BEFORE INDEPENDENT COMMISSIONERS
AT WELLINGTON

UNDER	the Resource Management Act 1991
IN THE MATTER	of an application by NCI Packaging (NZ) Limited for a resource consent in relation to the manufacture of metal cans and associated processes at 66 Montgomery Crescent, Upper Hutt.

STATEMENT OF EVIDENCE OF JENNIFER MARY SIMPSON

AIR QUALITY

26 JULY 2021

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1. INTRODUCTION

1.1 My full name is Jennifer Mary Simpson. I hold the position of Technical Director - Environmental Engineering at Tonkin & Taylor Ltd ("T+T"). My qualifications are a Bachelor of Engineering (Chemical and Materials) and a Diploma in Environmental Management, both from the University of Auckland. I am an accredited Independent Resource Management Act ("RMA") Commissioner and am the Secretary, and a Life Member of, the Clean Air Society of Australia and New Zealand.

Experience

1.2 I have over 25 years' experience in environmental engineering and was employed as a specialist in air quality and hazardous substances management at T+T in January 1998. Since that time, I have undertaken many assessments of the effects of discharges to air, including odour, from a variety of industrial and waste management activities. Of particular relevance to this application, I have prepared air quality assessments for a number of small to medium sized industrial facilities with emissions from surface coating and printing activities similar to those carried out by NCI, including RoofTG Group (formerly AHI Roofing), Amcor Kiwi Packaging and Times Media Group. I have given evidence in relation to odour effects at council hearings, District Court and the Environment Court. Prior to joining T+T I worked in the superphosphate fertiliser industry, where I gained hands-on experience with industrial odour control techniques such as wet scrubbing and biofiltration.

Code of conduct

1.3 Although this is a Council hearing, I have read the Environment Court's Code of Conduct and agree to comply with it. My qualifications as an expert are set out above. I confirm that the issues addressed in this statement of evidence are within my area of expertise.

Involvement in Project

1.4 I was engaged by NCI in June 2020 to provide air quality technical advice in relation to odour emissions from the site at 60 – 66 Montgomery Crescent, Upper Hutt.

1.5 I undertook a desktop review of the resource consent application documents and carried out a site visit on 10 June 2020. I recommended to NCI that they

undertake further investigations to better characterise the effects of odour emissions from the site and evaluate further odour mitigation options (T+T letter report: Review of odour issues, 17 July 2020).

1.6 In January 2021 I reviewed the additional information collected by NCI and summarised my findings in a report (T+T letter report: Summary of further odour investigations and recommendations, 27 January 2021).

1.7 More recently I have been involved in discussions with Mr Bluett (GWRC's technical reviewer) and Ms McLintock (GWRC reporting officer) and responded to questions regarding the proposed odour mitigation measures (T+T letter dated 28 April 2021) and proposed conditions of consent.

1.8 I have read the Officer's Report, including the Addendum by Mr Jeff Bluett (Appendix 1 of the Report)

Scope of evidence

1.9 My evidence will:

(a) Provide a brief summary of the nature of odour emissions from the NCI site and my evaluation of the current level of odour effects;

(b) Summarise the effectiveness of the proposed odour mitigation; and

(c) Suggest some minor changes to the proposed conditions of consent attached to the Officer's Report to improve clarity and/or consistency with good practice odour management.

2. EXECUTIVE SUMMMARY

2.1 In summary, I consider that:

(a) The available information suggests the emissions from the NCI site are causing nuisance effects in a localised residential area at the western end of Mountbatten Grove. These effects are likely to be cumulative with other sources of similar solvent type odours in the area.

(b) Based on the dispersion modelling and odour survey findings, only a modest reduction in off-site odour concentrations (of the order of 30%) would be sufficient to avoid nuisance effects of odours from NCI.

(c) The proposed treatment of the highest odour emission source through a biofilter should achieve the required reduction. However, if required, a second stage of mitigation can be implemented by either expanding the biofilter to treat additional process emissions or increasing the height of the Internal Lacquer/Assembly Stack.

(d) This stagewise implementation of odour mitigation and monitoring of performance is an appropriate way to achieve the best practicable option for odour control.

(e) Overall, I consider that the effects of odour emissions from the site can be adequately managed through consent conditions.

3. EMISSIONS TO AIR OF VOCS AND ODOUR

3.1 The emissions to air from the NCI plant include volatile organic compounds (VOCs) from solvents and coatings applied to the surfaces of steel and aluminium cans. The manufacturing plant is fitted with an extraction system to capture the majority of VOCs from these processes and vent them to air via two stacks (the Line 2 Main Stack and the Internal Lacquer/Assembly Stack). Mr Kevern's evidence describes the different sources of VOCs from the processes. The chemical and physical parameters of the discharges are likely to be relatively consistent while the plant is operating.

3.2 Mixtures of VOCs can give rise to odours that are often described as a 'sweet solvent' type odour. There are other industrial and commercial activities in the vicinity of the NCI site that can give rise to VOC emissions. These include spray painting (for example at Wedgelock Equipment (72 Montgomery Crescent) and the Resene paint manufacturing facility (corner of Fergusson Drive and Montgomery Crescent).

4. EFFECTS OF ODOUR EMISSIONS

4.1 I have relied on the following information in forming my opinion about the current odour effects of the emissions from the NCI site:

(a) My observations during the site visit, which included:

(i) weak, intermittent solvent odours, which I attributed to the NCI plant stacks, in the 'building downwash' zone close to the building (at the southwestern site boundary); and

(ii) similar weak solvent-type odours outside an adjacent industrial premise on Montgomery Ave.

(b) The odour dispersion modelling of emissions from the NCI stacks;

(c) The minutes of the pre-hearing meetings, particularly the submitters' description of their experience of odour; and

(d) The field odour survey commissioned by NCI in 2020.

4.2 The field odour survey was carried out between 10th August 2020 and 8th September 2020 (over 17 working days). As summarised in my report of 17 January 2021, I evaluated each ten-minute measurement to determine whether it constituted an 'odour hour' in accordance with the method recommended in the European Standard EN 16841-1:2016.[1] A single ten-minute measurement is counted as an odour hour when the percentage odour time (for that odour) reaches or exceeds 10 %, i.e., at least 6 out of the 60 observations.

4.3 The odour hour calculation does not take into account the intensity of odours above the odour recognition threshold. This is because the European Standard supports a different type of odour assessment framework compared to New Zealand. For example, Germany has set an exposure limit in residential areas of 10% of hours being odour hours for recognisable odours from a particular facility. The assessment against this exposure limit is based on a rigorous odour survey programme, carried out over at least a year with multiple panellists. To my knowledge, an odour assessment that is fully compliant with these European standards has never been carried out in New Zealand.

4.4 New Zealand has a different assessment approach based on a holistic, qualitative assessment considering the FIDOL factors.[2] In a New Zealand context, the concept of 'odours hours' can be useful to confirm the absence/presence of odour and to inform the frequency aspects of the FIDOL assessment.

4.5 The European standard relies on field measurements of odour intensity carried out in accordance with the German Standard VDI 3940 Part 3[3]. In interpreting

[1] EN 16841-1:2016 Ambient air – Determination of odour in ambient air by using field inspection – Part 1: Grid method

[2] FIDOL: Frequency, Intensity, Duration, Offensiveness (hedonic tone) and Location (sensitvity of the receiving environment)

[3] VDI 3940 Part 3: 2010 Measurement of odour impact by field inspection Determination of odour intensity and hedonic odour tone

the odours hours derived from the NCI odour survey, it is important to understand the differences between the odour scale described in VDI 3940 Part 3 and the modified odour scale generally used in New Zealand (and used in the study NCI commissioned). This difference arises from a difference in approach to low level odours that are detectable, but not at a strength where their character can be clearly described (i.e. above the detection threshold but below the recognition threshold).

4.6 In odour surveys in New Zealand, all odours that are detected (i.e. any odours above the detection threshold) are recorded using a scale from 1 (very weak) to 6 (extremely strong). A very weak odour (1) means that there is 'probably' an odour, but there may be some doubt as to whether an odour is present. Weak odour (2) means that an odour is present but cannot be described using precise words. Distinct odour (3) is used where the odour character is distinctly recognisable.

4.7 VDI 3940 Part 3 includes the following explanation to the odour intensity scale:

> When using the intensity scale for evaluating odours in the ambient air, the lowest grade (1 = "very weak") is awarded if the recognition threshold is exceeded. This means that the odour being assessed (e. g. facility odour) has been clearly identified, assigned to an odour quality from the quality key and there is no uncertainty or guessing involved. In the application of the intensity scale in the field, the middle grade 3 = "distinct" does not therefore mean that the odour is only now clearly identifiable, but that the odour is stronger than 2 = "weak" but cannot yet be described as 4 = "strong".

4.8 Using the categorisation scheme in VDI 3940 Part 3, the lowest odour intensity value (1) would only be applied to a recognisable odour, ie where the odour can clearly be ascribed to the facility being assessed with no uncertainty or guesswork. This level of odour would be categorised as a '3' on the scale used widely in New Zealand. Therefore, for the purposes of calculating odour hours strictly in accordance with the European standard, only odour observations with an intensity greater than 3 would be included. However, in New Zealand we are also interested in the frequency of very weak and weak odours as these form part of the overall consideration using the FIDOL factors. Therefore, in my evaluation of the odour survey carried out around NCI, I considered all of the odours that were detected.

4.9 The main findings of the odour survey, with respect to odours on Mountbatten Grove were that:

(a) At the end of Mountbatten Grove, there were 6 occasions (out of 17) where a sweet solvent odour was detected, 4 of which were 'odour hours'. If a threshold odour intensity of "3" were used, as per the European standard method, then there was only 1 odour hour recorded (on 26//8/21). On this day, NCI was probably not the source of odour because there were light winds blowing from the west southwest.

(b) Towards the middle of Mountbatten Grove, there was only 1 odour hour recorded over the survey period, and there would be no odour hours if a threshold odour intensity of 3 were adopted.

4.10 During the survey period, odours were generally of a low intensity and largely confined to a relatively localised area at the western end of Mountbatten Grove. This is consistent with the odour dispersion modelling, which found that the odour modelling assessment criterion was exceeded by a relatively small margin (2.6 OU/m^3 compared to a criterion of 2 OU/m^3) at the boundary with the residential zone. This is also consistent with my understanding that odour complaints are generally only received from Mountbatten Grove. Overall, this suggests that the odour from the NCI site is likely to be causing nuisance effects from repeated instances of low intensity (very weak or weak) odour.

4.11 I agree with Mr Bluett's report (Officer's Report Appendix 1, page 8) that there may be a cumulative effect of odour emissions from the NCI site with other sources in the area and that it is important that these other odours sources are identified by GWRC and required to control their effects.

5. PROPOSED ODOUR MITIGATION

5.1 The dispersion modelling suggests that a modest reduction (of the order of 30%) in offsite odour concentrations from the NCI site would probably be sufficient to avoid odour nuisance. Based on this, I consider a stage-wise approach is an appropriate way to achieve the best practicable option for odour control.

5.2 NCI reviewed a range of odour emission control technology and concluded that a biofilter was the preferred option (NCI, 18 June 2020). They carried out a 'proof of performance' trial on a pilot-scale biofilter over an 11-week period treating a side-stream of gas from the Internal Lacquer/Assembly Stack.

5.3 The performance of the biofilter was evaluated by site staff who observed the odour intensity at the inlet and outlet of the biofilter using a 1 to 6 scale on a regular basis. The outlet of the biofilter was generally reported as essentially odour-free, apart from an earthy smell associated with the media. The inlet

concentration was variable, but was often reported as a “3” (Distinct). There was no reduction in performance of the biofilter, and no evidence of odour break-through, over the 11-week period.

5.4 NCI proposes to treat the basecoat application and oven emissions through a biofilter because these have been identified by NCI as contributing the highest odour emissions from the site. Mr Kevern’s evidence describes the key design features for the proposed biofilter. In my opinion, the pilot-scale trial provides sufficient evidence that a biofilter is capable of effectively treating VOC odours at the site. Based on NCI’s measurements of different odour sources from the process, the diversion of emissions to the biofilter is expected to reduce the odour emissions from the Line 2 Main Stack by 70%. The Line 2 Main Stack is one of the two odour sources on-site; so this is expected to reduce the off-site effects of odour emissions by approximately 35%. As I noted in paragraph 5.1, this is likely to be sufficient odour reduction to mitigate odour nuisance.

5.5 The proposed conditions require the overall odour performance of the site to be evaluated within 6 to 9 months of the biofilter being installed (condition 21). If this evaluation determines that further mitigation is required, this can be achieved by treating additional process air flows through an expanded biofilter or increasing the height of the Internal Lacquer/Assembly Stack by 2 m (to a height of 27 m).

5.6 The combined effect of treating the basecoat application and oven emissions through a biofilter and increasing the height of the Internal Lacquer/Assembly Stack is estimated to be a 50% reduction in off-site odour concentrations compared to the present situation. The estimated off-site maximum ground level odour concentration is 1.2 OU/m^3 (99.5th percentile), or 60% of the odour modelling assessment criterion.

5.7 In my opinion, the stagewise implementation of odour mitigation and monitoring of performance is an appropriate way to achieve the best practicable option for odour control at the site.

6. RECOMMENDED CONDITIONS

6.1 I am broadly in support of the proposed conditions, but have some minor suggested changes to improve clarity and/or consistency with good practice odour management.

6.2 Condition 14(a) refers to operating the biofilter to ensure compliance with Condition 3, which is the general odour limit condition requiring no offensive or

objectionable effects of odour beyond the boundary. As the biofilter will only treat one component of the odour emissions from the site, I consider that a more appropriate performance requirement would be for it to be operated so there is no detectable VOC odour at the downwind edge of the biofilter, as per the following:

> 14. The Consent Holder shall install a Biofilter capable of treating the basecoat application process and curing oven emissions of the Aluminium Aerosol Can Line within four months of granting this consent. The Biofilter shall be:
>
> (a) Designed, built, operated and maintained to effectively treat the odour so that there is no VOC odour at the downwind edge of the biofilter ~~to ensure compliance with Condition 3~~; and …

6.3 Condition 16 is intended to minimise fugitive emissions of odour from activities inside the building. I understand that this relates to activities such as decanting solvents or solvent wash up. I agree with the intent of this condition, but I consider that it could be more clearly worded to manage activities that are not normal process emissions captured by the extraction system, as follows:

> 16. The consent holder shall ensure that the external factory doors are closed during any activities that give rise to appreciable odour not captured by the extraction system~~potential or actual odour generating activities~~.
>
> *Note. ~~Potential and actual~~ Odour generating activities not captured by the extraction system are defined in the AMOP.*

6.4 Condition 19 sets out the requirements of the field odour observation programme. The three key elements recorded in an odour survey are:

(a) the odour intensity (recorded every 10 seconds over a 10-minute period);

(b) The maximum and average impression of the odour character, also called its hedonic tone (relative pleasantness/unpleasantness), over the 10 minutes; and

(c) An odour descriptor (e.g. ‘sweet solvent’).

6.5 I suggest slight re-wording to better reflect these requirements:

> 19. The results of the field odour observation programme required by Condition 18 shall be reported to the Manager, within 4 weeks of its completion. The report shall include:

(a) The date, time, duration, meteorological conditions and location of each odour observation;

(b) For each odour observation:

(i) Whether it constituted an “odour hour”;

(iii) The average and maximum hedonic tone (pleasantness/unpleasantness) of any odours identified~~intensity;~~ and

(iii) Descriptor(s) ~~The character~~ of any odours identified.

(c) …

6.6 Condition 20 requires a review of the odour control performance of the biofilter between 6 and 9 months after it has been commissioned. For the same reasons I set out in paragraph 6.2, this condition should not refer to the biofilter being adequate to ensure compliance with Conditions 3, because the biofilter only treats a component of the odour sources at the site. The overall odour performance of the site, in relation to Condition 3, is monitored by Conditions 17 (regular boundary monitoring) and 18 (odour survey), and the review required by Condition 21.

6.7 I suggest re-wording as follows:

20. After a period of six months, but less than nine months of the installation and operation of the biofilter, the Consent Holder shall commission a review of the odour control performance of the biofilter and provide this report to the Manager. The purpose of the review is to demonstrate whether the biofilter is ~~adequate~~ effective at removing odour so that there is no VOC odour at the downwind edge of the biofilter ~~to ensure compliance with Condition 3~~.

7. CONCLUSION

7.1 I am in agreement with the overall finding of the Officer’s Report that adverse effects of odour from the site can be appropriately managed and mitigated through consent conditions.

Jenny Simpson

26 July 2021