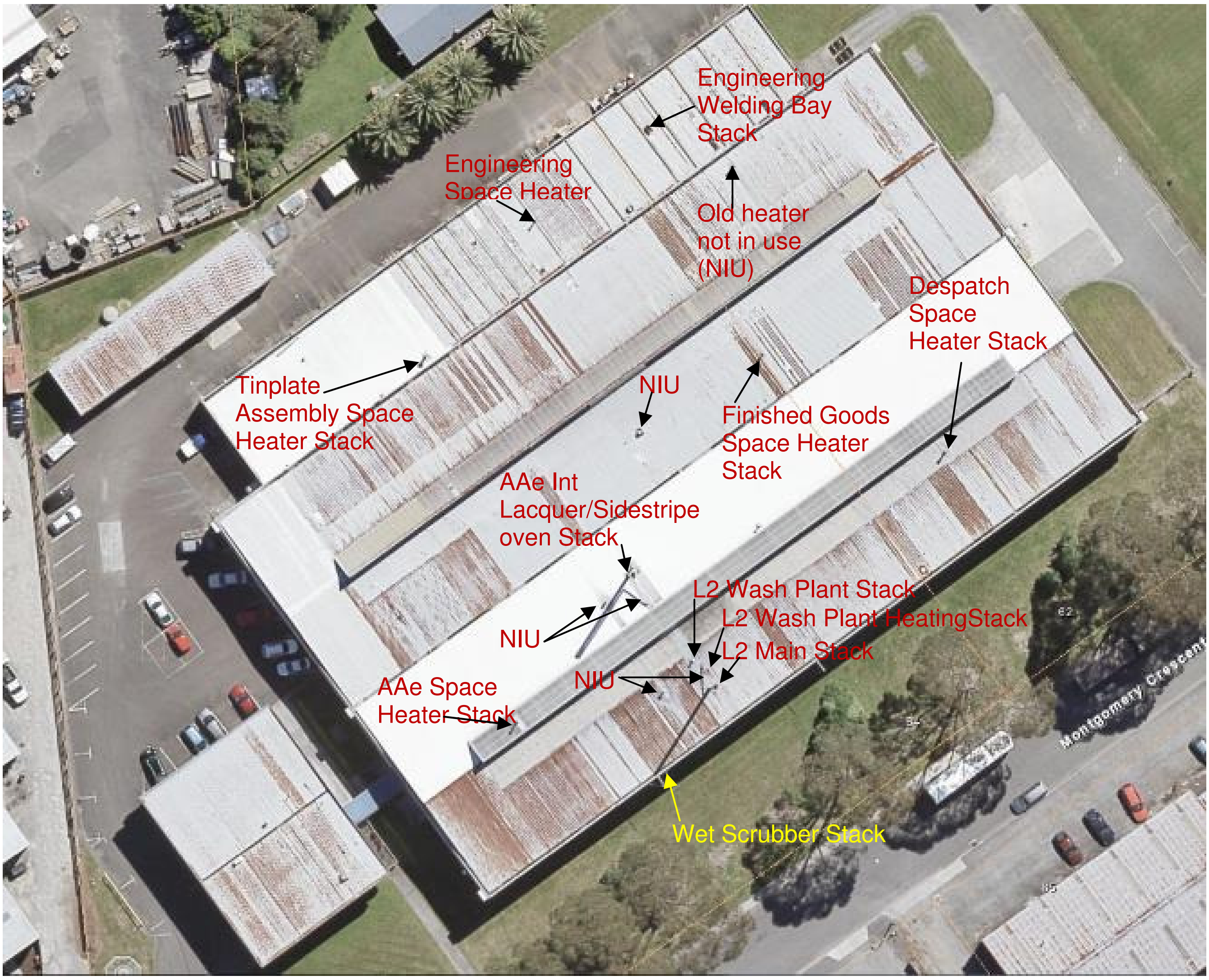
Line two only uses electricity to heat and maintain the temperature of the ovens.

### 3.3 Forming Steel Paint Cans

There are two tinplate assembly lines one for 1 & 2 L Cans and one for 4 & 5 L Cans. A Can is made up of coated tin plated steel sheet metal formed into a cylinder and welded. A circular End is double seamed onto one end of the cylinder and either a Top or Ring is double seamed on the other end.

Just after the body of the Can (cylinder) is formed a solvent based resin (acrylic with a small amount of epoxy) is sprayed on the inside of the weld area. This lacquer is dried/cured using a gas fired oven curing ovens which discharge through the old L1 AAe Main stack.

**Figure 3-2 Discharge points**




NIU = not in use

# 4 Regulatory Framework

## 4.1 Resource Management Act

Section 15 (1)(c) of the Resource Management Act 1991 (RMA) states that any discharge from an industrial or trade premises into air requires a Resource Consent unless that discharge is expressly allowed by a rule in a Proposed Regional Plan and Regional Plan, or a Regulation.

## 4.2 Wellington Regional Air Quality Management Plan

The relevant regional rules covering discharges of contaminants to air are set out in Section 5.2 of the Greater Wellington Regional Council's (GWRC) Regional Air Quality Management Plan (WRP). The plan has been operative since May 2000. Change 1 to the Regional Air Quality Management Plan was made operative on1 September 2003. The rules relevant to the NCI operation are presented in Table 4-1 and "Op Rules". Table 4-1 also indicates whether NCI is able to meet the requirements of these Rules. The Proposed Natural Resources Plan for the Wellington Region dated 31.07.2015 also has Rules relating to air discharges which are discussed in Table 4-1 as "Prop Rules".

**Table 4-1 Wellington Regional AQMP Rules**

| Rule No. | Scope | NCI status against rule |
|---|---|---|
| Op Rule 6 | Small internal or external combustion engines, heating appliances and electrical generation plants (<2 MW) (Permitted Activity) | For processes that are <100 kW, best dispersion possible is required, for processes >100 kW discharges need to be 3 m above the roof height. NCI operations exceed 100 kW, and the stack heights are less than 3 m above the roof. Therefore this activity does not meet the permitted criteria. |
| Prop Rule 7 | Natural gas and liquefied petroleum gas – permitted<br>Activity (40 kW – 5 MW) | The discharges do not cause adverse effects off site, the discharges are vertical but have rain covers on them which does not meet the requirements of section (c) and (d). Therefore this activity does not meet the permitted criteria. |
| Op Rule 13 | Chemical processes (Permitted Activity) | Discharges from chemical processes (excluding specifically named activities) are permitted subject to conditions. One of the specific activities excluded is the discharge of hazardous air pollutants (HAP). Several of the compounds discharged from the NCI operations such as toluene and ethylbenzene are classified as HAP. Therefore this activity does not meet the permitted criteria. |
| Op Rule 15 | Coating processes with more than 30 (kg or L) per day or 3 (kg or L) per hour<br>Use of more than 500 kW of electrical or combustion energy for baking or drying coatings<br>Chimneys need to be at least 3 m above the roof (Permitted Activity) | NCI exceeds the coating processes requirements of more than 30 kg per day. The NCI hourly operations do not exceed 3 kg, however as they are a 24 hour operation, the daily coating processes is exceeded.<br>Therefore this activity does not meet the permitted criteria. |
| Prop Rule 16 | Printing processes – permitted activity | NCI uses acrylic based inks and the activity complies with the permitted criteria. |

| Rule No. | Scope | NCI status against rule |
|---|---|---|
| Prop Rule 19 | Workplace ventilation – permitted activity | There may be small amounts of hazardous air pollutants released from the building in general. Monitoring of VOC concentrations of indoor air have been undertaken and report in later sections of this report. this activity may not meet the permitted criteria. |
| Op Rule 22 | Miscellaneous processes incl. Laboratory fume cupboards (Permitted Activity) | NCI do not breach the regulations of Rule 22, therefore it is a permitted activity. |
| Op Rule 23 | General rule (Discretionary Activity) | Consequently the activities of NCI must be considered discretionary under Rule 23 of the WRP and consent is required. |
| Prop Rule 41 | All other discharges – discretionary activity | The main coating processes are not explicitly categorised under other rules therefore this activity is discretionary. |

### 4.3 National Environmental Standards

The Ministry for the Environment promulgated National Environmental Standards (NES) for air on 8 October 2004. Since that time two amendments have been made to the NES. The NES applies standards to five air pollutants; fine particulate, carbon monoxide, nitrogen dioxide, sulphur dioxide and ozone. The standard also places restrictions on home heating appliances, hazardous waste combustion etc.

The criteria in the NES for assessing whether a consent to discharge particulate matter less than 10 µm diameter ($PM_{10}$) should be allowed is more involved than for the other contaminants. The main criteria relates to whether the ambient concentrations of $PM_{10}$ within the local airshed are in compliance with the standard or not. If they are not, then the assessment needs to consider whether the proposed discharge is likely to cause the planned reduction strategies to meet the standard by 2013 or not. The other contaminants are more simply assessed against whether the proposed discharge will result in concentrations in the airshed to breach the standard or not. Nitrogen oxides and volatile organic compounds can, under certain circumstances, cause photochemical pollution and therefore limitations are placed on the discharge of these compounds where ozone may be generated as a result.

Regulation 20(2) of the NES stipulates that an application to discharge $NO_2$ or VOCs must be declined if the discharge is likely to cause the concentration of $NO_2$ or $O_3$ to breach the air quality standard in the airshed, and the discharges are likely to be the principal source in the airshed.

The assessment of discharges in relation to the NES is contained in section 8 of this report.

### 4.4 Conclusion

The operations at NCI do not meet all of the permitted activity criteria for air discharges and therefore the coating operations are discretionary and a resource consent is required.

# 5 Discharges to Air

This section of the report presents information on the discharges to air from the operations at NCI. There are three main potential emissions from the site:

- Volatile Organic Compounds (VOC) (mainly solvents);
- Odour; and
- Products of Combustion

## 5.1 Flow Monitoring Results

For each sampling location, stack velocity was determined according to US EPA Method 1 and 2 using a manometer and Pitot tube. The temperature was measured using a K type thermocouple and digital thermometer. The oxygen and nitrogen composition of the stack gas was assumed to be the same as air. Moisture content was assumed to be 5% based on previous humidity measurements at the site. Flow measurement results are presented in Table 5-1. Average values have been used in the modelling.

**Table 5-1 Flow Monitoring Results**

| Parameter \ Stack | L1 Main Stack | L2 Internal/ Assembly Stack |
|---|---|---|
| Stack Velocity at sample point (m/s) | 7.4 | 7.8 |
| Discharge Velocity, (m/s) | 14.2 | 14.9 |
| Stack Temp (℃) | 34 | 91 |
| Stack Flow ($m^3$/s) | 1.18 | 1.24 |
| Stack Flow ($m^3$/s @ 0℃, 1 atm, dry gas) | 0.90 | 1.04 |

## 5.2 VOC

Sampling was undertaken by Source Testing New Zealand (STNZ) during November and December 2018. Duplicate sampling for odour and VOCs was conducted on Line 2 Main Stack and Internal Lacquer/Assembly stack.

Not all of the VOC can be measured by one method therefore two laboratories (and methods) were used.

Some VOC, mainly alcohols and esters were collected on coconut shell charcoal adsorbent tubes using calibrated air pumps. Samples were collected over a 60 minute period using USEPA Method 18 (modified) augmented by NIOSH Methods 2500, 1302 and 1500. Prior to sampling, the pumps were calibrated to a known flow rate. On completion of the sampling, the sample tubes were capped, given unique reference numbers and sent to R J Hill Laboratories, Hamilton for analysis by gas chromatography/ flame Ionisation detection (GC-FID).

Additional whole gas samples were taken by a similar method to the odour sampling but with smaller bags using modified USEPA Method 18. These samples were sent to Analytica in Hamilton for analysis by Selected Ion Flow Tube Mass Spectrometry (SIFT-MS).

The materials being used during the sampling and process parameters are summarised in Tables 5-2 and 5-3. The compounds measured cover most of the compounds present in the raw materials.

**Table 5-2 Line 2 Process Parameters**

| Sampling Day | Can size |
|---|---|
| 13/11/18 | 35 x 98 mm |
| 14/11/18 | 35 x 149 mm |
| 05/12/18 | 31.65 x 165.1 mm |

**Table 5-3 Materials Composition**

| Line 2 Main Stack | Internal lacquer and Assembly Stack |
|---|---|
| White Basecoat PPG3046-006B and gloss over varnish PPG3603-801A | Epoxy PPG7407-310A plus Akzo Nobel 6102541 sidestripe |
| White Basecoat PPG3046-006B<br>10 – 30% Heavy Aromatic Pet Naphtha, CAS 64742-94-5<br>1 – <10% 2-(2-butoxyethoxy) ethanol, CAS 112-34-5<br>1 – <10% Dimethyl glutarate, CAS 1119-40-0<br>1 – <10% isobutyl alcohol CAS 78-83-1<br><1% Naphthalene, CAS 91-20-3<br><1% Xylene, CAS 1330-20-7<br>0 – 10%, 2-butanone oxime, CAS 96-29-7 | PPG7407-310A Epoxy<br>30 – 60% 2 methoxy 1 methyl ethyl acetate (PGMEA), CAS 108-65-6<br>10 – 30% 4-Methyl-4-hydroxy-2-pentanone (diacetone alcohol), CAS 123-42-2<br>1 – 10% n-Butanol, CAS 71-36-3<br>1 – 10% Ethyl benzene, CAS 100-41-4<br>1 – 10% Xylene, CAS 1330-20-7<br>1 – 10% 1 methoxy 2 propanol, CAS 107-98-2<br>1 – 10% Dimethyl glutarate, CAS 1119-40-0<br><1% Formaldehyde, CAS 50-00-0<br><1% Phenol, CAS 108-95-2 |
| Gloss over varnish PPG3603-801A<br>25 – 50% Heavy Aromatic Pet Naphtha, CAS 64742-94-5<br>3 – <5% n-Butanol, CAS 71-36-3<br>2 – <3% Naphthalene, CAS 91-20-3<br>1 – <2 1,2,4-trimethyl benzene, CAS 95-63-6<br>0.1-<0.2% Formaldehyde, CAS 50-00-0 | Akzo 6102541 sidestripe<br>25 – 35% 2-butoxyethanol, CAS 111-76-2<br>15 – 25% Aromatic hydrocarbon, CAS 64742-94-5<br>5 – 15% 1-methoxy-2-acetoxypropane, CAS 108-65-6<br>5 – 15% Solvent naphtha, light aromatic, CAS 64742-95-6<br>1 – 5% Cyclohexanone, CAS 108-94-1<br>1 – 5% Xylene, CAS 1330-20-7<br>0 – 1% Ethyl benzene, CAS 100-41-4 |

The range of VOC compounds sampled from the stacks was determined from the components listed in the material safety data sheets for the coatings used in the process. Some of the materials listed are mixtures (especially solvents such as aromatic hydrocarbons) and therefore the analysis results show a wider range of compounds.

### 5.2.1 CSC Tube VOC Monitoring Results

Table 5-4 presents the results of the VOCs determined by Hill Laboratories. Table 5-5 presents the results of alcohol monitoring.

**Table 5-4 Average Tube VOC Discharge Rates**

| Determinand | Line 2 Main Stack, g/hr | Internal Lacquer/Assembly Stack, g/hr |
|---|---|---|
| Chloroform | ND | ND |
| 1,1,1-trichloroethane | ND | ND |
| 1,2 Dichloroethane | ND | ND |
| Carbon Tetrachloride | ND | ND |
| 1,1 Dichloropropene | ND | ND |
| Benzene | ND | ND |
| Trichloroethene | ND | ND |
| 1,2 Dichloropropane | ND | ND |
| Dibromomethane | ND | ND |
| bromodichloromethane | ND | ND |
| cis-1,3-dichloropropene | ND | ND |
| Toluene | **0.4** | **0.8** |
| Trans 1,3-dichloropropene | ND | ND |
| 1,1,2 Trichloroethane | ND | ND |
| 1,3 Dichloropropane | ND | ND |

| **Determinand** | **Line 2 Main Stack, g/hr** | **Internal Lacquer/Assembly Stack, g/hr** |
|---|---|---|
| Dibromochloromethane | ND | ND |
| tetrachloroethene | ND | ND |
| 1,2 dibromoethane | ND | ND |
| Chlorobenzene | ND | ND |
| 1,1,1,2 tetrachloroethane | ND | ND |
| Ethylbenzene | **78.2** | **92.7** |
| m-, p-Xylene | **40.3** | **44.1** |
| o-Xylene | **13.6** | **13.7** |
| Styrene | **0.1** | ND |
| Bromoform | ND | ND |
| iso-Propylbenzene | **0.2** | **0.5** |
| 1,1,2,2-tetrachloroethane | ND | ND |
| 1,2,3 trichloropropane | ND | ND |
| bromobenzene | ND | ND |
| 2-chlorotoluene | ND | ND |
| n-Propylbenzene | **1.3** | **1.5** |
| 4-Chlorotoluene | ND | ND |
| 1,3,5 trimethylbenzene | **3.8** | **3.0** |
| tert-butylbenzene | ND | ND |
| 1,2,4 Trimethylbenzene | **51.0** | **14.8** |
| 1,3 Dichlorobenzene | ND | ND |
| sec-Butylbenzene | **1.9** | **0.3** |
| 1,4 Dichlorobenzene | ND | ND |
| 4-iso-Propyltoluene | **2.2** | **0.4** |
| 1,2 Dichlorobenzene | ND | ND |
| n-Butylbenzene | ND | ND |
| 1,2 Dibromo-3-chloropropane | ND | ND |
| 1,2,4 Trichlorobenzene | ND | ND |
| Naphthalene | **14.0** | **1.6** |
| 1,2,3 Trichlorobenzene | ND | ND |
| Hexachlorobutadiene | ND | ND |
| MIBK | ND | ND |

ND = not detected

**Table 5-5 Average Tube Alcohol Discharge Rates**

| **Determinand** | **Line 2 Main Stack, g/hr** | **Internal Lacquer/Assembly Stack, g/hr** |
|---|---|---|
| 2-Butoxyethanol | 10.6 | 170.5 |
| n-Butanol | 143.9 | 101.0 |
| 1-Methoxy-2-propanol | 38.8 | 37.7 |

### 5.2.2 Bag Sample VOC Monitoring Results

Table 5-6 presents the results of the VOCs determined from the Analytica analysis as well as the mass discharges.

**Table 5-6 Average Bag VOC Discharge Rates**

| Determinand | Line 2 Main Stack, g/hr | Internal Lacquer/Assembly Stack, g/hr |
|---|---|---|
| Butanone oxime | 7.8 | ND |
| Formaldehyde | 8.3 | 1.3 |
| Isobutanol | 28.9 | ND |
| Cyclohexanone | ND | 21.1 |
| Phenol | ND | 13.8 |
| Propylene glycol methyl ether acetate | ND | 176.4 |

### 5.2.3 VOC Summary Including Library Search VOC

**Table 5-7 VOC Emission Rate Summary**

| Contaminant discharge rate | Line 2 Main (g/hr) | Internal/ Assembly (g/hr) |
|---|---|---|
| **VOC Suite** | | |
| Toluene | 0.4 | 0.8 |
| Ethylbenzene | 78.2 | 92.7 |
| *m-, p-Xylene* | 40.3 | 44.1 |
| *o-Xylene* | 13.6 | 13.7 |
| Total Xylene | 53.9 | 57.8 |
| Naphthalene | 14 | 1.6 |
| **Aromatics** | | |
| iso-Propylbenzene (Cumene) | 0.2 | 0.5 |
| n-Propylbenzene | 1.3 | 1.5 |
| 1,3,5-Trimethylbenzene | 3.8 | 3.0 |
| 1,2,4-Trimethylbenzene | 51.0 | 14.8 |
| sec-Butylbenzene | 1.9 | 0.3 |
| 4-iso-Propyltoluene (p-Cymene) | 2.2 | 0.4 |
| Benzene, 2-ethyl-1,4-dimethyl- | 8.8 | 5.8 |
| Benzene, 1,2,3,4-tetramethyl- | 19.7 | 7.0 |
| Benzene, 1,2,3 Trimethyl - | 17.0 | - |
| Benzene, 1,3-diethyl- | 8.8 | - |
| Benzene, 1,1'-(1-ethenyl-1,3-pro… | 21.7 | - |
| Benzene, 1-ethyl-3,5-dimethyl- | 24.8 | - |
| Benzene, 1-methyl-3-propyl- | 8.1 | - |
| Benzene, 2-ethyl-1,3-dimethyl- | 5.0 | - |
| Benzene, 1-ethyl-2,4-dimethyl- | - | 5.5 |
| Aromatic solvent naphtha, heavy | 174.3 | 38.8 |
| **Hydrocarbons** | | |
| Cyclohexanone | - | 21.1 |
| 1,3,8-p-Menthatriene | 15.0 | - |
| TPH | 1364 | 453.6 |
| (C4-C12 alkane hydrocarbons inc distillates (petroleum), hydrotreated light) | 1379 | 474.7 |

| Esters and Alcohols | | |
|---|---|---|
| Pentanedioic acid, dimethyl ester (dimethyl glutarate) | 17.7 | - |
| Hexanedioic acid, dimethyl ester | 10.9 | - |
| Butanone oxime | 7.8 | - |
| 2-Butoxyethanol | 10.6 | 170.5 |
| n-Butanol | 143.9 | 101.0 |
| Isobutyl alcohol | 28.9 | - |
| 1-Methoxy-2-propanol | 38.8 | 37.7 |
| Propylene glycol methyl ether acetate or 1-Methoxy-2-propyl acetate (PGMEA) | - | 176.4 |
| **Others** | | |
| Formaldehyde | 8.3 | 1.3 |
| Phenol | - | 13.8 |
| 1,1,2,2-Tetrachloroethane | 0.02 | - |
| 1,4-Dichlorobenzene | - | 0.03 |
| Styrene | 0.1 | - |

### 5.3 Odour Monitoring Results

Odour is measured by dynamic dilution olfactometry which involves collecting bag samples of air from the sources for analysis by Watercare Laboratory Services Limited. The air is extracted from the stack using the Lung principle which uses a sealed barrel to contain the bag which is connected to the stack. Air is extracted from the barrel to create a vacuum which draws a sample into the bag to equalise the pressure. The bags are made of inert plastic and are flushed with the stack gas prior to collecting the sample for analysis at the Laboratory.

The Laboratory analysis utilises a panel of people to determine the concentration at which the odour can only just be detected following various dilutions. The number of dilutions required to obtain a concentration of odour that can only just be detected is the odour concentration in odour units e.g. if a sample was diluted with 2,000 parts of clean air to reach a concentration that could only just be detected, the odour concentration would be 2,000 odour units. Odour monitoring was undertaken in accordance with AS/NZS 4323.3.

Table 5-7 presents the odour monitoring results.

**Table 5-8 Average Odour Emissions**

| Stack / Parameter | L2 Main Stack | L2 Lacquer/Assembly Stack | L2 Main Stack | L2 Lacquer/Assembly Stack |
|---|---|---|---|---|
| | Concentration, OU/$m^3$ | | Mass Discharge, OU/s | |
| **Odour** | 4,625 | 5,325 | 4,152 | 5,524 |

### 5.4 Natural Gas Combustion Emissions

There are several relatively small natural gas fired space heaters used in the plant during winter. They have a maximum heat output of about 380 kW. In November 2010 gaseous products of combustion were monitored using a Testo 350 XL combustion gas analyser on stacks which discharge products of combustion. The Testo 350 XL utilises electrochemical cells to monitor oxygen ($O_2$%), carbon monoxide (CO) parts per million on a volume basis (ppmv), nitric oxide (NO ppmv), and nitrogen dioxide ($NO_2$ ppmv). The concentration of carbon dioxide ($CO_2$%) was monitored using an Infra Red (IR) cell. USEPA Method 3 was subsequently used to determine the molecular weight of the stack gas. The monitoring results are presented in Tables 5-9 to 5-11.

**Table 5-9 Combustion Source Discharge Parameters**

| Process | Wash Plant Heating | AAe Space Heater | Despatch Space Heater | Finished Goods Space Heater | Tinplate Assembly Space Heater |
|---|---|---|---|---|---|
| Stack Diameter, (m) | 0.2 | 0.25 | 0.25 | 0.25 | 0.25 |
| Stack Temperature, (℃) | 98.8 | 185 | 207 | 212 | 202 |
| Atmospheric pressure (hPa) | 1021 | 1021 | 1021 | 1021 | 1021 |
| Humidity | 45.6 | ND | ND | ND | ND |
| Stack Velocity, (m/s) | 2.45 | 4.29 | 3.54 | 3.92 | 3.82 |

**Table 5-10 Combustion Source Monitoring Results, 23 November 2010**

| Flue | | $O_2$ (%)[1] | $CO_2$ (%)[1] | CO (ppmv)[2] | NO (ppmv)[2] | $NO_2$ (ppmv)[2] | $NO_X$ (ppmv)[2] |
|---|---|---|---|---|---|---|---|
| Wash Plant Heating | Ave. | 8.6 | 7.4 | 1 | 46 | 1.9 | 48 |
| | Max. | 11.4 | 7.6 | 39 | 49 | 2.2 | 51 |
| | Min. | 8.2 | 5.6 | 0 | 36 | 1.4 | 38 |
| AAe Space Heater | Ave. | 9.2 | 7.1 | 4 | 36 | 1.9 | 38 |
| | Max. | 9.5 | 7.3 | 15 | 38 | 2.5 | 41 |
| | Min. | 8.8 | 6.9 | 1 | 31 | 1.4 | 33 |
| Despatch Space Heater | Ave. | 11.0 | 6.1 | 3 | 37 | 1.3 | 39 |
| | Max. | 11.5 | 7.0 | 21 | 40 | 1.7 | 41 |
| | Min. | 9.8 | 5.9 | 1 | 31 | 0.8 | 33 |
| Finished Goods Space Heater | Ave. | 11.4 | 6.2 | 32 | 33 | 0.2 | 33 |
| | Max. | 17.7 | 6.3 | 538 | 35 | 0.6 | 36 |
| | Min. | 11.1 | 1.3 | 18 | 9 | 0.0 | 9 |
| Tinplate Assembly Space Heater | Ave. | 11.0 | 6.1 | 3 | 37 | 1.3 | 39 |
| | Max. | 11.5 | 7.0 | 21 | 40 | 1.7 | 41 |
| | Min. | 9.8 | 5.9 | 1 | 31 | 0.8 | 33 |

[1] Dry gas basis

[2] parts per million per volume, dry gas basis

The smaller heater in Engineer wasn't tested.

**Table 5-11 Products of Combustion Results**

| Contaminant | Combustion Emissions (kg/hr) | | | | |
|---|---|---|---|---|---|
| | Wash Plant Heating | AAe Space Heater | Despatch Space Heater | Finished Goods Space Heater | Tinplate Assembly Space Heater |
| $NO_2$ | 0.03 | 0.04 | 0.03 | 0.09 | 0.03 |
| CO | 0.35 | 0.13 | 0.19 | 4.84 | 0.19 |

The main discharge of concern from burning natural gas is nitrogen dioxide ($NO_2$) but carbon monoxide (CO) can also be generated. The combustion emissions are low and therefore not expected to cause any off-site effects. They have not been considered further.

# 6 Assessment Criteria

The NES are the primary standards used within New Zealand. The Greater Wellington Regional Plan contains some ambient air quality targets, however some of these are the same as the NES values or the New Zealand Ambient Air Quality Guidelines (NZAAQG) and therefore a combination of the GWRC targets and the NES have been used in this assessment. As discussed in Section 5 of this report, combustion emissions such as $PM_{10}$, $NO_2$ and CO are low and will not be assessed further. Table 6-1 lists the relevant guidelines for the discharges from this site.

## 6.1 National Environmental Standards

The criteria in the NES for assessing whether a consent to discharge particulate matter less than 10 µm diameter ($PM_{10}$) should be allowed is more involved than for the other contaminants. The main criteria relates to whether the ambient concentrations of $PM_{10}$ within the local airshed are in compliance with the standard or not. If they are not, then the assessment needs to consider whether the proposed discharge is likely to produce ambient concentrations more than 2.5 µg/m$^3$ of $PM_{10}$ within the airshed. If it is, then offsets may be required. There are no specific $PM_{10}$ discharges from the site.

The other contaminants are more simply assessed against whether the proposed discharge will result in concentrations in the airshed to breach the standard or not. Nitrogen oxides and Volatile Organic Compounds can under certain circumstances cause photochemical pollution and therefore limitations are placed on the discharge of these compounds where ozone may be generated as a result. While the NES are not primarily designed for direct assessment they have become de facto emission assessment criteria as the emissions cannot be allowed if the emissions cause the airshed to exceed the NES. The standards are presented in Table 6-1.

If any of the contaminants listed in Table 6-1 are a significant/principal emission in the airshed and could cause a breach in the standard then consent cannot be granted.

**Table 6-1 Ambient Air Quality Criteria**

| Compound | Air Quality Criteria (µg/m$^3$) | Averaging Time | Source |
|---|---|---|---|
| Nitrogen dioxide, $NO_2$ | 200<br>100 | 1 hour<br>24 hour | NES<br>GW Proposed Plan |
| Sulphur dioxide, $SO_2$ | 350<br>120 | 1 hour<br>24 hour | NES<br>GW Proposed Plan |
| Carbon dioxide, CO | 30,000<br>10,000 | 1 hour<br>8 hour | GW Proposed Plan<br>NES |
| Ozone, $O_3$ | 150<br>100 | 1 hour<br>8 hour | NES<br>GW Proposed Plan |
| Particulate ($PM_{10}$) | 50<br>20 | 24 hour<br>Annual | NES<br>GW Proposed Plan |
| Fine particulate ($PM_{2.5}$) | 25<br>10 | 24 hour<br>Annual | GW Proposed Plan<br>GW Proposed Plan |
| Benzene | 3.6 | Annual | GW Proposed Plan |

Both the NES and GW Proposed Plan criteria are set for locations where people may be exposed for the averaging period. The maximum off-site concentration predictions from modelling have been assessed at residential locations. The other contaminants are more simply assessed against whether the proposed discharge will result in concentrations in the airshed to breach the standard or not.

Where there is no relevant New Zealand standard or guideline, the California Office of Environmental Hazard Assessment acute and chronic reference exposure limits (OEHHA) have been used. If the OEHHA does not have a reference exposure limit then Texas Commission on Environmental Quality (TCEQ) Effects Screening

Levels[1] (ESL) have been used. The Greater Wellington Regional Council (GWRC) has set a number of Regional Ambient Air Quality Guidelines which are primarily based on the NZAAQG. Table 6-2 lists the relevant guidelines for the discharges from this site including the relevant odour thresholds.

Discharges to air from the NCI site are existing emission sources in the air shed.

The MfE has produced guidance[2] which considers that for less sensitive areas such as industrial areas, the ambient odour levels should be less than 10 OU/m$^3$ for 99.5% of the time. For high sensitivity areas such as residential zones, 2 OU/m$^3$ for 99.5% of the time has been used.

**Table 6-2 Ambient VOC Air Quality Criteria**

| VOC | 1 hr Ave Air Quality Criteria, µg/m$^3$ | Air Quality Criteria Source | Annual Air Quality Criteria, µg/m$^3$ | Air Quality Criteria Source |
|---|---|---|---|---|
| **VOC Suite** | | | | |
| Toluene | 37,000 | OEHHA | 300 | OEHHA |
| Ethylbenzene | 26,000 | TCEQ | 2,000 | OEHHA |
| Total Xylene | 22,000 | OEHHA | 700 | OEHHA |
| Naphthalene | 440 | TCEQ | 9 | OEHHA |
| **Aromatics** | | | | |
| Aromatic solvent naphtha, heavy | 2,560 | TCEQ | 256 | TCEQ |
| **Hydrocarbons** | | | | |
| C4-C12 alkane hydrocarbons inc distillates (petroleum), hydrotreated light | 3,500 | TCEQ | 350 | TCEQ |
| **Esters and Alcohols** | | | | |
| Pentanedioic acid, dimethyl ester (dimethyl glutarate) | 100 | TCEQ | 10 | TCEQ |
| Hexanedioic acid, dimethyl ester | 4,300 | TCEQ | 430 | TCEQ |
| Butanone oxime | 360 | TCEQ | 36 | TCEQ |
| 2-Butoxyethanol | 4,700 | OEHHA | 82 | OEHHA |
| n-Butanol | 610 | TCEQ | 61 | TCEQ |
| Isobutyl alcohol | 1500 | TCEQ | 150 | TCEQ |
| 1-Methoxy-2-propanol | 3,700 | TCEQ | 7000 | OEHHA |
| Propylene glycol methyl ether acetate or 1-Methoxy-2-propyl acetate (PGMEA) | 2,700 | TCEQ | 270 | TCEQ |
| **Others** | | | | |
| Formaldehyde | 100 | MfE (30 min) | - | - |
| Phenol | 5,800 | OEHHA | 200 | OEHHA |
| 1,1,2,2- | 70 | TCEQ | 7 | TCEQ |

[1] Available from http://www.tceq.state.tx.us/implementation/tox/
[2] Good Practice Guide for Assessing and Managing Odour in New Zealand, Ministry for the Environment, 2003

| VOC | 1 hr Ave Air Quality Criteria, µg/m$^3$ | Air Quality Criteria Source | Annual Air Quality Criteria, µg/m$^3$ | Air Quality Criteria Source |
|---|---|---|---|---|
| Tetrachloroethane | | | | |
| 1,4-Dichlorobenzene | 900 | TCEQ | 160 | TCEQ |
| Styrene | 21,000 | OEHHA | 900 | OEHHA |
| **Odour** | 2 OU Residential<br>10 OU Industrial | MfE 99.5% of the time<br>1 hour | | |

# 7 Modelling Assessment Methodology

## 7.1 Meteorological Modelling

One of the main inputs required by dispersion model programmes is meteorological (met) information representative of the location. This information is used by the model to predict where the contaminants will be transported as they are diluted. Specific met information at the site has been recorded for approximately 6 years as 1-minute averages. Data from the NCI meteorological monitoring site has been extracted and processed as 1-hour averages to develop a meteorological dataset for dispersion modelling. In addition, met data from the NIWA-operated Wallaceville Electronic Weather Station (EWS), located 3.2 kilometres to the southwest of the site, has been used.

A windrose of data collected at the NCI site as 1-hour averages is provided as Figure 10-2.

Winds at the site are shown to be variable, with predominant winds being from the west-northwest and east-southeast. Calms occurred 1.3% of the time, and the average wind speed was 2.2 m/s over the two-year period.

### 7.1.1 TAPM

Comprehensive meteorological data suitable for use with the CALPUFF dispersion model was not available for this study area. Meteorological data was therefore developed using the prognostic model *"The Air Pollution Model"* TAPM (Version 4), which incorporated local meteorological data collected at the NCI monitoring site as well as the Wallaceville meteorological monitoring site for the years 2016 and 2017.

The TAPM model predicts all meteorological parameters for the region based on large-scale synoptic information provided by the Australian Bureau of Meteorology for the modelling period (Hurley, 2008).

Meteorological data collected at the NCI and Wallaceville meteorological monitoring sites for 2016 and 2017 were assimilated into the TAPM model to improve the correlation of the model predictions with actual surface wind measurements.

The TAPM outputs were processed by the CALTAPM utility program to format the TAPM data into a format that CALMET can use.

The inputs and settings used in the TAPM model are as follows.

**Table 7-1 TAPM v 4.0.4 Model Inputs**

| Parameter | Value |
|---|---|
| Number of grids (spacing) | 5 (30 km, 10 km, 3 km, 1 km, 0.3 km) |
| Number of grid points (x, y, z) | 25 x 25 x 25 |
| Year(s) of analysis | 2016-2017 |
| Centre of grid | Upper Hutt<br>41.12° S, 175.08° E, (339322 E, 5446805 S, UTM Zone 60S) |
| Meteorological data assimilation | Data assimilation using data from the NCI and Wallaceville EWS monitoring stations |

### 7.1.2 CALMET

CALPUFF requires complex meteorological data in order to be able to predict the potential effects associated with emissions from the proposed expansion.

This TAPM data previously discussed, together with the topographical data discussed in the following section, is pre-processed using CALMET to produce multi-dimensional hourly varying wind fields.

The parameters used in the CALMET meteorological modelling are summarised in Table 7-2.

**Table 7-2 Calmet v 6.334 Input Parameters**

| Parameter | Value |
|---|---|
| Meteorological grid size | 10 km x 10 km |
| Meteorological grid coordinates | Lower left corner: UTM 334300 m E, 5441100 m N (zone 60 south)<br>Top right corner: UTM 344300 m E, 5451100 m N (zone 60 south) |
| Meteorological grid resolution | 100 m |
| Number of grid points (x, y, z) | 101 x 101 x 11 |
| Year(s) of analysis | 2016 - 2017 |
| Centre of grid | Project Site<br>UTM 339300 m E, 5446100 m N (zone 60 south) |
| TAPM-generated meteorological data | **Surface Data**:<br>Wallaceville EWS: 335744 m E, 5443825 m N;<br>NCI EWS UTM: 339322 m E, 5446085 m N;<br><br>**Upper Air Data**:<br>Generated from TAPM/CALTAPM for the modelling domain |
| Terrain Data | LINZ Data Service – Wellington LiDAR 1m DEM |
| Land Use Data | LCDB v4.1 - Land Cover Database version 4.1, Mainland New Zealand (Updated 16 July 2015) |

### 7.1.3 Terrain

Jacobs prepared terrain and land use 1m LiDAR data obtained from the Land Information New Zealand (LINZ) site (https://data.linz.govt.nz/layer/53621-wellington-lidar-1m-dem-2013).

Land use was obtained from the Land Resource Information Systems (LRIS) portal, which provides a thematic classification of New Zealand's land cover (https://lris.scinfo.org.nz/layer/48423-lcdb-v41-land-cover-database-version-41-mainland-new-zealand/). Land use categories were converted to the equivalent categories as recognised by the CALMET model to take into account effects on meteorological parameters.

## 7.2 Dispersion Modelling Inputs

This section describes the CALPUFF dispersion model used to assess the potential environmental effects of the air discharges from the NCI site.

### 7.2.1 Background Concentrations

NCI is unaware of any ambient VOC monitoring undertaken in the area. NCI considers that there is unlikely to be an appreciable ambient VOC concentration due to the lack of a major discharge in the area.

### 7.2.2 Other Parameters

Models were run for the plant operating hours of 7 am – 11 pm, 7 days per week for 365 days. Maximum one hour predictions of VOC emissions are reported as the 99.9th percentile value in accordance with the Ministry for the Environment guidance[3]. Odour predictions are reported as 99.5%ile values as per the guidelines.

[3] Ministry for the Environment, 2004 Good *Practice Guide for Atmospheric Dispersion Modelling.* Ministry for the Environment PO Box 10-362, Wellington, New Zealand ISBN: 0-478-18941-9 ME number: 522

### 7.3 The CALPUFF Dispersion Model

For this assessment the puff model CALPUFF version 7.2.1 has been used. CALPUFF has been accepted by the United States Environmental Protection Agency (USEPA) as a guideline model to be used in all regulatory applications involving the long-range (>50km) transport of pollutants, and can also be used on a case-by-case basis in situations involving complex flow and non-steady state cases from fence-line impacts to 50 km.

CALPUFF is recommended by the Ministry for the Environment (MfE) as one of the most commonly used advanced dispersion models in New Zealand[4].

CALPUFF is a multi-layer, multi-species non-steady-state puff dispersion model, which is able to simulate the effects of time and space-varying meteorological conditions on pollutant transport. This enables the model to account for a variety of effects such as spatial variability of meteorological conditions, causality effects, dry deposition and dispersion over a variety of spatially varying land surfaces, plume fumigation, low wind-speed dispersion, pollutant transformation and wet removal.

Like all dispersion models, CALPUFF has requirements for a number of inputs in order to make it function. The inputs and settings used in the Calpuff model are summarised in Table 7-3.

**Table 7-3 Calpuff v 7.2.1 Model Inputs**

| Parameter | Setting |
|---|---|
| Plume rise | Transitional |
| Plume penetration | Partial |
| Stack downwash | Yes |
| Building downwash | Prime |
| Method of dispersion (MDISP) | Dispersion coefficients calculated using micrometeorological variables |
| Probability Density Function (MPDF) | PDF used for dispersion under convective conditions |

### 7.4 Specific Model Inputs

There have been modifications made to the four stacks and the new stack parameters used in the model are presented in Table 7-4

**Table 7-4 Modelled Stack Parameters**

| Stack / Parameter | L2 Main Stack | L2 Internal lacquer and Assembly Stack |
|---|---|---|
| **Stack Height (m)** | 25 | 25 |
| **Stack Temp (°C)** | 91 | 34 |
| **Stack Diameter at sample point (m)** | 0.45 | 0.45 |
| **Stack Diameter at exit (m)** | 0.325 | 0.325 |
| **Stack Velocity at sample point (m/s)** | 7.4 | 7.8 |
| **Stack Velocity at exit (m/s)** | 14.2 | 14.9 |

### 7.5 Modelled Emissions

As only two samples were taken during the stack monitoring the maximum result has been modelled. In addition individual aromatic compounds have been modelled as total aromatic compounds. Similarly individual hydrocarbons have been modelled as total hydrocarbons. Alcohols were modelled separately.

4 Ministry for the Environment, Good Practice Guide for Atmospheric Dispersion Modelling, 2004

The in-stack concentrations of the compounds shown in Table 7-5 are less than the ambient standards without dilution therefore no modelling is required. Emission rates for all other contaminants as modelled are provided in Table 7-6.

**Table 7-5 Low Concentration Emissions not Modelled**

| Compound | Stack Concentration, µg/m$^3$ | 1 hr Ambient Standard, µg/m$^3$ |
|---|---|---|
| Phenol | 3,439 | 5,800 |
| 1,1,2,2-Tetrachloroethane | 6.5 | 70 |
| 1,4-Dichlorobenzene | 7.6 | 900 |
| Styrene | 36.2 | 21,000 |

**Table 7-6 Modelled Emission Rates**

| Contaminant discharge rate | Line 2 Main (g/hr) | Internal/ Assembly (g/hr) |
|---|---:|---:|
| **VOC Suite** | | |
| Toluene | 0.4 | 0.8 |
| Ethylbenzene | 78.2 | 92.7 |
| Total Xylene | 53.9 | 57.8 |
| Naphthalene | 14 | 1.6 |
| **Aromatics** | | |
| Aromatic solvent naphtha, heavy | 174.3 | 38.8 |
| **Hydrocarbons** | | |
| (C4-C12 alkane hydrocarbons inc distillates (petroleum), hydrotreated light) | 1379 | 474.7 |
| **Esters and Alcohols** | | |
| Pentanedioic acid, dimethyl ester (dimethyl glutarate) | 17.7 | - |
| Hexanedioic acid, dimethyl ester | 10.9 | - |
| Butanone oxime | 7.8 | - |
| 2-Butoxyethanol | 10.6 | 170.5 |
| n-Butanol | 143.9 | 101.0 |
| Isobutyl alcohol | 28.9 | - |
| 1-Methoxy-2-propanol | 38.8 | 37.7 |
| Propylene glycol methyl ether acetate (PGMEA) or 1-Methoxy-2-propyl acetate | - | 176.4 |
| **Others** | | |
| Formaldehyde | 8.3 | 1.3 |
| **Odour, OU/s** | 4,152 | 5,524 |

## 8 Modelling Assessment

The predicted 99.9%ile 1 hour average and maximum predicted annual average concentrations of the VOCs are presented in Table 8-1. All of the results are very much less than the air quality criteria and are considered to be less than minor.

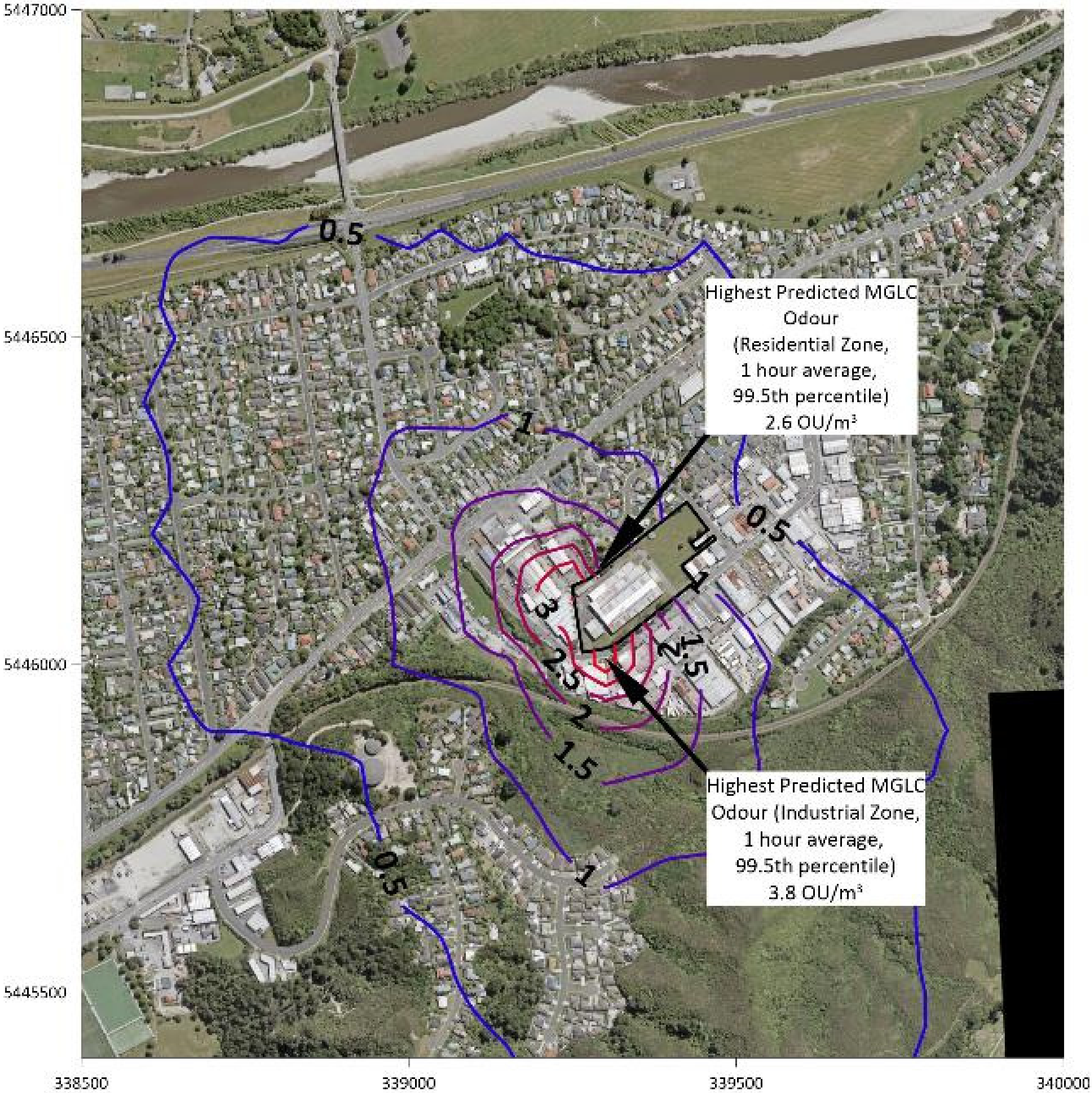
Predicted 99.5%ile 1 hour average odour concentrations are also presented in Table 8-1. The highest predicted concentrations of odour are presented for both the industrial and residential zoning for comparison against the relevant MfE guideline values. The highest predicted MGLCs for odour are well within the MfE guideline of 10 OU/m$^3$ for industrial areas. The MfE guideline for residential property is exceeded to the north of the NCI site, specifically at the Mountbatten Grove cul-de-sac. The area of exceedance is relatively small however and is restricted to an area of around 10 metres beyond the boundary to the residential zone. An isopleth diagram of the odour modelling results is provided as Figure 8-1 below, with the highest predicted MGLCs in the industrial and residential areas indicated.

**Table 8-1 Maximum Predicted Off-Site VOC Concentrations**

| VOC | Max off-site concentration, µg/m$^3$ | Assessment % of guideline | Air Quality Criteria, µg/m$^3$ | Averaging Period |
|---|---|---|---|---|
| **VOC Suite** | | | | |
| Toluene | 0.2 | 0.006% | 37,000 | 1 hr |
| | 0.01 | 0.004% | 300 | Annual |
| Ethylbenzene | 24.4 | 0.09% | 26,000 | 1 hr |
| | 1.6 | 0.08% | 2,000 | Annual |
| Total Xylene | 15.4 | 0.07% | 22,000 | 1 hr |
| | 1.0 | 0.15% | 700 | Annual |
| Naphthalene | 1.9 | 0.4% | 440 | 1 hr |
| | 0.1 | 1.4% | 9 | Annual |
| **Aromatics** | | | | |
| Aromatic solvent naphtha, heavy | 31.8 | 1.2% | 2,560 | 1 hr |
| | 1.7 | 0.7% | 256 | Annual |
| **Hydrocarbons** | | | | |
| C4-C12 alkane hydrocarbons inc distillates (petroleum), hydrotreated light | 212 | 6.0% | 3,500 | 1 hr |
| | 16.8 | 4.8% | 350 | Annual |
| **Esters and Alcohols** | | | | |
| Pentanedioic acid, dimethyl ester (dimethyl glutarate) | 2.3 | 2.3% | 100 | 1 hr |
| | 0.16 | 1.6% | 10 | Annual |
| Hexanedioic acid, dimethyl ester | 1.4 | 0.03% | 4,300 | 1 hr |
| | 0.1 | 0.02% | 430 | Annual |
| Butanone oxime | 1.0 | 0.3% | 360 | 1 hr |
| | 0.1 | 0.2% | 36 | Annual |
| 2-Butoxyethanol | 41 | 0.9% | 4,700 | 1 hr |
| | 2.2 | 2.7% | 82 | Annual |
| n-Butanol | 31 | 5.0% | 610 | 1 hr |
| | 2.2 | 3.6% | 61 | Annual |

| VOC | Max off-site concentration, µg/m$^3$ | Assessment % of guideline | Air Quality Criteria, µg/m$^3$ | Averaging Period |
|---|---|---|---|---|
| Isobutyl alcohol | 3.7 | 0.2% | 1,500 | 1 hr |
| | 0.3 | 0.2% | 150 | Annual |
| 1-Methoxy-2-propanol | 10.6 | 0.3% | 3,700 | 1 hr |
| | 0.07 | 0.01% | 7,000 | Annual |
| Propylene glycol methyl ether acetate or 1-Methoxy-2-propyl acetate (PGMEA) | 43 | 1.6% | 2,700 | 1 hr |
| | 2.3 | 0.8% | 270 | Annual |
| **Others** | | | | |
| Formaldehyde | 1.2 | 1.2% | 100 | 30 min |
| **Odour** | 2.6<br>3.8 | 130%<br>38% | 2 OU Residential<br>10 OU Industrial | 1 hr<br>1 hr |

**Figure 8-1 Highest Predicted MGLCs of Odour, 1-hour average (99.5th percentile)**




As stated the dispersion model predictions for individual compounds are well below the relevant ambient air criteria used in this assessment. For the purpose of illustrating the dispersion patterns of these compounds, isopleth diagrams are provided as Figures 8-2 and 8-3 below for total petroleum hydrocarbons (TPH) as 1-hour and annual averages. The highest concentrations are predicted to occur in the industrial area to the south of the NCI site, and to rapidly decrease with distance from the site boundary. Concentrations in the residential area are significantly less.

**Figure 8-2** **Highest Predicted MGLCs of Total Petroleum Hydrocarbons (TPH), 1-hour Average, 99.9th percentile (µg/m³)**

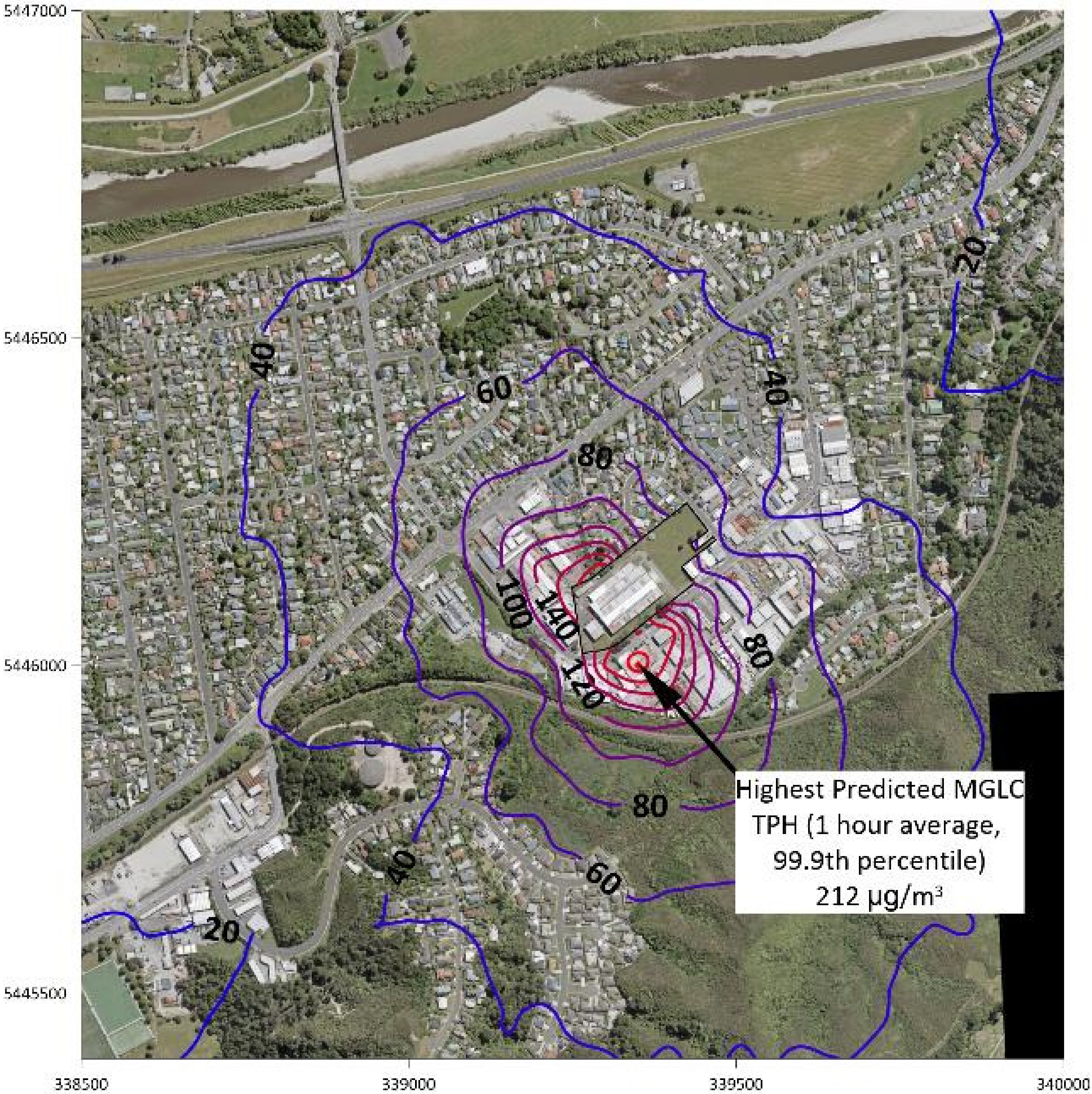
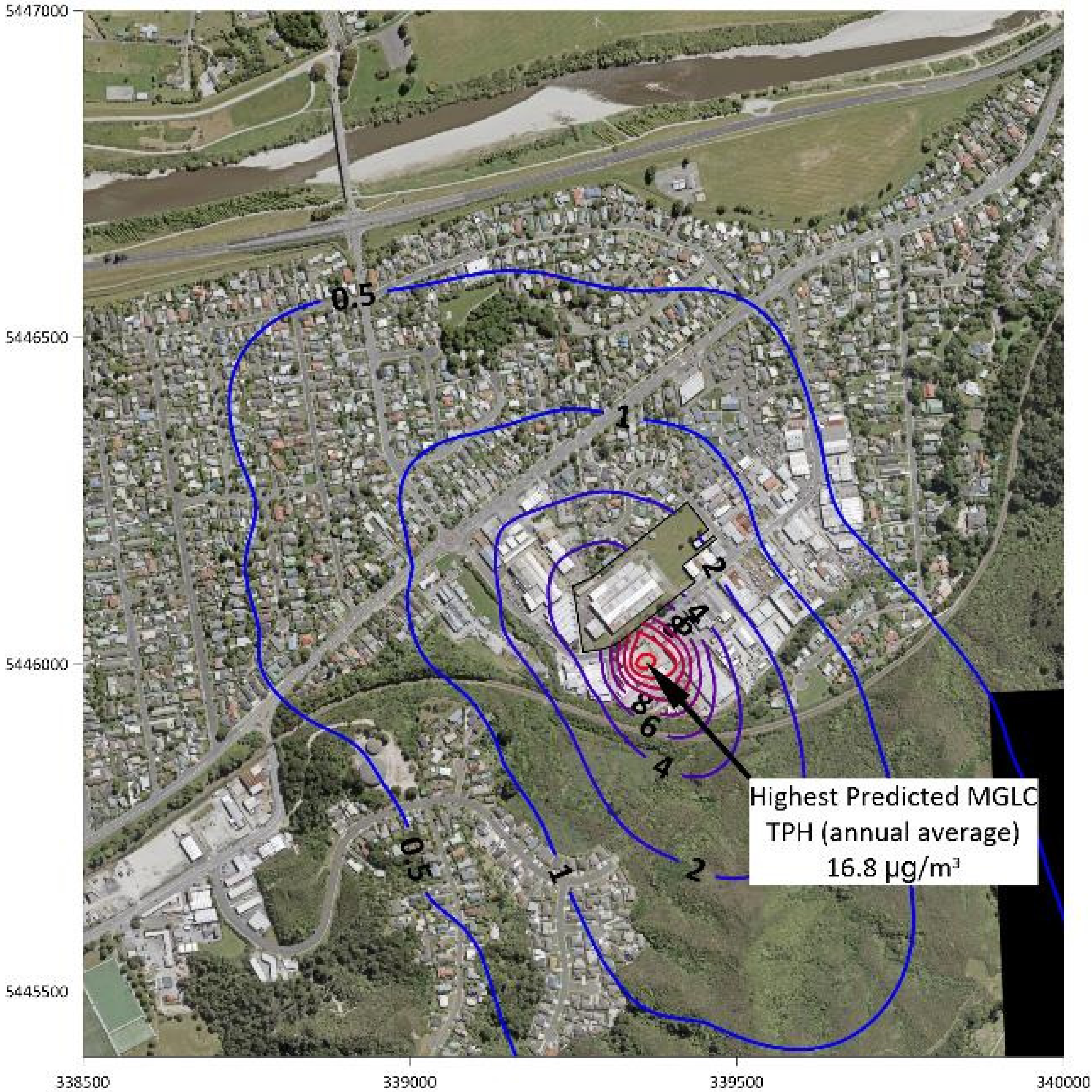


**Figure 8-3** **Highest Predicted MGLCs of Total Petroleum Hydrocarbons (TPH), Annual Average (µg/m³)**



# 9 Fugitive Emissions

Although the majority of VOC are captured through process ventilation and dispersed at around 25 m above ground level there is a low concentration of VOC inside the factory. During the warmer periods of the year some doors or windows may be open for ventilation. An ambient monitoring exercise has been undertaken at the site around machinery that uses materials with a VOC content mainly for hazardous substance compliance related to flammability but the survey does provide VOC concentration data.

To assess the concentration of VOC around equipment using flammable materials a MiniRae 3000 photoionisation detector (PID) was used for the detection of volatile organic compounds using a 10.6 eV lamp. The detection process uses high energy ultraviolet light to break apart VOC and the electrical current that results from this process is proportional to the amount of VOC in the air. The unit was calibrated against isobutene (2-methyl propene) although it responds to a wide range of compounds.

If a solvent mixture is detected, then the resultant concentration is an average response to the compound mix, as the PID sensor has a different response level for different chemicals. For example, acetone has a response factor of 1.1 and isopropyl alcohol has a response factor of 6.0. Therefore, if the PID reads 10 ppm and you know the material being sampled is acetone, the real concentration would be 11 ppm, or in the case of isopropyl alcohol the real reading would be 60 ppm.

## 9.1 Monitoring around the Tinplate Lines

### 9.1.1 Side Stripe Resin

An acrylic/epoxy heat set resin is sprayed onto the outside of Cans where the weld of the body is made. The side stripe resin used in assembly lines 1 & 2 is Akzo Nobel 6102541 which contains several solvents as follows.

**Table 9-1 Akzo 6102541 Resin Composition**

| Compound | Composition, % | Correction Factor | LEL, ppm | TWA (STEL) ppm |
|---|---|---|---|---|
| 2 butoxyethanol | 25 – 35 | 1.2 | 11,000 | 25 |
| Aromatic hydrocarbon | 15 – 25 | Not Listed | 11,000 Naphtha | 100 (white spirits) |
| 1-methoxy-2-acetoxypropane | 5 – 15 | 1.0 | ND | ND |
| Solvent naphtha, light aromatic | 5 – 15 | Not Listed | 11,000 Naphtha | 100 (white spirits) |
| Cyclohexanone | 1 – 5 | 0.9 | 10,000 | 25 |
| Xylene | 1 – 5 | 0.44 | 10,000 | 50 |
| Ethyl benzene | 0 – 1 | 0.52 | 10,000 | 100 (125) |

For the higher proportion contents of the resin formulation the response factors are near 1, although xylene and ethyl benzene are part of the aromatic hydrocarbons which have a lower response and therefore the readings on the meter are likely to be conservative. The lower explosion limit (LEL) and workplace time weighted average concentration (TWA) and short term exposure limit (STEL) are presented for the chemicals that data is available. Note "ND" means no data. The LEL is taken to be 11,000 ppm.

### 9.1.2 Assembly Line 2 Monitoring Results

There are two potential flammable vapour sources on Lines 1 & 2, the sidestripe sprayer and the epoxy resin pail. As the same processes are undertaken on both Lines, measurements from Line 2 can be applied to Line 1. Line 1 was not operating on the day that monitoring was undertaken. The system has been set up so if the internal lacquer or the assembly machines are started, then the main fan extracting both lines will start automatically i.e. its interlocked and staff are not relied on to activate the fan.

The location of potential ignition sources and VOC measurement values, ppm (in pink) are presented in Table 9-2 and Figures 9-1 and 9-2.

**Figure 9-1 Tinplate Assembly Line 2 Monitoring Results**

**Figure 9-2 Tinplate Assembly Line 2 Monitoring Results Cont.**


**Table 9-2 Tin plate Assembly Line 2 Monitoring Results**

| No | Description | VOC, ppm | LEL, % of | No | Description | VOC, ppm | LEL, % of |
|---|---|---|---|---|---|---|---|
| A | Weld Rollers | 2.5 | 0.023 | B | Control panel | 4.2 | 0.038 |
| C | Feed motors | 4.4 | 0.040 | D | Overhead light | 3.6 | 0.033 |
| E | Above lacquer spray | 2.5 | 0.023 | F | Above lacquer drain | 13 | 0.12 |
| G | Between lacquer spray and oven | 160 | 1.45 | H | Oven entrance | 205 | 1.9 |
| i | Oven conveyor switch | 4.1 | 0.037 | J | Oven control panel | 4.0 | 0.036 |
| K | Lacquer Extraction exhaust | 60 | 0.54 | L | Switch on opposite side of the conveyor | 3.9 | 0.035 |
| M | Flanger Control panel | 10 | 0.09 | O | Spare lacquer drums | 3.4 | 0.031 |

The concentration near the electrical socket at the end of the oven conveyor was 5.6 ppm (0.051% LEL).

The majority of the monitoring results are below 0.1% of the LEL and below the TWA of 100 ppm. The highest reading was at the entrance of the oven at about 1.9% of the LEL.

## 9.2 Ink jet Coder

The concentration of solvent (presumably methyl ethyl ketone – MEK) at the code marker on the flanger was around 27 ppm. The LEL for MEK is 14,000 ppm therefore the concentration recorded just above the can was 0.2% of the LEL.

### 9.3 AAe Internal Lacquer Application

The first coating process for the aluminium aerosol can is internal lacquer. On the day of testing an epoxy coating was used. Twin spray nozzles are introduced into the can while it rotates. The solvent and any overspray is extracted through a filter and then discharged via the Internal Lacquer/Assembly stack.

#### 9.3.1 Coating Composition

The coating running on Coating Line 1 during monitoring was PPG 7407-310A. The composition of this coating is presented in Table 9-3.

**Table 9-3 PPG 7407-310A Coating Composition**

| Compound | Composition, % | Correction Factor | LEL, ppm | TWA (STEL), ppm |
|---|---|---|---|---|
| 2 methoxy 1 methyl ethyl acetate PGMEA | 30 – 60 | 1.0 | 13,000 | ND (100 (150) for similar compound). |
| 4-Methyl-4-hydroxy-2-pentanone (diacetone alcohol) | 10 – 30 | 0.7 | 18,000 | 50 |
| n-Butanol | 1 – 10 | 4.7 | 14,000 | (50) |
| Ethyl benzene | 1 – 10 | 0.52 | 10,000 | 100 (125) |
| Xylene | 1 – 10 | 0.44 | 10,000 | 50 |
| 1 methoxy 2 propanol | 1 – 10 | 1.5 | 14,800 | 100 (150) |
| Dimethyl glutarate | 1 – 10 | ND | 9,000 | ND |
| Formaldehyde | <1 | ND | 70,000 | 0.5 |
| Phenol | <1 | 1 | 17,000 | 5 |

A weighted correction factor for the monitoring of PPG 7407-310A has been conservatively taken as 1, as the correction factors for the main constituents are near or below 1. The weighted LEL has been taken as being 13,000 ppm.

#### 9.3.2 Internal Lacquer AAe Monitoring Results

The results of monitoring undertaken around the internal lacquer section of the AAe Line are presented in Figures 9-3 and 9-4 and Table 9-4.

**Figure 9-3 AAe Internal Lacquer Monitoring Results**

**Figure 9-4 AAe Internal Lacquer Monitoring Results cont.**


**Table 9-4 AAe Internal Lacquer Monitoring Results**

| No | Description | VOC, ppm | LEL, % of | No | Description | VOC, ppm | LEL, % of |
|---|---|---|---|---|---|---|---|
| A | Belt Drive motor | 3.6 | 0.028 | B | Drive motor | 4.2 | 0.032 |
| C | Interlock switch | 5.2 | 0.040 | D | Electrical socket | 3.6 | 0.028 |
| E | Electrical socket | 3.8 | 0.029 | F | Tray of MEK | 27 | 0.20 |
| G | Control panel | 5.6 | 0.043 | H | Can conveyor | 15 | 0.12 |
| i | Switch | 4.5 | 0.035 | | | | |

The highest VOC concentration near electrical equipment on or around the internal lacquer sprayer is only 0.2% of the LEL. This concentration is very much less than the TWA for this coating.

## 9.4 AAe Basecoat Application

The second coating process undertaken on the aerosol can is application of a white basecoat and curing the coating via an electric oven. This is roller coated.

### 9.4.1 Basecoat Composition

The white basecoat running during the monitoring was PPG 3046-006B. The composition of this coating is presented in Table 9-5.

**Table 9-5 PPG 3046-006B Coating Composition**

| Compound | Composition, % | Correction Factor | LEL, ppm | TWA (STEL), ppm |
|---|---|---|---|---|
| Heavy Aromatic Naphtha | 10 – 30 | 0.97 | 11,000 (naphtha) | 400 (Rubber Solvent) |
| 2 methoxy 1 methyl ethyl acetate, PGMEA | 0 – 10 | 1.0 | 13,000 | ND (100 (150) for similar compound). |
| Xylene | 0 – 10 | 0.44 | 10,000 | 50 |
| Ethyl benzene | 0 – 10 | 0.52 | 10,000 | 100 (125) |
| Dimethyl glutarate | 0 – 10 | ND | 9,000 | ND |
| Dimethyl adipate | 0 – 10 | ND | ND | ND |
| Dimethyl sucinate | 0 – 10 | ND | ND | ND |
| 2-(2-butoxyethoxy) ethanol | 0 – 10 | 4.6 | 8,500 | ND |
| Isobutanol | 0 – 10 | 3.8 | 12,000 | 50 |

A weighted correction factor for the monitoring of PPG 3046-006B has been conservatively taken as 1, as the correction factors for the main constituents are near or below 1. The weighted LEL has been taken as being 10,000 ppm.

### 9.4.2 AAe Basecoat Coating Monitoring Results

The results of monitoring undertaken on AAe Basecoat coater are presented in Figures 9-5 and 9-6 and Table 9-6.

**Figure 9-5 Basecoat Monitoring Results**

**Figure 9-6 Basecoat Monitoring Results cont**

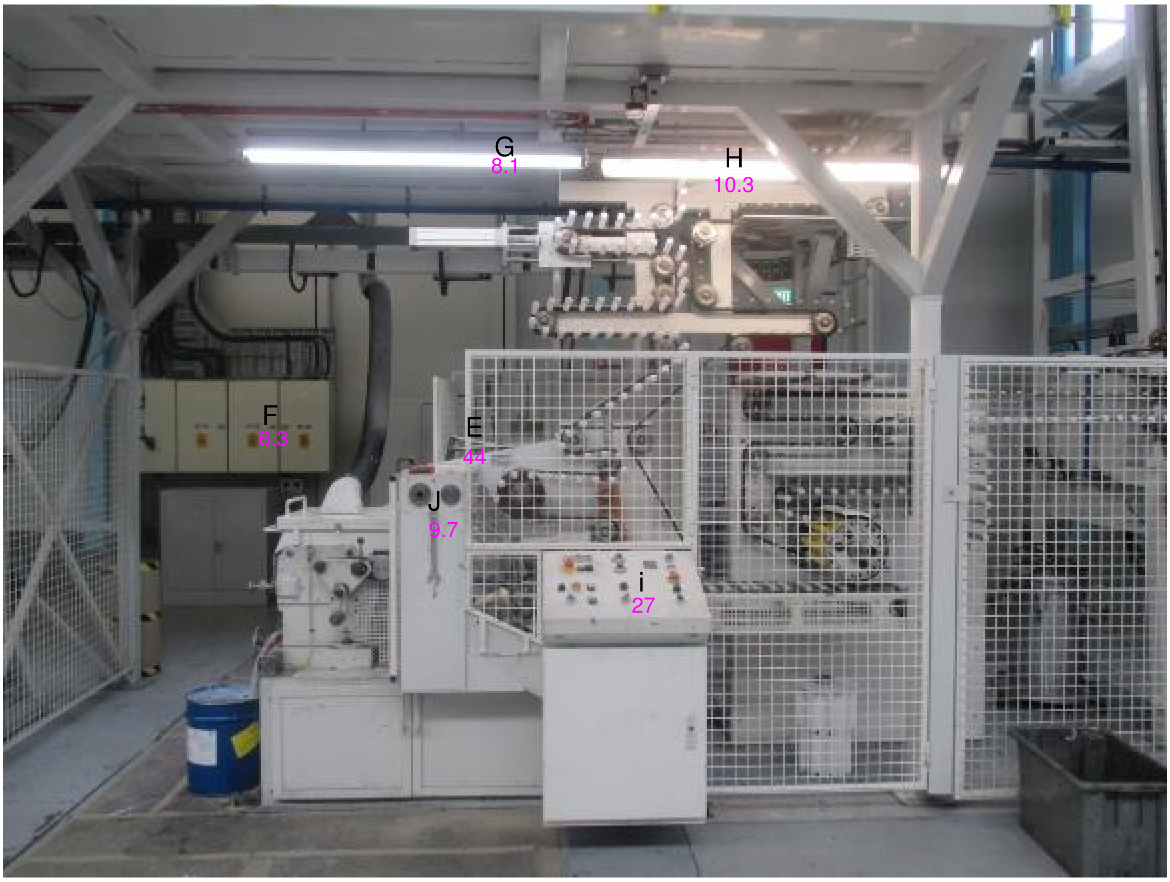



**Table 9-6 Basecoat Monitoring Results**

| No | Description | VOC, ppm | LEL, % of | No | Description | VOC, ppm | LEL, % of |
|---|---|---|---|---|---|---|---|
| A | Switchboard | 11.7 | 0.12 | B | Controller | 14.5 | 0.15 |
| C | Drive motor | 7.9 | 0.08 | D | Extraction | 26 | 0.26 |
| E | Above coated Cans | 44 | 0.44 | F | Switchboard | 6.3 | 0.06 |
| G | Lights | 8.1 | 0.08 | H | Lights | 10.3 | 0.10 |
| i | Control panel | 27 | 0.27 | J | Guarding interlock | 9.7 | 0.10 |

The highest VOC concentration near electrical equipment was 0.44% of the LEL just above the freshly coated Cans.

All of the readings around the basecoat coater were below the TWA.

## 9.5 AAe Printing

The third process involves Printing using a multicolour station and curing the print via an electric oven.

### 9.5.1 Printing Ink Composition

The printing ink is classed as combustible and therefore does not contain volatile solvents. The printing process also does not require alcohol water mixtures in the printing processes. The composition of the ink has conservatively been taken to be Light Aromatic Naphtha as the hazardous substances listed in the safety data sheet for ink 2,6-di-tert-butyl-p-cresol and 2-tert-butylhydroquinone do not have correction factors for the PID monitor.

**Table 9-7 Conservative Ink Monitoring factors**

| Compound | Composition, % | Correction Factor | LEL, ppm | TWA (STEL) ppm |
|---|---|---|---|---|
| Solvent naphtha, light aromatic | 0 – 10 | 0.97 | 11,000 Naphtha | 100 (white spirits) |

The correction factor for has been taken to be 1 and the LEL is taken to be 11,000 ppm.

### 9.5.2 AAe Printing Monitoring Results

The results of monitoring undertaken on the Printing station are presented in Figures 9-7 and 9-8 and Table 9-8.

**Figure 9-7 Printing L2 AAe Monitoring Results**

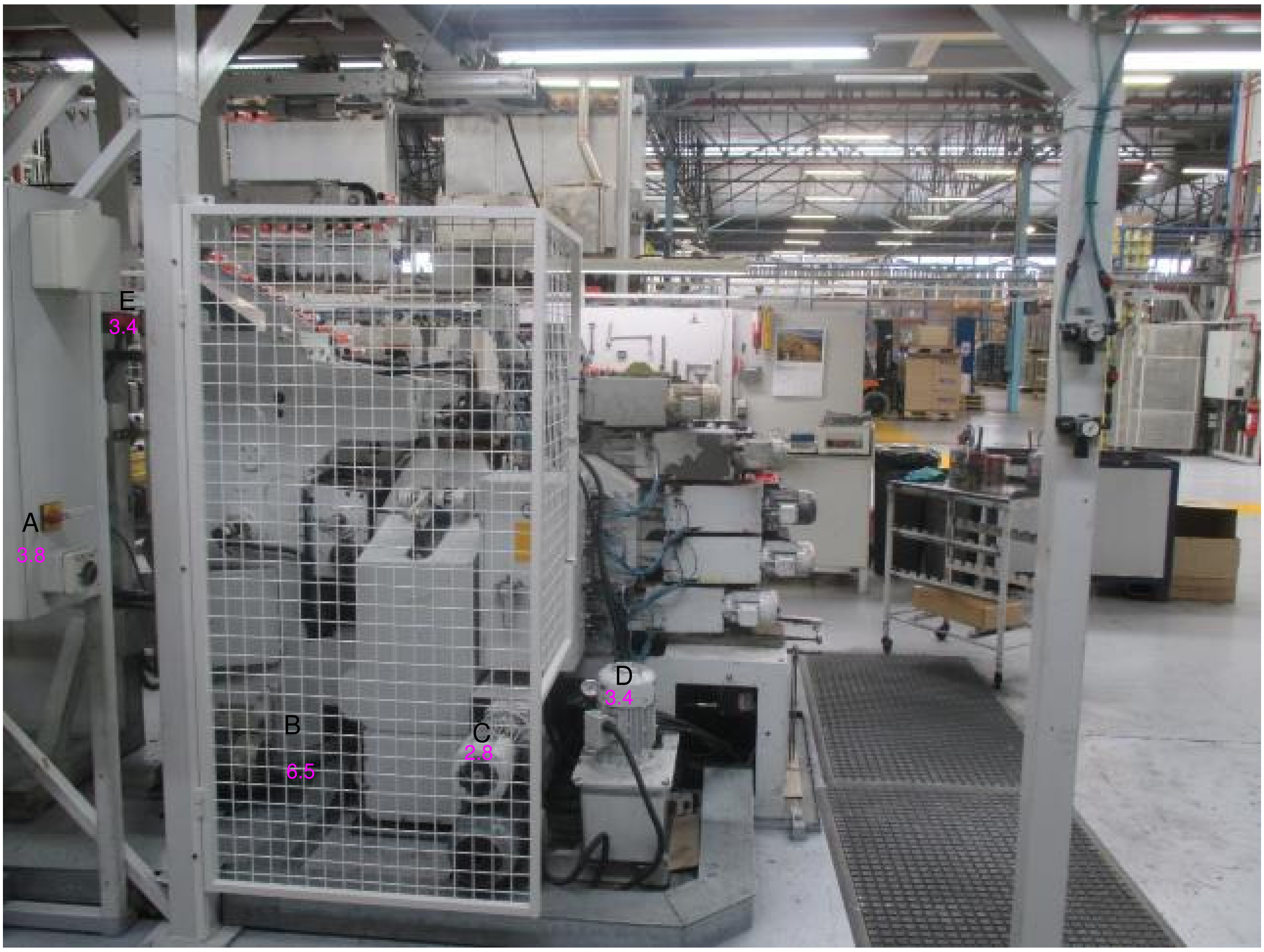


**Figure 9-8 Printing L2 AAe Monitoring Results Cont**

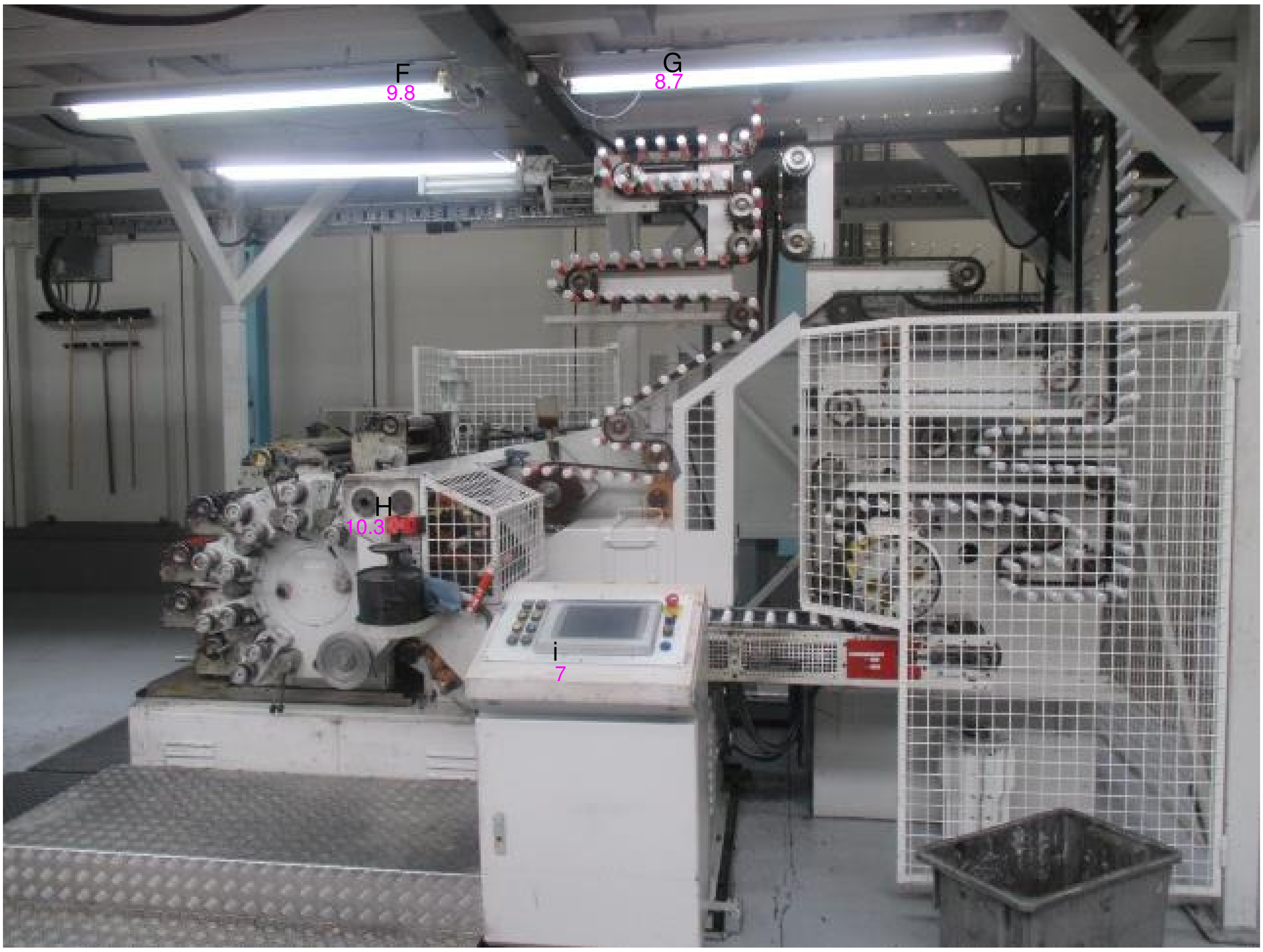



**Table 9-8 Printing Monitoring Results**

| No | Description | VOC, ppm | LEL, % of | No | Description | VOC, ppm | LEL, % of |
|---|---|---|---|---|---|---|---|
| A | Switchboard | 3.8 | 0.035 | B | Drive motor | 6.5 | 0.06 |
| C | Drive motor | 2.8 | 0.025 | D | Drive motor | 3.4 | 0.031 |
| E | Controller | 3.4 | 0.031 | F | Lights | 9.8 | 0.089 |
| G | Lights | 8.7 | 0.079 | H | Solvent pot | 10.3 | 0.094 |
| i | Control panel | 7 | 0.063 | | | | |

The highest VOC concentration recorded was just above the print solution tray which was ~0.1% of the LEL. All results are less than the TWA.

### 9.6 AAe External Varnish Application Results

The final coating process is roller application of a clear varnish PPG 3603-801A.

#### 9.6.1 External Varnish Composition

The composition of this coating is presented in Table 9-9.

**Table 9-9 PPG 3603-801A Coating Composition**

| Compound | Composition, % | Correction Factor | LEL, ppm | TWA (STEL), ppm |
|---|---|---|---|---|
| Heavy Aromatic Naphtha | 25 – 50 | 0.97 | 11,000 (naphtha) | 400 (Rubber Solvent) |
| n-Butanol | 3 – 5 | 4.7 | 14,000 | (50) |
| Naphthalene | 2 – 3 | 0.42 | 9,000 | 10 (15) |
| 1,2,4-trimethyl benzene | 1 – 2 | ~0.35 | 9,000 | 25 |
| Formaldehyde | 0.1 – 0.2 | ND | 70,000 | 0.5 |

A weighted correction factor for the monitoring of PPG 3603-801A has been conservatively taken as 1, as the correction factors for the main constituents are near or below 1. The weighted LEL has been taken as being 11,000 ppm.

### 9.6.2 AAe External Varnish Monitoring Results

The results of monitoring undertaken on Printing Line 6 are presented in Figures 9-9 and 9-10 and Table 9-10.

**Figure 9-9 External Varnish Monitoring Results**

**Figure 9-10 External Varnish Monitoring Results cont**

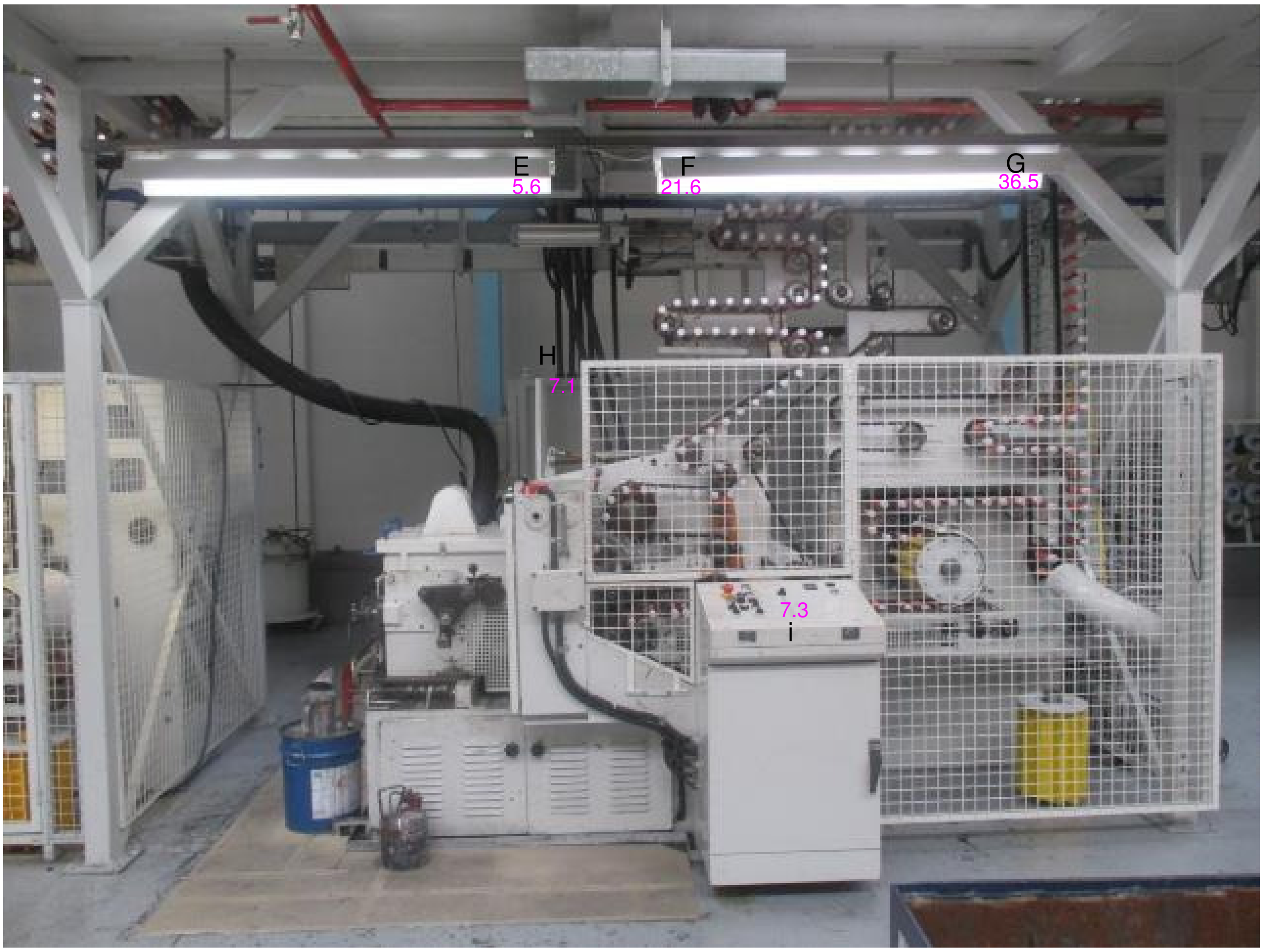



**Table 9-10 AAe External Varnish Monitoring Results**

| No | Description | VOC, ppm | LEL, % of | No | Description | VOC, ppm | LEL, % of |
|---|---|---|---|---|---|---|---|
| A | Swtichboard | 4.9 | 0.044 | B | Swtichboard | 7.2 | 0.065 |
| C | Controller | 5.2 | 0.047 | D | Electric motor | 4.9 | 0.044 |
| E | Light | 5.6 | 0.051 | F | Light | 21.6 | 0.20 |
| G | Light | 36.5 | 0.33 | H | Near coater | 7.1 | 0.065 |
| i | Control panel | 7.3 | 0.066 | | | | |

The highest VOC concentration recorded was near the fluorescent light where the cans enter the oven which was 0.33% of the LEL. The results were below the TWA and STEL.

## 9.7 Conclusion

The ambient VOC concentration within the whole building will be less than the specific measurements around the equipment (which are already low) due to dilution through the building volume.

# 10 Meteorology and Odour Complaints

## 10.1 Meteorology

NCI operates a 10 m meteorological monitoring mast in the field beside the main plant building which collects wind direction and velocity data from an ultrasonic anemometer on a 1 minute average basis. The data is collected by "Harvest" and viewable via an internet site.

**Figure 10-1 Meteorological Mast Location**


The frequency of different wind directions at the site are presented in the windrose for 2016 & 2017 which represent the direction the wind comes from, see Figure 10-2.

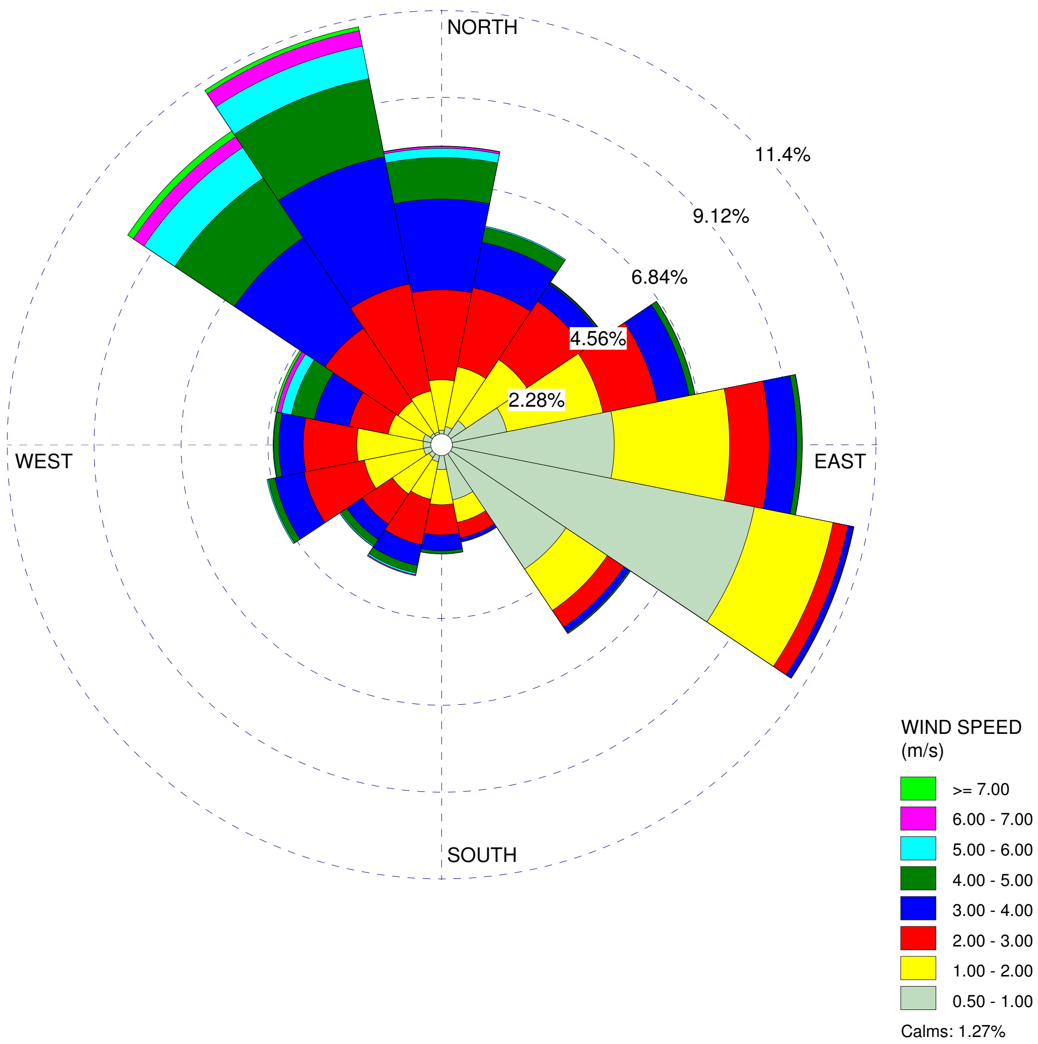
## Figure 10-2 Windrose 2016 - 2017

WIND ROSE PLOT:

**NCI Windrose 2016-2017**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**




COMMENTS:

DATA PERIOD:

**Start Date: 1/01/2016 - 00:00**
**End Date: 31/12/2017 - 23:00**

COMPANY NAME:

**Jacobs New Zealand Ltd**

MODELER:

**Chris Bender**

CALM WINDS:

**1.27%**

TOTAL COUNT:

**17540 hrs.**

AVG. WIND SPEED:

**2.15 m/s**

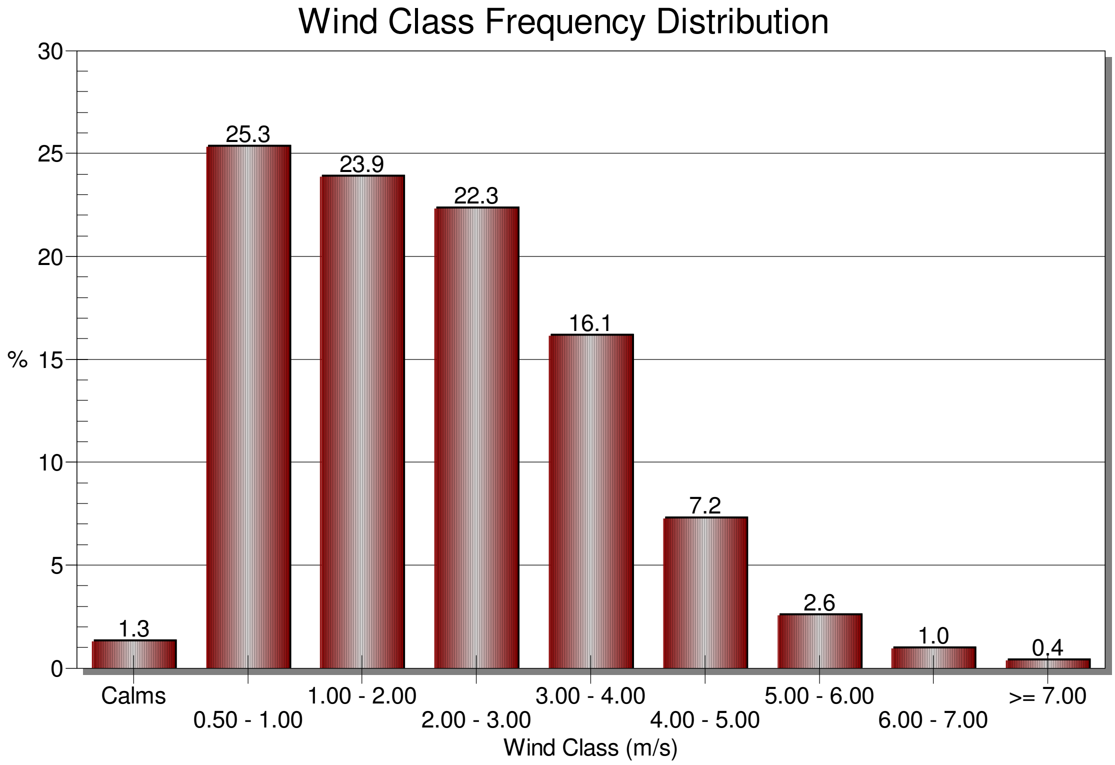
DATE:

**26/11/2018**

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

**Figure 10-3 Wind Frequency**




### 10.2 Complaints

The land-use to the northwest of the site along Mountbatten Grove is more sensitive being residential. Two residences at the lower end of Mountbatten Grove have detected odour at their site on occasion which they consider to be from NCI. Wind directions between 150º and 200º cover directions that would potentially line up NCI with Mountbatten Grove, see Figure 10-4. There are however other sources of solvents in the area such as Wedgelock who spray paint heavy machinery and Resene who manufacture industrial and automotive paints.

There were only two odour complaints during 2018

| | | |
|---|---|---|
| 40 Mountbatten Grove, Ann Devlin | 9/02/2018 | Strong odour at 4:44 PM for about 15 mins |
| Mountbatten Grove, Trevor | 1/11/2018 | Odour reported at 10:42 PM |

The wind data from the NCI anemometer has been reviewed for 2018, as presented in Table 10-1, to select only dates that the plant could potentially be operating i.e. not weekends or public holidays. The wind data has been further filtered to show data for times where the plant could be operating 7am – 11 pm although the plant mainly operates to 6:30 pm now. As discussed above only wind directions have been selected between 150º and 200º.

There was a total of 404 hours throughout the year that air emissions from NCI could reach Mountbatten Grove. Compliant details are typically of a short term 10 – 15 min odour whereas there is over 1,000 minutes every month that emissions are in the direction of Mountbatten Grove. NCI has visited Mountbatten on many occasions and not detected a strong odour ever and typically there is either no odour or it is very weak. Using the FIDOL[5] odour assessment, regardless of where the alleged odour comes from, the frequency, duration and intensity are all low and therefore the odour is not offensive.

[5] FIDOL = an odour assessment criteria related to the frequency, intensity, duration, offensiveness and location.

**Figure 10-4 Local Wind Directions**


**Table 10-1 Amount of Time the Wind was Blowing Towards Mountbatten Grove and NCI Could be Operating**

| Month (2018) | Minutes | Hours |
|---|---:|---:|
| January | 1,693 | 28.2 |
| February | 1,485 | 24.8 |
| March | 2,888 | 48.1 |
| April | 1,006 | 16.8 |
| May | 1,006 | 16.8 |
| June | 2,610 | 43.5 |
| July | 1,822 | 30.4 |
| August | 2,467 | 41.1 |
| September | 3,701 | 61.7 |
| October | 1,493 | 24.9 |
| November | 2,151 | 35.9 |
| December | 1,901 | 31.7 |
| Total | 24,223 | 403.7 |

# 11 Mitigation Methods and Alternatives

Air discharge controls have been discussed throughout this report, this section discusses them in more detail including their operation, and actions used to ensure they provide consistent control. In addition, this section discusses alternatives as required in the Fourth Schedule and Section 105 of the RMA.

## 11.1 Site

The site is established and therefore there are limited alternatives to the processes on site. The location is fixed as the company has significant capital investment in the site so there are no alternatives to the use of this site.

## 11.2 Energy Alternatives

Natural gas is used as fuel for space heating, in the sidestripe curing oven and a couple of heaters in the aluminium aerosol plant and is a clean burning fuel so any alternative fuel source would produce higher emissions. Most of the ovens in the aluminium aerosol plant use electricity for heating.

## 11.3 Emissions Control

The main mitigation method for air discharges is the use of adequate collection and dispersion of air discharges. After the issue of the current air discharge permit a full review of potential control options was undertaken.

The options identified for the site to reduce odour are listed below. The feasibility of their implementation is discussed in the following sections.

- Production rate changes
- Chemical formulation changes
- Chemical application rate changes
- UV-ozone Treatment
- Incineration/afterburner
- Carbon filtration
- Further stack height increases
- Off-site odour investigations
- Turning off the Line

### 11.3.1 Production Condition Adjustments

The first three options listed above are related. The amount of discharge from any particular stack is related to the rate at which cans are produced (and therefore how often coating is applied), the type of coatings applied (more or less volatile) and the amount of coating applied per can. An analysis of the type of chemical being applied and the production rate was made following the issue of the current permit to compare the times when there have been complaints. No correlations were found for a specific can production rate. Line 1 is no longer used so the emissions have essentially halved.

On some cans an internal lacquer isn't required, as the can is used to stored compressed gas. Internal lacquer is still required for the coating and Can transfer equipment to work effectively however only half of the usual amount is applied. Although again there appears to be no correlation of this reduction with complaint times, this reduction in internal lacquer application is used wherever the product allows, to minimise emissions.

The type of coatings applied are set by the end user of the cans. Substitutes e.g. waterbased coatings are starting to come into the market however NCI would need to undertake an extensive testing programme as well as the end user for them to be implemented completely.

### 11.3.2 Air Discharge Control Technology

A number of air discharge control options have been considered. During the monitoring of the discharges for the original application, a UV-ozone unit was trialled which didn't appear to reduce the emissions noticeably. If there was a much longer residence time i.e. the unit was in a large chamber the effect may have been better however further trials weren't considered to be warranted.

Incineration is used in the much larger NCI Auckland coating plant to treat VOC discharges. However, a review of the level of discharge at the Upper Hutt site, the capital cost of installing a unit and the high running cost (burning fuel to maintain temperature) concluded this option is unfeasible.

Carbon filtration is another possible treatment option however it similarly has a high capital cost as the adsorbent beds need to be large enough to have a suitable residence time to provide treatment. In addition the carbon adsorbent has a finite capacity for VOC adsorption and therefore needs to be replaced from time to time which is an additional cost.

Overall the concentration/discharge rate of VOC is not particularly high (in the order of 2 kg/hr from the main stack and 1.2 kg/hr from the internal lacquer/assembly stack) and the large investment required to treat this level of emission is not warranted.

### 11.3.3 Further Stack Height Increases

A potential option is to increase the stack heights further to increase dispersion further. A good level of improvement has been noted in the community from the height increases undertaken after the issue of the current discharge permit. Increasing the height further may start to have impacts on the more distant neighbours on the hill side where currently there are no impacts and therefore this option may in fact make the situation worse. The increases are not likely to markedly improve the concentrations near the plant (where all of the complaints have come from). In addition the wind direction monitoring near the site has shown that many of the complaints have related to other wind directions and are potentially from other sources such Wedgelock and Resene.

## 11.4 Ambient Odour Investigations

Two staff have been trained in ambient odour assessment, one for each operating shift. Some random downwind assessments have been undertaken since the granting of the permit and some complaint follow-up has also been undertaken. The time delay between reporting any specific event has often meant that verification of the level of odour in the area could not be made. NCI staff have not detected strong odours in the area, with the maximum odour level generally weak and it is intermittent.

### 11.4.1 Turning off the line

As a last resort NCI can shut down the production line to stop discharges, however this does not have an immediate effect. There are cans in each part of the manufacturing process at the same time, therefore even if the can drawing machine stopped producing cans and the application of internal lacquer spray and other coatings ceased, there would be at least 15 - 20 minutes of discharge during the period when the cans that had just been coated were being cured in the ovens. This would also cause a significant disruption to the process however if there were no other alternatives the emissions could be stopped after a period of time.

### 11.4.2 Summary

Some odour reduction measures have either been trialled or implemented such as UV-ozone treatment and raising the stacks, however several others are considered to be unfeasible such as installation of expensive control equipment. Further raising of the stacks was considered but discounted as there is a reasonable probability that new areas may be impacted where they aren't now and little improvement to areas where complaints are occurring is likely. Reductions in the amount of coatings applied to the cans are made where applicable.

## 12 Consultation

As there are a large number of neighbours and some that are unlikely to sign a non-notified approval, NCI requests limited notification of Montgomery Crescent and Mountbatten Grove.

## 13 Consent Condition Changes

- References to the new consent application will be required.
- Odour reduction investigations are not required.
- The Adaptive Management Odour Plan is not relevant to NCI's operations as the production equipment operates in the same manner every day besides sometimes there are lower emissions for some Can types. As discussed above, stopping the line would not have an immediate effect on emissions as a large number of Cans are in the production line when it is running. In the last 6 years of operating under the current consent there has never been a sustained strong odour in Mountbatten Grove from any source.
- Conditions with the satisfaction of the Manager are ultra vires, NCI does have the criteria that satisfies the Manager
- Emission analysis and reporting are not necessary, emissions monitoring has just been repeated for this assessment of environmental effects.
- Communications with the residents of Mountbatten Grove (two that indicated they wished to receive the communication has only served to remind them to make allegations of odour nuisance against NCI.

## 14 Conclusion

NCI Packaging Limited operates a Can manufacturing plant in Montgomery Crescent, Upper Hutt, Wellington and are required to apply for a replacement air discharge permit as the current permit will expire in 2 August 2019.

The emissions are mainly solvent based volatile organic compounds which have an associated odour and minor seasonal combustion emissions. A modelling assessment has been undertaken however the results are not available yet. Model predictions are expected to comply with national or international guidelines due to the low emission rates and therefore off-site effects are not expected. It is requested that the permit be granted for a minimum of 20 years. The Council also has the option of reviews in the permit, which allows for any issues that may arise to be dealt with at a later stage. NCI's proposed consent conditions changes are attached in Appendix A.

# Appendix A Proposed Consent Conditions

A

| | | |
|---|---|---|
| **Name** | NCI Packaging (NZ) Limited | |
| **Address** | 80 Mount Wellington Highway, Panmure, Auckland 1060 | |
| **Duration of consent** | Granted: ~~2 August 2013~~ | Expires: ~~2 August 2018~~ 20 yrs |
| **Purpose for which right is granted** | To discharge contaminants into air associated with the operation of a steel and aluminium can manufacturing and painting plant. | |
| **Location** | 60-66 Montgomery Crescent, Clouston Park, Upper Hutt, at or about map reference NZTM 1775130.5445749 | |
| **Legal description of land** | Lot 1 DP 30717, Lot 1 DP 28552, Lot 11 DP 30232, Lot 12 DP 30232, Lot 13 DP 30232, Lot 14 DP 30232 and Lot 16 DP 30232. | |
| **Conditions** | ~~1-25~~ as attached | |

## General note for emailing notifications to Wellington Regional Council

The report or notifications can be emailed to notifications@gw.govt.nz. Please include the consent reference ~~WGN110219~~ WGNxxxxx in the subject line, and the name and phone number of a contact person responsible for the discharge.

## General conditions

1. The location, design, implementation and operation of the discharge shall be in general accordance with the consent application and its associated plans and documents lodged with the Wellington Regional Council on ~~31 January 2011~~date, and further information received on:

- ~~12 August 2011 (response to further information request, report URS 2011b)~~
- ~~30 August 2012 (Changes to stacks as completed by 16 April 2012)~~
- ~~7 November 2012 (Notes of correspondence between NCI and Regional Public Health)~~
- ~~19 November 2012 (Report on unsuccessful trial of UV treatment)~~
- ~~15 January 2013 (Report URS 2013a on results of stack testing and dispersion re-modelling)~~
- ~~24 January 2013 (Report URS 2013c Odour survey report)~~
- ~~8 February 2013 (Report URS 2013b cc of memo from URS to Golders — further information request on report URS 2013a)~~
- ~~27 March 2013 (Report URS 2013d Updated modelling on stack extension up to 25 metres)~~
- ~~23 April 2013 (Proposed NCI Adaptive Management Strategy), and~~
- ~~29 April 2013 (Confirmation of completion of stack extension to 25 metres on 26 April 2013)~~
- ~~11 July 2013 (Conditions as proposed by NCI following meeting with GWRC on 9 July 2013)~~

Where there are contradictions or inconsistencies between the application and further information provided by the consent holder, the most recent information applies. In addition, where there may be inconsistencies between information provided by the consent holder and conditions of this consent, the conditions apply.

*Note: Any change from the location, design concepts and parameters, implementation and/or operation may require a new resource consent or a change of consent conditions pursuant to section 127 of the Resource Management Act 1991.*

2. The consent holder shall ensure that a copy of this consent and all documents and plans referred to in this consent, are kept on site at all times and presented to any Wellington Regional Council enforcement officer on request.

3. There shall be no discharges to air that are noxious, dangerous, offensive or objectionable at or beyond the legal boundary of the site property from which the consent holder operates, as determined by an enforcement officer of the Wellington Regional Council using the FIDOL methodology.

*Note: For the purposes of this consent, the boundary of the properly from which the consent holder operates is the outer perimeter of the land bearing the legal description Lot 1 DP 30717, Lot 1 DP 28552 and Lots 11-14 816 DP30232.*

**~~Investigation of Odour Mitigation Options~~**

~~4. The consent holder shall undertake an investigation into technical options that can be used to minimise odour emissions from the site and which will form the basis for the Adaptive Management Odour Plan (AMOP) required by condition 5 of this consent. The results of this investigation shall be reported to the Manager, Environmental Regulation, Wellington Regional Council, by 6 February 2014.~~

~~On written application, the Manager, Environmental Regulation, Wellington Regional Council, may extend the timeframe for submission of the technical options report provided that the consent holder provides sufficient grounds to satisfy the Manager, Environmental Regulation, Wellington Regional Council that such an extension is warranted. Such application shall be in writing, prior to the due date for submission of the technical report.~~

**~~Adaptive Management Odour Plan~~**

~~5. The consent holder shall prepare and submit an Adaptive Management Odour Plan (AMOP) to the Manager, Environmental Regulation, Wellington Regional Council, for approval.~~

**~~Purpose of the AMOP~~**

~~The purpose of the AMOP is to ensure the consent holder has management procedures and practices to both proactively and reactively meet condition 3 at all times. This management plan must outline what measures the consent holder will undertake to prevent and/or respond to any breaches of condition 3 and/or notifications of odour occurring beyond the site boundary.~~

*~~Note: It is the specific intent of this condition that the AMOP will function in the background at all times, and when specified "trigger conditions" occur, actions prescribed in the AMOP shall be initiated by the specified responsible person.~~*

~~Without limiting the extent of the AMOP, it is expected that it will deal with the following:~~

- ~~a) Procedures for incident notification to GWRC (Environmental Hotline 24 hour number: 0800496734) in accordance with condition 22~~
- ~~b) Contact details of the person on site with the responsibility and authority to implement the provisions of the AMOP during plant operating hours~~
- ~~c) Procedures for investigating any odour complaints received including:~~
  - ~~i. Timeframes for initiating investigations~~
  - ~~ii. Timeframes for responding to complainants~~
  - ~~iii. How to review on-site meteorological data~~
- ~~d) Procedures for undertaking both on-site and off-site odour assessments, including training procedures for staff~~
- ~~e) Procedures for initiating actions that have the potential to reduce discharges to air, including proactive odour control measures~~
- ~~f) Procedures for the review of meteorological and production conditions during complaints to assess whether there is any correlation between these conditions and the likelihood of there being a complaint~~
- ~~g) On site responsibilities during odour complaints~~
- ~~h) Procedures for modification of the AMOP following onsite identification of odour, including submission of updated AMOP to Wellington Regional Council~~

**~~Development or review of the AMOP~~**

~~6. The consent holder shall engage an independent technical expert, with specific experience and expertise in industrial odour discharges; to develop, or if developed by the applicant, complete a technical review of the AMOP prior to submission to the Wellington Regional Council.~~

~~The consent holder should incorporate all changes to the AMOP recommended by the technical expert. Where these are not adopted the consent holder shall provide to the Manager, Environmental Regulation Wellington Regional Council, detailed reasons why the recommendations have not been incorporated. A copy of the independent technical review shall be provided with the AMOP.~~

**~~Submission of the AMOP for approval~~**

~~7. The consent holder shall submit the final, technically reviewed, AMOP to the Manager, Environmental Regulation, Wellington Regional Council for approval, by **6 August 2014**.~~

~~On written application, the Manager, Environmental Regulation, Wellington Regional Council, may extend the timeframe for submission of the AMOP provided that the consent holder provides sufficient grounds to satisfy the Manager, Environmental Regulation, Wellington Regional Council that such an extension is warranted. Such application shall be provided, in writing, prior to the due date for submission of the AMOP.~~

~~*Note. Nothing in this or any other condition precludes the consent holder submitting drafts of the AMOP to the Wellington Regional Council prior to the time frames specified in this consent.*~~

~~**Limitations to the approval of the AMOP**~~

~~The approval of the AMOP by the Manager, Environmental Regulation, Wellington Regional Council in no way implies that the measures as specified in the AMOP ensures that the consent holder will meet condition 3. The approval is a technical approval only, and in no way absolves the consent holder from their responsibilities to manage the discharges to meet condition 3 at all times.~~

~~**Limitations of the approval of the AMOP & investigations of odour incidents**~~

~~In no way does this this plan, or the approval of this plan, authorise any breach(es) of condition 3 of this consent, nor will compliance with this plan mean that an investigation into any confirmed breach(es) of condition 3 will not be undertaken, or that enforcement action will not be undertaken even if the actions in the AMOP were undertaken as required.~~

~~**Trigger conditions and timeframes for implementation of actions specified in the AMOP**~~

~~8. The consent holder shall initiate the specified actions detailed in the AMOP:~~

~~a) Following receipt of a notification or complaint regarding odour discharged from the site (either received by GWRC or the consent holder directly); or~~
~~b) Following formal notification by telephone, electronically or in person by a GWRC Enforcement Officer that an odour discharge from the site has been confirmed Offensive and/or Objectionable.~~

**Source identification/investigation procedures & reporting**

9. Following condition ~~8(a)~~ of this consent being triggered or on written request by the Manager, Environmental Regulation, Wellington Regional Council, the consent holder shall prepare a technical report identifying the source/reason for the odour discharge. The report shall:

a) Address the issues detailed in the request;
b) Be submitted to Wellington Regional Council within the timeframe specified;
c) Outline what measures were implemented and within what timeframes, and the effectiveness of the measures in mitigating the odour effects; and
d) Specify what changes, if any, will be made to operating procedures, site practices and the AMOP to prevent/reduce the potential for similar odour events in the future.

~~**Annual technical reviews of the AMOP**~~

~~10. If the AMOP has not been otherwise reviewed during the previous 12 months as a result of a review required by conditions 5 or 9, the consent holder shall undertake a technical review of the AMOP. The review shall include but not be limited to:~~

~~a) Frequency of incidents of Offensive and/or Objectionable odour events that have occurred (if any)~~
~~b) Effectiveness of the AMOP in preventing, reducing and/or responding to incidents; and~~
~~c) A technical process review/evaluation and the requirement for changes to:~~
   ~~i. The plant operating procedures and practices; additional procedures and practices recommended~~
   ~~ii. Changes to emission reduction/treatment equipment, including proposals for further equipment; and~~
   ~~iii. Timeframes for the selection, approval, procurement, installation and commissioning of the specified equipment~~

~~Where new, or changes to existing; emission reduction or treatment equipment are proposed, the consent holder shall have the proposed changes reviewed by an independent technical expert, with specific experience and expertise in industrial odour discharges.~~

~~The technical review, when required, shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council by **30 August 2014 and every year thereafter**.~~

~~**Amendments to the approved AMOP**~~

~~11. Any proposed amendments or additions to the approved AMOP shall be submitted to the Wellington Regional Council for approval, and shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council. Once approved by the Manager, Environmental Regulation, Wellington Regional Council, the approved AMOP shall become the operative AMOP and the plant shall be operated in accordance with the approved AMOP at all times.~~

**On-site meteorological station**

12. The consent holder shall install, operate and maintain at least one meteorological station on the site, compliant with the New Zealand Standards listed below. The meteorological station(s) shall be situated in a location that is representative of site and sensitive receptor (residential) conditions. This weather station shall record the wind speed and direction in an appropriate format. The data shall be logged and available real-time via a website or other user accessible interface. Wellington Regional Council shall be given access to the real-time data upon request.

*Note: There are 2 New Zealand Standards relevant to the meteorological site. Australian/New Zealand Standard AS NZS 3580,1.1:2007 Methods for sampling and analysis of ambient air Part 1.1: Guide to siting air monitoring equipment,*

*Australian Standard AS 2923:1987 Measurement of horizontal wind provides guidance on the measurement of wind speed and direction.*

**Operations and Maintenance Manual**

13. The consent holder shall maintain~~prepare and submit for approval to the Manager, Environmental Regulation, Wellington Regional Council,~~ an Operation & Maintenance Manual (OMM) ~~by 6 February 2014~~, ~~or within another timeframe to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.~~

The scope of the OMM shall include but not be limited to the following matters in order to minimise the discharge of contaminants:

a) A summary of the plant purpose, location, layout, and manufacturing equipment with specific reference to contaminant discharge, extraction and treatment equipment, discharge stacks and processes, including responsibilities and contact details of key personnel
b) Operation, inspection and maintenance of the manufacturing equipment, including the extraction and treatment equipment
c) Procedures adopted to ensure that the extraction equipment is fully functional before manufacturing commences
d) Procedures adopted to ensure that the plant complies with the conditions of this consent at all times
e) Contingency plans in the case of accidents and emergencies, such as spills, fires, and incidents where the discharge of excessive contaminants to air was unavoidable; and
f) Any other issues considered important, including:
    - Details of the general operation and maintenance of all emissions control equipment (including the associated ducting for this equipment)
    - Staff training on the process requirements, use of emissions control equipment, and emergency response
    - Details of how the building envelope is maintained to minimise the potential for fugitive emissions

The consent holder shall ensure that the OMM is consistent with the conditions of this consent, and shall be updated as required, with a copy forwarded to the Manager, Environmental Regulation, Wellington Regional Council within one month of any update.

Any amendments to the OMM shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council. (this is ultra vires NCI does have the criteria for the manager to be satisfied)

14. The consent holder shall, at all times, operate, maintain, supervise and control all processes and equipment on site to ensure compliance with the approved OMM required by condition 13 and pursuant to condition 3 and all other conditions of this consent.

**Emission Control Equipment**

15. The consent holder shall ensure that no part of the aluminium can manufacturing process is operated without the associated extraction being fully operational and functioning efficiently.

16. The consent holder shall ensure that the ventilation system shall draw adequate negative pressure to ensure the effective capture of contaminants from the aluminium can manufacturing process and all other areas from which air is extracted to ensure that fugitive emissions are minimised.

17. The point of discharge from the main and lacquer stacks shall terminate at a point no less than 25 metres above ground level. The stacks shall be designed and operated to ensure ~~the~~ uninterrupted vertical discharge of process emissions~~vapour~~.

The stacks shall have the following diameters at the point of exit:

| Stack / Parameter | ~~Line 1 Main Stack (No.11)~~ | ~~Line 1 Lacquer Stack (No.9)~~ | Line 2 Main Stack ~~(No.1)~~ | ~~Line 2~~Internal Lacquer/Assembly Stack ~~(No.0)~~ |
|---|---|---|---|---|
| Diameter at exit m | ~~0.325~~ | ~~0.15~~ | 0.325 | 0.~~15~~325 |

~~Source URS 2013d dated 22 January 2013 Table 2-1 Emission Monitoring~~

18.There will be no routine emission monitoring requirement for this consent. However, **on written request** by the Manager, Environmental Regulation, Wellington Regional Council, **the consent holder shall conduct an emissions testing programme for odour or Volatile Organic Compounds likely to be discharged from the plant, within two months of the written request.** The emissions testing programme and report shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council. (note satisfaction criteria needs to be spelled out)

*Note: The Manager, Environmental Regulation, Wellington Regional Council, will consult with the consent holder prior to such a request for any additional emissions testing programme(s).*

19.All sampling techniques employed in respect of the conditions of this consent shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council. All analyses shall be performed by an International Accreditation New Zealand (IANZ) registered laboratory or otherwise as specifically approved by the Manager, Environmental Regulation, Wellington Regional Council.

~~**Emission analysis and reporting**~~

~~20.Where monitoring indicates that discharges are 10% greater than those in the application (URS 2013d: URS Memorandum dated 22 January 2013 *"Further Assessments of Stack Height Changes on Ambient Odour Concentrations"*, received by Wellington Regional Council on 27 March 2013); the Manager, Environmental Regulation, Wellington Regional Council may require further analysis and interpretation based on the emission testing results, including computer dispersion modelling and comparison with relevant guidelines.~~

~~Within a timeframe as agreed with the Manager, Environmental Regulation, Wellington Regional Council, the consent holder shall submit a report containing the results and analysis of the emissions testing programme to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council. The report shall contain the results of the emission test, including all relevant plant operating parameters and conditions, and all calculations and assumptions. The report shall contain data analysis and interpretation by a suitably qualified and experienced person.~~

~~*Note 1: A 10% increase from those in the initial report are consistent with the National Environmental Standards for Air Quality 2004,*~~

~~*Note 2: This condition may be altered following a request under section 127 of the Act provided the effects are no more than minor and consistent with the original application.*~~

**Complaints record**

21.The consent holder shall maintain a record of any complaints received alleging adverse effects from or related to the discharge the subject of this consent. This record shall include:

a) The name and address of the notifier (if provided)
b) The date and time that the notification was received
c) Details of the alleged incident

d) Weather conditions at the time of the incident
e) The most likely cause of the incident, and
f) Any measures taken to mitigate/remedy the cause of the incident and address the complaint

**A copy of this record shall be sent to the Manager, Environmental Regulation, Wellington Regional Council as soon as possible, or at the latest the close of business the next working day.**

This record shall be maintained for the duration of this consent and made available to the any enforcement officer of the Wellington Regional Council, on request.

*Note 1: The Wellington Regional Council will notify the consent holder as soon as possible about any odour notifications received that are attributed to the consent holder.*

*Note 2: Incidents involving odour are reported under condition 9 of this consent. The intent of this condition is to capture any other environmental incidents that may occur.*

**Incident Reporting**

22. Any incident that may result in adverse effects on the environment beyond the boundary of the consent holders site shall **be notified to the Manager, Environmental Regulation, Wellington Regional Council as soon as possible, or at the latest the close of business the next working day**. A written report shall be submitted to the Wellington Regional Council within five working days with reasons for the incident, and measures taken to mitigate the effects of the incident and prevent a recurrence.

Note: The Wellington Regional Council may also investigate any incidents to determine if a breach of this consent or the Resource Management Act 1991 has occurred and may also undertake enforcement action depending on the circumstances.

~~**Communications Plan**~~

~~23. The consent holder shall prepare a communications plan, which sets out how it will liaise with the local community. This plan shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council by **6 November 2013** and will include but not be limited to:~~

~~a) A dedicated telephone number (hotline) for neighbours to contact the consent holder during day shift hours~~
~~b) A dedicated telephone number for neighbours to contact the consent holder after 4 pm.~~
~~c) Preparation and distribution of a quarterly newsletter~~

~~The consent holder shall ensure that the communications plan is reviewed on six monthly basis to ensure the needs of the local community are being met. The consent holder shall provide a report to the Manager, Environmental Regulation, Wellington Regional Council within one month of a review being undertaken which shall include:~~

- ~~How the review was undertaken~~
- ~~Feedback provided by the community, and~~
- ~~Any changes to the communication plan~~

~~The report shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.~~

**Reporting Conditions**

24. The consent holder shall submit an **Annual Report** to the Manager, Environmental Regulation, Wellington Regional Council by **31 July each year** for the period 1 July — 30 June inclusive. The report shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council, and shall contain, but not be limited to:

- Details of significant maintenance or upgrade items where relevant to the discharge of contaminants or treatment of emissions,
- ~~Any technical reviews undertaken relating to the AMOP~~,
- Complaints received and actions implemented by the consent holder to minimise effects (if any),
- Details of production information, including volumes of materials used per annum, and
- Any other information considered relevant

**Review Condition**

25. The Wellington Regional Council may review any or all conditions of this consent by giving notice of its intention to do so pursuant to section 128 of the Resource Management Act 1991, at any time within three months of the 30 June each year for the duration of this consent for the purpose of:

a) To review the adequacy of any report and/or monitoring requirements, and if necessary, amend these requirements outlined in this consent
b) To deal with any adverse effects on the environment that may arise from the exercise of this consent; and which are appropriate to deal with at a later stage, or
c) To enable consistency with any relevant Regional Plans or any National Environmental Standards or Regulations
d) To adopt the best practicable option to remove or reduce any adverse effect on the environment.

The review of conditions shall allow for the deletion or amendment of conditions of this consent; and the addition of such new conditions as are shown to be necessary to avoid, remedy or mitigate any significant adverse effects on the environment.

**Notes**

a) A resource management charge, set in accordance with section 36(2) of the Resource Management Act 1991 shall be paid to the Wellington Regional Council for the carrying out of its functions in relation to the administration, monitoring, and supervision of resource consents and for the carrying out of its functions under section 35 (duty to gather information, monitor, and keep records) of the Act.

b) The Wellington Regional Council shall be entitled to recover from the consent holder the costs of any review, calculated in accordance with and limited to the Wellington Regional Council's scale of charges in force and applicable at that time pursuant to section 36 of the Resource Management Act 1991.