Air Quality Technical Review

Technical Report – Air Quality Impact Assessment of Rotomould Facility (Cardup)

Shire of Serpentine Jarrahdale

30 July 2024

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Heather O'Brien
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Air Quality Technical Review

Dear Heather,

This technical review provides comments on the accuracy and representativeness of the *Technical Report – Air Quality Impact Assessment of Rotomould Facility (Cardup)* conducted by EAQ Consulting in 2024. The review focuses on investigating whether there are matters of potentially material significance, rather than seeking to explore potential minor improvements.

Kind regards,

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1. Introduction

1.1 Purpose of this report

GHD Pty Ltd (GHD) was engaged by the Shire of Serpentine-Jarrahdale (SSJ) to provide an independent technical review of an air quality impact assessment (the assessment), prepared by EAQ Consulting (EAQ, 2024) for a rotomoulding facility in Cardup, Western Australia.

1.2 Scope

This scope of this technical review is summarised as follows:

– Consider the methodology and approach for the assessment, regarding the accuracy of emissions estimation and updated results.
– Identify any data gaps, errors, or inconsistencies in the assessment.
– Determine the adequacy and accuracy of the assessment based on the updated results.
– Provide any additional recommendations going forward.

The following documents were reviewed:

– Technical Report – Air Quality Impact Assessment of Rotomould Facility (EAQ, 2024), including:
  - Appendix A – Ektimo Laboratory Results

1.3 Limitations

This report has been prepared by GHD for the Shire of Serpentine-Jarrahdale and may only be used and relied on by Shire of Serpentine-Jarrahdale for the purpose agreed between GHD and Shire of Serpentine-Jarrahdale as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Shire of Serpentine-Jarrahdale arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

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

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

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

2. Project summary

Smartstream Technology owns and operates a plastic production facility (the facility) at Lot 41, 17 Cardup Siding Road, Cardup. The facility undertakes rotational moulding (often called rotomoulding), which produces hollow plastic products. During the rotomoulding process, high temperatures are generated in the rotational moulding oven, and toxic pollutants may form. The atmospheric toxic pollutants may then be released through the ovens stack.

SSJ approved a Development Application (DA) for Smartstream Technology concerning their plastic production warehouse. The DA was subject to several conditions, including the removal of the annual production limit (previously restricted to 1500 plastic units a year) and the ability to operate 24 hours a day, seven days a week.

The DA was approved in August 2023 subject to a new condition as follows:

Condition 10[1]

The development is unrestricted in terms of total production for a period of one year, following which:

a. The production is to return to no more than 1500 plastic units per year due to unsatisfactory outcomes associated with noise, air emissions and odour impacts; or

b. The production is to remain unrestricted due to satisfactory outcomes associated with noise, air emissions and odour impacts.

The objective of the air quality impact assessment is to demonstrate that air emissions have been adequately managed since the imposition of Condition 10.

3. Assessment criteria

The criteria pollutants and principal toxic substances selected for assessment are the same as stack testing results from a suite of combustion gases and aldehydes conducted on 20 September 2022 by Ektimo Pty Ltd (Ektimo).

The additional stack testing was completed by Ektimo on 1 and 2 May 2024, noting the second round of stack testing included emissions from two stacks (Roto Moulding Oven Exhaust Stack (West) and Roto Moulding Oven Exhaust Stack (East), whereas the first round only included one stack.

4. Emission estimation

The emission inventory was based on stack testing results of the rotomoulding oven exhaust stacks, undertaken on 1 and 2 May 2024 by Ektimo. Ektimo is a National Association of Testing Authorities (NATA) accredited laboratory and undertook the stack testing under the appropriate United State Environmental Protection Agency methods and Australian Standards. Monitoring sampled odour, criteria pollutants (nitrous oxides (NO_x), SO_2 and CO), aldehydes and ketones, carbon dioxide and oxygen. GHD reproduced the emissions rates from the stack testing results, which were calculated correctly from the monitoring results.

The basis for the modelling scenario is to represent operating all hours of the year. The operating conditions for the site are unrestricted, allowing 24-hour, seven day per week operation.

Overall, the emission source and estimation approach are considered appropriate.

5. Assessment of results

The predicted concentrations at the nearest receptor for odour and air pollutant results are presented in Table 3-4 for both the previous assessment (EAQ, 2022) and the updated assessment. No pollutants were shown as contour plots. Analysis and interpretation of the predicted airborne concentrations at the ‘nearest receptor’ results are provided and compared to the relevant criteria. The predicted concentrations have only been provided at the nearest sensitive receptor, thus it is assumed predicted concentrations at the remaining four receptors are lower than the presented closest sensitive receptor.

The adjusted predicted concentrations compliance with pollutant criterion, based on updated stack testing results (Ektimo, 2024) as presented in column 7 do not result in exceedance against any of the assessment criteria. Results are presented for NO_x predicted concentrations where NO_2 is the criteria pollutant. This is considered appropriate, as the predicted NO_x concentration is 2.69 percent of the NO_2 criteria.

The predicted concentrations appear to have been factored using the change observed in measured concentrations (columns 2 and 5) to adjust the percentage of criteria (columns 4 and 7). This approach is appropriate providing the stack characteristics have not changed markedly from the first round of stack testing to the second round (i.e. stack temperature and exit velocity), which influence the dispersion characteristics of the plume.

As mentioned, the first round of stack testing only measured pollutant concentrations from one stack whereas the second round measured pollutants from two stacks. The measured stack temperature and exit velocity from the first round was 225°C and 12 metres per second (m/s). The measured stack temperature and exit velocity from the second round was 194°C and 179°C and 4.5 and 15 m/s, for Stack West and Stack East, respectively.

Reviewing the stack characteristics, Stack West is likely to have a plume with less buoyancy (due to lower stack temperature) and less plume momentum (due to much lower exit velocity) and hence higher predicted concentrations than that modelled initially (as presented in Table 3-4, column 3).

Stack East is likely to have a plume with slightly lower buoyancy (due to lower stack temperature) and slightly higher plume momentum (due to higher exit velocity). As the higher plume momentum will likely offset the lower

plume buoyancy, predicted concentrations are likely to be similar to those modelled initially (as presented in Table 3-4, column 3).

In reviewing measured concentrations for Stack West, higher measured concentrations for odour (1400 vs 570 ou.m^3), nitrogen oxides (49 vs 15 mg/m^3), carbon monoxide (28 vs 6.6 mg/m^3) and acetaldehyde (0.23 vs 0.17 mg/m^3) are present for Stack West, which has reduced plume dispersion. Therefore, the predicted concentrations and percentage of criteria (Table 3-4, column 7) may be slightly higher than predicted if dispersion modelling was repeated to include both stacks.

In reviewing measured concentrations for Stack East, higher measured concentrations for total VOCs (6.3 vs 1.3 mg/m^3), formaldehyde (0.42 vs 0.20 mg/m^3) and acetone (4.4 vs 2.5 mg/m^3) are present for Stack East, which has similar plume dispersion to that of the previous assessment.

Therefore, the predicted concentrations and percentage of criteria (Table 3-4, column 7) may be slightly higher than predicted if dispersion modelling was repeated to include both stacks for nitrogen oxides, carbon monoxide and acetaldehyde. However, given the comfortable margin of compliance, with nitrogen oxides having the highest percentage of the criterion at 2.69 percent, it is highly unlikely that remodelled concentrations would be materially higher than those calculated in Table 3-4.

The assessment report (Page 6) states "*Odour impacts are evaluated based on odour field assessment (OFA) techniques, not dispersion modelling; where the OFAs have been undertaken and reported by Ektimo and therefore not represented or discussed herein."*

The OFAs have not been provided for review as part of this technical review. Such OFAs should be requested and provided for review.

6. Conclusions

This technical review has been conducted based on the information presented in *Technical Report - Air Quality Impact Assessment of Rotomould Facility (Cardup)* by EAQ Consulting (2024). The air quality assessment, which also includes odour, presents the measured concentration of the facility's oven stacks and assessment of relevant airborne pollutants.

The key findings for improvement are outlined below:

– **Emission estimation** – Using the results from stack testing by Ektimo to determine emissions gives credibility to emission rates.

– **Assessment of results** – The predicted concentrations appear to have been factored using the change observed in measured concentrations to adjust the percentage of criteria.

  Reviewing the stack characteristics, Stack West is likely to have a plume with less buoyancy (due to lower stack temperature) and less plume momentum (due to much lower exit velocity) and hence higher predicted concentrations than that modelled initially. Stack East is likely to have a plume with slightly lower buoyancy (due to lower stack temperature) and slightly higher plume momentum (due to higher exit velocity). As the higher plume momentum will likely offset the lower plume buoyancy, predicted concentrations are likely to be similar to those modelled initially.

  Higher measured concentrations for odour, nitrogen oxides, carbon monoxide and acetaldehyde are present for Stack West. Therefore, the predicted concentrations and percentage of criteria may be slightly higher than predicted if dispersion modelling was repeated to include both stacks. For Stack East, higher measured concentrations for total VOCs, formaldehyde and acetone are present for Stack East, which has similar plume dispersion to that of the previous assessment.

  Therefore, the predicted concentrations and percentage of criteria may be slightly higher than predicted if dispersion modelling was repeated to include both stacks for nitrogen oxides, carbon monoxide and acetaldehyde. However, given the comfortable margin of compliance, with nitrogen oxides having the highest percentage of the criterion at 2.69 percent, it is highly unlikely that remodelled concentrations would be materially higher than those presented.

  The OFAs have not been provided for review as part of this technical review. Such OFAs should be requested and provided for review.

It is the technical reviewer's opinion that the assessment meets the necessary requirements of the Conditions related to the SSJ's Development Approval.

GHD recommends that an air dispersion modelling assessment is not required annually due to low predicted concentrations and hence low risk to air quality; however continued annual stack testing of criteria pollutants, aldehydes, ketones and odour to demonstrate ongoing compliance is recommended.

7. References

Department of Environmental Protection (2002) *Odour Methodology Guideline.* March 2002

Department of Water and Environmental Protection (2019) *Draft Guideline: Air Emissions.* October 2019

Department of Water and Environmental Protection (2019) *Guideline: Odour Emissions*

EAQ Consulting (2024) *Technical Report - Air Quality Impact Assessment of Rotomould Facility (Cardup)*

EAQ Consulting (2022) *Technical Report - Air Quality Impact Assessment of Rotomould Facility (Cardup)*