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TNG ENERGY FROM WASTE FACILITY – RESPONSE TO SUBMISSION ON THE PLUME RISE ASSESSMENT

Jacobs, on behalf of Blacktown City Council, have reviewed the amended Environmental Impact Statement (EIS) for The Next Generation Energy from Waste Facility (the EIS Review).

Section 3.6 of the EIS review included comments on the Plume Rise Assessment, which was prepared by Ramboll Environ.

Ramboll Environ's response to the Jacobs review of the Plume Rise Assessment is provided in the table below.

Jacobs comment	**Ramboll Environ response**
Section 2.2 notes the existence of 2 stacks each with 2 ducts.	Noted
In Section 2.4 the buoyancy enhancement associated with the 4 ducts is calculated using an approach from Manins et al. 1992. There are two errors in the application of this approach.	Response itemised below
• Firstly given each stack has 2 ducts which are immediately adjacent to one another, the exhaust will in fact be a merged plume immediately above the point of release and would be more accurately modelled as a single release point, with an effective diameter equivalent to the duct diameters of 2.2 m, while retaining the 21.7 m/s velocity.	Hibberd et al / CSIRO (2005) describes how the merging of buoyant plumes from each flue in a multi flue stack can be taken into account in modelling either by using buoyancy enhancement factors, or equivalently, by treating them as a combined source. In other words, the approach suggested by Jacobs in their review and the approach adopted by Ramboll Environ in the Plume Rise Assessment are both valid according to CSIRO (2005).

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Jacobs comment	Ramboll Environ response
• Secondly the term NE in Equation 2 is incorrectly interpreted as the effective number of stacks instead of the buoyancy enhancement factor.	Manins et al (1992) clearly defines N_E as the *effective number of stacks.* Rise enhancement is defined in Manins et al (1992) as the ratio of the rise of the combined plume to the rise of a single plume and the rise enhancement factor (E_N) is then taken as the lesser of $N_E^{1/3}$ or $N^{1/3}$ (where N is the number of stacks). Manins et al (1992) also notes that the maximum rise enhancement factor for N stacks would be $N^{1/3}$, if all the emitted buoyancy were to be completely combined. Therefore, following the approach in Manins et al (1992), *NE* should be raised to the power of 1/3 to derive the rise enhancement factor (which we use as the buoyancy enhancement factor) and not, as suggested by Jacobs, used directly as the buoyancy enhancement factor.
Each of these errors would underestimate the buoyancy of the plumes from each of the 4 ducts and the errors also compound one another.	For the reasons above, our modelling approach is valid and appropriate and, we understand, has been generally accepted by the Department of Infrastructure and Rural Development (DIRD).

References

- CSIRO (2005). Meteorological and Dispersion Modelling Using TAPM for Wagerup: Phase 3B: HRA (Health Risk Assessment) Concentration Modelling – Expanded Refinery Scenario. Prepared for Alcoa World Alumina Australia, By CSIRO Atmospheric Research, 5 April 2005.
- Manins, P.C., Carras, J.N., Williams, D.L. (CSIRO) (1992). Plume rise from multiple stacks. Clean Air Australia May 1992. Vol 26 Part 2 pp 65-68.

Yours sincerely

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