

Independent Peer Review – Willawong Air Quality Health Risk Assessment

Final Report



Dedicated to a better Brisbane

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Attention: Deanna Heinke

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Ref: 2355RepLet6V4

Dear Deanna

Re: INDEPENDENT PEER REVIEW - WILLAWONG AIR QUALITY HEALTH RISK ASSESSMENT - FINAL REPORT

This letter report presents the outcome of an independent peer review of the final Willawong Air Quality Health Risk Assessment (reference: oe102093f2b - dated 9 June 2011) prepared by SIMTARS for Brisbane City Council. Previous review comments have been provided as follows:

- 8 April 2010: interim expert review (reference: 2355RepLet3) considering the Modelling Phase report prepared by SIMTARS (reference: oe102093p1a).
- 20 December 2010: further review report considering the revised modelling report and analyses presented in the SIMTARS report (oe102093p4e).
- 22 March 2011: independent peer review of draft final report (reference: oe102093p4i).

This final peer review provides general overall comments and conclusions, and more specific detailed comments where aspects of the SIMTARS report are considered uncertain or where the approach taken is not supported. The focus of this peer review is the technical aspects of the investigations particularly the dispersion modelling and considers only the data provided in the Final report. It should be noted that review of modelling data input files and other data input and calculations has not been completed.



COMMENTARY ON AIR DISPERSION MODELLING

The atmospheric dispersion modelling completed using the CALPUFF dispersion modelling is considered to represent a suitable methodology.

Uncertainties relating to the waste throughput rate of the Ace Waste incinerator have been addressed in the final report. As a result, emission rates are higher for some compounds than for previous model runs completed by SIMTARS for this project. In the case of benzo-a-pyrene the adopted emission rate is based on laboratory method detection thresholds as opposed to actual measurements (ie, the emission concentration was below the method detection threshold). Because of this, the factoring of the benzo-a-pyrene emission rate is considered highly conservative. Overall, the scaled emission data are considered reasonable in the context of the available emission data for the sources considered in the modelling, and highly conservative in the case of benzo-a-pyrene.

With respect to the meteorological data inputs, an issue that has been raised previously in the peer review process relates to the suitability of the meteorological data utilised in the CALPUFF modelling. The final report provides a comparison of long term Archerfield meteorological data to Brisbane Airport, and to the site specific dataset developed for Willawong for use in the CALPUFF modelling. This comparison demonstrates that the Archerfield meteorological data is reasonably consistent with the Brisbane Airport dataset, however this is of limited relevance given the location of the investigation site at Willawong.

Comparison of the on-site meteorological measurements with data from Archerfield Airport is of direct relevance to the assessment. The comparison demonstrates that while the Archerfield airport data represents the same pattern of wind directions to that observed at the Willawong monitoring site, the wind speeds and % calm conditions vary significantly. For the measured Willawong dataset wind speeds are significantly lower for all wind directions, and calm conditions are 34 % compared to 16 % at Archerfield Airport. The implications of this are that the long term average spatial patterns of ground level concentrations predicted by the atmospheric dispersion modelling are expected to be appropriate. However, the predicted concentrations may be underestimates, as poor dispersion conditions often occurs under calm and low wind conditions.

In the case of the Ace Waste incinerator, the dominant source of emissions considered in the modelling, monitoring data confirms that the gases are emitted at a relatively high temperature (in excess of 100 °C). Where emissions have a relatively high temperature thermal buoyancy will assist in achieving reasonable atmospheric dispersion even under low wind and calm conditions. Thus, whilst the over-estimation of wind speeds introduces greater uncertainty into the dispersion modelling, the potential for poor dispersion conditions to arise under low wind conditions will be less significant than for low temperature sources due to the influence of thermal buoyancy on plume dispersion from Ace Waste. It is expected that this potential under-estimation will be adequately encompassed in the 185 % modelling uncertainty adopted in the SIMTARS methodology for the air quality modelling assessment. The under-estimation will not have been adequately addressed for the chronic health risk assessment, however the adopted methodology is considered highly conservative, hence the uncertainty is considered to be within the bounds of the adopted conservatism and adjustment of the modelling predictions used as an input to the health risk assessment is not considered necessary.



Should the conservatism of the health risk assessment be adjusted, for example by reducing population exposure period assumptions, in the future, then the potential under-estimation of the dispersion modelling under low wind conditions would become a more significant issue and may necessitate re-modelling.

COMMENTS ON RECOMMENDED BUFFER SEPARATIONS

Introduction

Two issues of particular relevance to Brisbane City Council have been raised for specific comment in the peer review process. These relate to the suitability of adopting variable distance contours as the basis for the buffer separations, and the appropriate health risk acceptability threshold. These issues are commented on in the following paragraphs.

Variable Distance from Source

The variable distance of the buffer contours presented in Figure 11.1 of the SIMTARS report are directly related to the atmospheric dispersion patterns in the local area.

In the case of long term risks (chronic and cancer risk) the primary influence on these dispersion patterns is long term meteorological conditions. Therefore, adoption of a variable distance buffer as recommended by SIMTARS is supported for these risks.

In the case of short term risks (acute and odour) the primary influence on these dispersion patterns is short term meteorological events. In the case of odour, the short term impacts are accounted for in the assessment criteria by considering the upper 99.5 %ile of odour events across the modelling dataset (in this case a two year analysis). Further, these events have been adjusted for the typical human 'nose response time' by applying a peak to mean ratio, to represent short term exposure events that could result in nuisance impacts. The proposed buffer contour encompasses the extent of the worst case predicted odour 99.5th percentile for the BCC criterion, and also allows for the upper limit of uncertainty (an adjustment of +185 %) in the modelling data. Therefore, it is concluded that the adoption of the proposed variable distance buffer zone is suitable for achieving an appropriate odour outcome for the community in the vicinity of the Ace Waste incinerator. In the case of acute impacts, the acute risk contour extent is well within the proposed buffer zone hence does not affect the extent and shape of the buffer zone.

It is noted that detailed air quality studies, completed to assess the appropriateness of default guideline separation distances, generally assess acceptability of impacts in terms of the predicted contours. These contours are rarely concentric in nature, due to the range of meteorological, terrain and other factors that are accounted for in the modelling. Concentric buffer zones, such as a separation of 500 m or 1,000 m from a specific source, are most commonly adopted as generic buffer zones for planning purposes. These are generally refined through more detailed analysis and modelling, as undertaken by SIMTARS. The acceptability of distance varying contours where appropriate detailed modelling and analysis has been completed is well established and is regularly considered and accepted in the



Planning and Environment Court.

Health Risk Assessment Acceptability Threshold

The Brisbane City Council Air Quality Planning Scheme Policy (AQPSP) discusses application of health risk assessment methodologies, however no assessment threshold or criteria is defined. The Brisbane City Council Hazard and Risk Assessment Planning Scheme Policy (HRAPSP) primarily focusses on the hazard and risk associated with landuses involving the storage of dangerous goods. The HRAPSP identifies that a commonly adopted individual fatality risk criteria for residential uses is 1 in 1,000,000 per year (assuming a 70 year lifetime exposure, this would be equivalent to 70 in 1,000,000).

As summarised in the SIMTARS report, there is a trend toward adopting a 1 in a 100,000 health risk assessment threshold in Australia and in Queensland, although there is no clear consensus at present amongst the various state, national and international agencies.

The New Zealand government have identified a 1 in 100,000 health risk assessment threshold as acceptable, however other agencies (such as the Western Australian EPA) advocate more stringent thresholds of 1 in 1,000,000 or less. Current proposals by both the Commonwealth (EnHealth draft guidelines, 2010¹) and Queensland government (Draft Environmental Protection Policy for Contaminated Land) that define a 1 in 100,000 risk assessment threshold have yet to be adopted as final. The NSW DECCW allow for a health risk assessment threshold in the range 1 in 10,000 to 1 in 1,000,000 but require demonstration that international best practice has been adopted. To demonstrate international best practice in terms of plant, equipment and operations at Ace Waste would require a more detailed audit of operations and is likely to necessitate licence changes that reflect international best practice. Discussions between Brisbane City Council personnel and the Victorian Environmental Protection Agency² have confirmed that, in Victoria, a 1 in 1 million health risk criteria is adopted for individual sources of emissions, and a 1 in 100,000 health risk criteria is applied as a broader test for overall cumulative health risk impacts from all sources of emissions at a given locality.

In considering the suitability of adoption of a 1 in 100,000 health risk assessment threshold, as advocated in the SIMTARS report, it is also appropriate to consider the uncertainties relating to the Ace Waste emissions. The modelling and assessment process completed by SIMTARS has highlighted the ambiguity of the licence conditions relating to waste throughputs currently imposed on Ace Waste by the Department of Environment and Resource Management (DERM). The emissions monitoring data completed historically at Ace Waste demonstrates non-compliance for some parameters, despite the emission limits being less stringent than those adopted over-seas for a number of the emitted compounds.

Hazardous and regulated waste incinerators overseas, for example in the United Kingdom (UK), are often located at lesser distances than the buffer separations of 400 m or more proposed by SIMTARS. However, these UK operations fall under the auspices of the emission and operational regime imposed

¹ *Environmental health risk assessment: Guidelines for assessing human health risks from environmental hazards*, draft 2010, EnHealth Council

² *Personal communication, Frank Henry (Brisbane City Council) and Lynette Denison (VIC EPA), May 2011.*



under the EC Directive 2000/76/EC (December 2000). The EC directive imposes significantly more stringent emission concentrations than the Ace Waste licence issued by DERM.

Overall, it is considered appropriate to adopt a precautionary approach in relation to Ace Waste, until there is clear policy direction from Brisbane City Council, DERM and/or the Commonwealth on the appropriateness of a 1 in 100,000 risk assessment threshold. This could be satisfied in the near future (by the end of 2011) if the final Commonwealth EnHealth guidelines recommend adoption of this risk threshold or the QLD DERM issuing regulatory guidance that identifies the 1 in 100,000 risk assessment threshold as appropriate.

In addition, it is recommended that the issues identified in the SIMTARS analysis of the Ace Waste operations and development permit conditions (Section 10.3.1 of the SIMTARS report oe102093f2) should also be addressed to ensure the outcomes of the modelling predictions remain valid in the future. In our opinion, the area of uncertainty with greatest significance to increase the buffer zone is the potential for emissions from the Ace Waste incinerator to vary significantly over time. Therefore, the management of future emissions through appropriate licensing and control by the Department of Environment and Resource Management (DERM) is a key element in achieving this outcome.

CONCLUSIONS

Overall, it is concluded that the SIMTARS 'Willawong Air Quality Health Risk Assessment' provides a suitable basis for developing appropriate buffer separations from the Ace Waste incinerator. As with any technical study of this nature, there are a number of uncertainties that apply to the analysis however SIMTARS has attempted to address these uncertainties wherever possible. Where these uncertainties cannot be fully accounted for, the issues are identified by SIMTARS to allow a view to be formed regarding the suitability of the overall analysis.

Subject to the 1 in 100,000 health risk assessment threshold being adopted in as appropriate by Brisbane City Council or at Commonwealth and/or State level in the future, then it is concluded that the 1 in 100,000 buffer zone defined in Figure 11.1 of the SIMTARS report is appropriate from an air quality and health risk perspective. It is noted that the long-term suitability of the buffer zone recommended by SIMTARS is reliant on the appropriate licensing and control of Ace Waste by the Queensland Department of Environment and Resource Management (DERM) in the future.

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Yours sincerely
for Air Noise Environment Pty Ltd

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