Tonkin+Taylor

Job No: 1015131
29 August 2020

Bay of Plenty Regional Council
PO Box 364
Whakatane 3158

Attention: Danielle Petricevich

Dear Danielle

Addiction Foods NZ Ltd (RM19-0556) - Air quality technical review

1 Introduction

Addiction Foods NZ Ltd (Addiction) has applied for a resource consent to authorise discharges of odour to air from an existing dry pet foods manufacturing facility at 240 Jellicoe Street, Te Puke (the Site). This report sets out the findings of a technical review conducted by Tonkin & Taylor Ltd (T+T) of the application prepared for the Bay of Plenty Regional Council (BOPRC) as our client. This review has been undertaken in accordance with our letter of engagement dated 13 August 2020.

The scope of the technical review is as follows:

1 Review the dispersion modelling including, where appropriate, any calculations undertaken.
2 Evaluate the appropriateness of the proposed mitigation measures compared to the best practicable option.
3 Review the assessment methodology with respect to its appropriateness for the activity and nature and scale of effects.
4 Comment on the overall conclusions of the assessment.

The following documents have been reviewed:

- Pattle Delamore Partners Ltd report "Pet Food Manufacturing, Discharges to Air – Assessment of Environmental Effect" dated 12 September 2019 (PDP report), and;
- AECOM New Zealand Limited report "Addiction Pet Foods Air Quality Assessment" dated 29 April 2020 (AECOM report).

We understand from an email dated 3rd July 2020 (provided to us by BOPRC) that Addiction is moving straight to Phase 2 of the proposed odour control upgrades (installation of a wet scrubber) and that, subject to any delivery issues that may occur because of Covid-19 restrictions, etc, the installation of the wet scrubber will occur in September 2020. On this basis, our review has focussed on the effects of the proposed activity after Phase 2 controls have been implemented and we have not explicitly considered the effects after Phase 1 (increased dilution).

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2 Odour dispersion modelling

2.1 Model selection

The odour dispersion modelling was undertaken using CALPUFF. We consider that the use of this model is appropriate, especially considering the high percentage of calms experienced at Te Puke.

2.2 Modelling meteorological dataset

Meteorological data was provided to AECOM by BOPRC and, as such, there is no information provided about how the met dataset was developed. We have assumed that BOPRC has undertaken appropriate validation of the met dataset.

As a simple check of the modelling met data, we consider it would be useful to compare the wind rose for the site based on observations at the Te Puke AWS (as used by AECOM in its evaluation of odour complaints) with an equivalent wind rose for the modelling meteorological dataset.

2.3 Odour emission rates

The dispersion modelling uses odour emission rates obtained by olfactometry measurements. The odour measurements were taken before and after the trial wet scrubber system using a portable olfactometer. The AECOM report does not describe the extent to which the use of the portable olfactometer complies with a recognised olfactometry standard (e.g. AS/NZS 4323.3:2001 Stationary source emissions - Determination of odour concentration by dynamic olfactometry). This is of relevance because the conclusions of the odour dispersion modelling study are sensitive to the odour emission rates used.

Our review has identified the following in relation to the odour emissions measurements:

- The number of samples taken to determine the "representative" results for each odour concentration measurement for each product is not stated.
- Although analysis of the complaints data concludes that over 75% of the complaints occurred when the plant was manufacturing products containing fish meal, the odour concentration measurements do not identify which (if any) of the measurements relate to products containing fish meal.
- The odour dispersion modelling scenario intended to be representative of the "current" plant operations excludes the highest measured concentration on the basis that this related to a fish meal-containing product that Addiction undertook would not be manufactured until the Phase 1 odour controls (increased dilution) were implemented. On this basis, the modelling of "current" effects potentially understates historical odour levels.
- It is not stated whether the odour emissions are assumed to occur continuously or only over the current hours of operation.

2.4 Odour modelling assessment criterion

The odour modelling assessment criterion used in the assessment is for sensitive receiving environments where the worst-case meteorological conditions for dispersion are stable to moderately stable. We agree that this is the appropriate assessment criterion given the previously relatively short stack at the site. Although it is unlikely, we consider that the worst-case meteorological conditions for dispersion of emissions from the new, taller stack should be identified to ensure that this is still the appropriate assessment criterion, i.e. worst case conditions are not unstable to semi-stable conditions.

3 Proposed mitigation measures

3.1 Process emissions

The proposed odour emission mitigation measures for the process emissions are based on increasing the stack height by 10 m, increasing the efflux velocity and installing a wet scrubber prior to discharge through the stack. The scrubber is described as a chemical scrubber, which suggests that there is chemical dosing. However, the nature of the chemical dosing (e.g. whether it is for pH adjustment and/or the addition of an oxidising agent) is not described.

Measurements of odour pre- and post- treatment were undertaken using a pilot-scale two-stage packed wet scrubber. The odour measurements indicate an odour removal efficiency of between 61% and 96% depending on the inlet concentration, where higher decreases are shown when the inlet concentrations are higher. This suggests that wet scrubbing is likely to be an effective odour control method for the types of odours produced from pet food manufacture.

The report indicates that a number of technologies for odour treatment were investigated and trials undertaken. No information on the trials of the other equipment or an options assessment for the various potential mitigation measures was provided. Notwithstanding this, in our experience a well-designed and operated chemical packed tower scrubber would be consistent with good practice for odour control for this type of activity.

There is no information provided that would allow us to comment on the appropriateness of the specific type of wet scrubber being proposed. Key design and operational parameters relevant to the performance of the proposed scrubber include:

- Whether the scrubber is a vertical or cross-flow design;
- Scrubber internal dimensions;
- Packing type and details of any redistribution plates or droplet eliminators;
- Proposed chemical dosing rate and any operational targets, e.g. pH or oxidant level;
- Liquid recirculation rate;
- Controls on liquid level and proposed blowdown/top-up;
- Operating temperature; and
- Methods to eliminate oil/fat droplets entering the scrubber.

Further information on these key design and operational parameters would give increased confidence that the proposed scrubber will consistently achieve the required odour reduction. This information would also help inform appropriate consent conditions related to scrubber operation and maintenance.

The reports do not explain how the effects of residual odour emissions will be evaluated once the wet scrubber is installed. However, we consider this can be adequately addressed through consent conditions, including the requirement for an odour management plan.

3.2 Fugitive odours

While flued process emissions (e.g. drying oven exhaust) are likely to be the most significant source of odours at the site, in our experience, fugitive odours from processing areas can also be appreciable. The PDP report states that fugitive odours are minimised by minimising the periods of time that doors are opened and by ensuring that all building penetrations are sealed, such as the

roof vents, windows and door frames. This implies that there is no external ventilation of air from the production room. This seems unusual and should be confirmed.

4 Odour assessment methodology

The assessment of effects of the proposed activity is largely reliant on odour dispersion modelling and assumptions about the performance of the proposed scrubbing system.

We have reviewed the assessment methodology against the recommended toolbox of assessment techniques for existing activities published in the Odour GPG[1] (see Appendix A). Overall, we consider that the assessment approach is consistent with the recommendations in the GPG.

5 Overall conclusions of the assessment

Based on odour dispersion modelling and an analysis of odour complaints records, the AECOM and PDP reports conclude that the current operation of the plant has the potential to create odour nuisance and that additional odour control measures are required. We agree this is a reasonable conclusion.

The applicant proposes several upgrades to reduce odour impacts including a taller stack and installation of a wet scrubber. AECOM has determined that stack odour concentrations from the wet scrubber should not exceed 2,000 OU/m^3, based on odour emissions measured during a pilot-scale trial. Dispersion modelling suggests that, on this basis, the resulting ground level odour concentrations will not exceed odour modelling assessment criteria that have been set to avoid odour nuisance in high sensitivity receiving environments. Consequently, AECOM conclude that odour effects following the proposed upgrades will be acceptable.

We agree that the proposed installation of a wet scrubber will reduce odour emissions and that installation of a taller stack will increase dispersion of residual odours. We also agree that these measures are generally consistent with the best practicable option to reduce the odour effects of the process emissions, although there is insufficient information to comment on the specific type of wet scrubber proposed. The assessment of effects of residual odours is sensitive to the assumed odour emission rate and the accuracy of dispersion modelling predictions. It also assumes that fugitive odour emissions are negligible. The provision of further information, as summarised in the following section, would give greater certainty about the validity of PDP's and AECOM's conclusions.

6 Further information

We consider the following additional information is necessary in order to better understand the effects of the proposed activity:

- Comparison of a wind rose based on observations at the Te Puke AWS with a wind rose based on wind speed/direction data for the site from the modelling meteorological dataset.
- Further information on the reliability of odour emission measurements using a portable olfactometer, including the level of confidence that maximum odour emission concentrations from the wet scrubber will not exceed 2,000 OU/m^3. If available, this should include information (e.g. comparative emission measurements or research papers) evaluating measurements conducted with the portable olfactometer compared to standard methods (such as AS/NZS 4323.3).
- Confirmation that the worst-case meteorological conditions for dispersion of odour remains neutral to stable conditions for the new, taller stack.

[1] MfE. (2016). Good Practice Guide for Assessing and Managing Odour. Wellington

- Confirmation that the odour modelling scenarios assume continuous (i.e. 24 hours per day) operation.
- Design and operational parameters relevant to the performance of the proposed scrubber, including:
  - Whether the scrubber is a vertical or cross-flow design;
  - Scrubber internal dimensions;
  - Packing type and details of any redistribution plates or droplet eliminators;
  - Proposed chemical dosing rate and any operational targets, e.g. pH or oxidant level;
  - Liquid recirculation rate;
  - Controls on liquid level and proposed blowdown/top-up;
  - Operating temperature; and
  - Methods to eliminate oil/fat droplets entering the scrubber.
  - A description of the general ventilation arrangements for the processing room.

We consider that an odour management plan and description of contingency measures should be provided and would likely be required by conditions on the consent, if granted. At a minimum, we consider the applicant should provide a draft table of contents for an odour management plan.

7 Applicability

This report has been prepared for the exclusive use of our client Bay of Plenty Regional Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that the Bay of Plenty Regional Council will use this report in fulfilling its regulatory functions in relation to the resource consent application by Addiction Foods NZ Ltd.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

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Jenny Simpson
Project Director

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Appendix A: MfE guidance on odour assessment tools

Table 1: Consideration of MfE guidance on odour assessment tools

Assessment tool	Commentary
Community consultation	Aside from consideration of complaints, no community feedback on the effects of the existing discharge has been incorporated into the assessment. Consultation with iwi is being undertaken. Consultation feedback may have provided further detail of the nature of historical or current nuisance effects.
Industry experience	Industry experience and knowledge from other sites of similar nature, scale and location, including consideration of appropriate separation distances has not been discussed in either report.
Complaints record	A discussion of complaints is provided in the AECOM and PDP reports. AECOM understood that no odour complaints were verified by BOPRC as being offensive or objectionable. Complaint locations are mapped showing the majority of the complaints occurred in the residential area to the west and south. AECOM's analysis suggests that the majority of complaints attributed as likely to be related to the site (based on wind direction) occurred during calm winds and/or during production of fish meal products.
Industry/council experience	The PDP report states that BOPRC records do not indicate whether any of the odour complaints were investigated or substantiated.
Odour annoyance survey	An odour annoyance survey has not been conducted. However, the complaints data provides a form of community feedback on odour effects on the surrounding area and, given the proposed installation of improved odour controls, we do not consider an odour annoyance survey would be warranted.
Meteorology and terrain assessment	Both the PDP and AECOM reports discuss weather conditions based on analysis of wind observations at Te Puke EWS meteorological station. The meteorological station is considered to be representative of the wind conditions at the site. We consider it would also have been useful to compare the Te Puke AWS observations with the modelling meteorological dataset, to confirm they are similar. Terrain effects are considered in both reports and conclude that there is no terrain that would locally influence the dispersion of odour.
Review emission control system(s)	The odour emissions control systems are proposed to be improved, particularly through the installation of a wet scrubber. Details of the proposed wet scrubber have not been provided however, in principle, wet scrubber technology would be appropriate for control of odours from the site.
Odour diaries and weather monitoring	An odour diary programme has not been conducted. However, the complaints data provides a form of community feedback on odour effects on the surrounding area. Field odour monitoring is proposed on a weekly basis after the upgrade for a period of two months.

Assessment tool	Commentary
Review of odour management plan and contingency procedures, risk assessment	An odour management plan and contingency procedures have not been provided.
Olfactometry and modelling of odour sources	A portable olfactometer has been used to quantify the current stack odour concentrations and likely stack concentrations after the wet scrubber has been installed. The odour measurements are used as an input for the dispersion modelling to determine the change in the potential odour nuisance. The assessment is therefore reliant on the accuracy of these measurements to the extent that they demonstrate the proposed maximum stack odour concentration of 2000 OU/m^3 is achievable.
Other tools not discussed in the MfE GPG recommendations	
Field odour observations	Although not discussed in the MfE Odour recommendations, field odour observations provide useful information on the scale of potential odour nuisance effects. The observations described in the AECOM and PDP reports were made on a single day and provide a snapshot of odour levels. There are several limitations in the data presented that restrict the ability to determine if the observations are representative of odours currently produced at the site and of odours observed in the wider receiving environment, as follows: • Addiction produces several different products with varying odour character, hedonic tone and intensity as described in Table 2 of the PDP report. The type of product that was being produced while the odour survey was undertaken has not been reported. Therefore, it cannot be determined how the observed odour relates to potential odour in the receiving environment. • Six observation points were taken during the sampling, however only observations at locations 1 and 3 appear to be downwind when the sampling occurred. The sampling may therefore not be representative of odours that may occur in the wider receiving environment. The observations indicated that odour levels at the time had the potential to cause odour nuisance. This is consistent with the findings of the complaints analysis and the dispersion modelling. We consider that a programme of field odour observations would be a useful tool to evaluate the effectiveness of the wet scrubber once it is installed. This could be considered when setting consent conditions.