



DOC21/1057479-10

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Attention: Mr Jeffrey Peng

ELECTRONIC MAIL
24 December 2021

Dear Mr Peng,

EPA Request for more Information on Environmental Impacts

Thank you for the request for advice from Public Authority Consultation (PAE-32670512), requesting the review by the NSW Environment Protection Authority (EPA) of the Environmental Impact Assessments for the proposed Second Thermal Oxidiser (Application DA246/96 MOD-4) at Terminals P/L, 45 and 51 Friendship Road, Port Botany (the premises).

The EPA has reviewed the *Statement of Environmental Effects Section 4.55(2) to DA 246/96, Second Combustor, Terminals Port Botany*, prepared by Urbis, undated (the Modification Report) which includes the following key appendices:

- Appendix D - HAZOP, prepared by Pinnacle Risk Management Pty Ltd, dated 28 October 2020;
- Appendix E - Preliminary Hazard Analysis, prepared by Pinnacle Risk Management Pty Ltd, dated 14 November 2020.
- Appendix F- Air Quality Assessment (Rev 4), prepared by Peter Ramsay and Associates dated 8 November 2021 (the AQIA)
- Appendix G - Waste Management and Impact Assessment prepared by Icubed dated 3 November 2021 (the WMIA)
- Appendix H - Waste Management and Heat Recovery Report, prepared by Quantem dated 11 August 2021 (the Waste Management and Heat Recovery Report)
- Appendix I - Technical Specification VOC and Liquid Waste, prepared by CEC dated 9 November 2021 (the Technical Specification)
- Appendix K - Response to EPA RFI, prepared by Ricardo dated 9 November 2021 EPA response

The purpose of this letter is to provide comments on the AQIA and on some aspects of the WMIA. This letter replaces the EPA's letter dated 17 December 2021 (DOC21/1047479-6) which provided comments on the AQIA only.

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The EPA will update its response in early 2022 to provide comments on the Comparative Assessment contained in section 3.7 of the WMIA and the Greenhouse Gas Comparison contained in section 3.8-3.11 of the WMIA.

The EPA understands that the proposal is for:

- Installation and operation of a second thermal oxidiser (TO) and associated infrastructure at the premises, to combust liquid hydrocarbon waste generated at the premises.
- Demolition and removal of an existing liquid waste tank.
- Repurposing of an existing tank for use as a new liquid waste tank.

Activities undertaken at the premises are regulated by the EPA under Environment Protection Licence no. 1048 (the licence), issued under the *Protection of the Environment Operations Act 1997* (the Act). Under Section 45 of the Act, in exercising its licensing functions, the EPA is required to take into consideration any pollution caused or likely to be caused by activities under the licence and the likely impact of that pollution on the environment.

The EPA notes that this proposal was previously submitted through 4.55(1A) of the *Environmental Planning and Assessment Act 1979* as Modification 3 (Mod-3) and sent to the EPA for comment (PAE-11650633) on 30 November 2020. The EPA reviewed the previous AQIA (Peter J Ramsay & Associates, V1.2, November 2020) and discussed the issues in subsequent meetings with the proponents and the Department. A revised AQIA (Peter J Ramsay & Associates, V1.3, February 2021) (the revised AQIA for Mod-3) was submitted under Mod- 3 prior to its withdrawal. The EPA refers to the revised AQIA for Mod-3 in this advice.

The EPA has reviewed the AQIA and considers that the document does not clearly present the expected and modelled emissions for the proposal.

The AQIA submitted for Mod-4 is not significantly altered from the revised AQIA submitted under Mod-3. Although the predicted impacts do not exceed the impact assessment criteria and the benzene impacts from the proposed thermal oxidiser do not appear to significantly contribute to ground level concentrations, the AQIA lacks clarity and robustness in providing the emission parameters with the result that it hinders evaluation of the proposal. Specifically, the EPA has identified numerous inconsistencies with the flow rates, two sets of manufacturer emission concentrations and stack specifications. The EPA is unable to confidently ascertain that the predicted impacts remain valid considering the uncertainties identified in the AQIA. Further details are outlined in **Attachment A**.

The EPA has reviewed the WMIA (except for the Comparative Assessment contained in section 3.7 and the Greenhouse Gas Comparison contained in section 3.8-3.11). Inadequacies remain within the WMIA and these are detailed in **Attachment B**.

If you have any questions in relation to this matter, please contact Afnan Fazli on (02) 8275 1415 or at Afnan.Fazli@epa.nsw.gov.au.

Yours sincerely



James Goodwin
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Attachment A – EPA review of the AQIA for Mod-4

Inconsistent and unclear emission concentrations and emissions parameters

The AQIA states that the proposed maximum emission limit for benzene is 1 mg/m³, however provides manufacturer emission calculations at reference conditions in both Appendix E (1.7482 mg/m³) and Appendix G (0.3707 mg/m³) that differ. The methodology section of the AQIA says the worst-case scenario calculation is provided in Attachment G. However, the lack of a clear and consistent emission concentration in the AQIA causes uncertainty regarding the expected performance of the proposed thermal oxidiser.

Further, the flow rates provided are inconsistent throughout the AQIA. The flow rates provided at reference conditions for the proposed thermal oxidiser provided in both Appendices E and G is 19734 Nm³/hr (5.48 m³/s), however, the flow rate provided in Table 5 of the AQIA for inputs into calculated emission rates is 6.71 m³/hr and 5.5 m³/s in Table 8. Flow rates provided in the revised AQIA for Mod3 were 25.16 m³/hr (Table 5) and 25.16 m³/s (Table 8). Similar inconsistencies occur for the existing thermal oxidiser.

Additionally, there have been changes in the AQIA for Mod-4 compared to the revised AQIA provided to the EPA for Mod3. These include the modelling of both thermal oxidisers at the licence limit (existing for TO-1 and proposed for TO-2) of 1 mg/m³ for benzene in the Mod3 AQIA while using the manufacturer calculations in the Mod4 AQIA. The proposed thermal oxidiser stack diameter has also changed while the flow rates remain the same (Appendix E vs Appendix G).

Despite all these inconsistent and unclear emission concentration, parameters and emission rates, the predicted impacts (Tables 9, 10, 11 and 12, Figures F3, F4, F5 and F6) remain exactly the same as presented in the revised AQIA for Mod3. Figure F3 of the predicted impacts remain dated 10/2/2021 which indicates the model has not been updated to reflect changes made as outlined above.

While the predicted impacts are all below the relevant impact assessment criteria and may not materialistically change as a result of the identified emission changes, the AQIA for Mod4 does not provide enough clarity and robustness to evaluate this. Although difficult to ascertain, the information in the AQIA indicates that the impacts of the proposal may need to be remodelled.

In summary this issue could be a result of:

- a) The AQIA providing multiple manufacture emission calculations (Appendix E, Appendix G), without clarity on which calculations are representative of the proposed design; and
- b) Inconsistencies with the emission parameters outlined and adopted within the modelling, particularly given the provision of multiple manufacturer emission calculations (Appendix E, Appendix G).

Recommendation: The EPA recommends the AQIA for Mod-4 include clear and consistent emissions concentrations and parameters and the proponent confirm the emission parameters (concentration, flow rate and emission rates) that were modelled for both of the thermal oxidisers.

The EPA recommends that the proponent either confirm that the predicted impacts remain valid or remodel them using the correct and updated emission parameters. This should include modelling existing sources at licence limits, clearly outlining the expected emissions performance of the proposed thermal oxidiser in the main AQIA and correcting inconsistent or incorrect emission parameters.

Attachment B – EPA review of the WMIA for Mod-4

1) Thermal oxidation has not been demonstrated as a suitable and fit-for-purpose technology for the treatment of all the liquid waste generated onsite proposed to be treated this way

The application (Technical Specification s3.3) states that solid particles are assumed not to be present in the liquid waste stream. Solid particles present an issue to the treatment of liquid waste via thermal oxidation. In addition to the potential for solid particles to foul the TO and its critical components such as the liquid waste injection/spray nozzle, the TO has no flue gas filtering. Without flue gas filtering the TO has no control of particulates generated from the waste streams that it treats, and ash and solids can accumulate within the TO.

The application refers to the Quantem facility as an 'end of line' storage facility and import terminal that does not have the processing equipment to undertake liquid treatment technologies such as filtration (WMIA, s3.4.2/3.4.3). Liquid wastes generated at the site are proposed to be consolidated and collected in a single tank (T261) in order to produce a waste stream that is as homogenous as possible, noting the high variability and lack of chemical and physical homogeneity in Quantem's waste streams.

Wastes to be treated in the TO are categorised in the application (WMIA s3.2) as:

- a. Waste from routine operations, generated primarily from line cleaning and line changeover operations. The waste is stated to be liquid chemical waste and solvents used to flush the lines.
- b. Waste from environmental effects, generated primarily at road tanker gantries and consisting of potentially contaminated stormwater. The waste is stated to be typically contaminated with minor quantities of product that has collected on pavement such as small drips and spills associated with sampling and hose couplings in the gantry bays.
- c. Waste from routine and planned maintenance, generated from the emptying, inspection and cleaning of tanks. The cleaning is stated to involve solvents with steam and water washing, generating a mixed composition waste, that can include flammable base solvents, cleaning solvents and water, de-greasers, scale and general heavy sludge from tank bases.

Waste from environmental effects (road and stormwater runoff) and routine and planned maintenance (including accumulated scale and sludge from tanks) therefore will and do contain solid particles. The thermal oxidation of site liquid waste (consolidated in Tank T261) will also therefore result in the generation and emission of particulate matter – which as noted above may foul and damage the TO, as well as have environmental effects.

The application (WMIA, s3.4.6) also refers to a previous disposal pathway of the site's liquid waste at Cleanaway's Homebush facility, the first step of which involved the removal of solids by gravity settlement, skimming or coarse filtration, with the solids being disposed to landfill. The Cleanaway liquid treatment process is designed to manage the solid component of the liquid waste generated at Terminals, which the current proposal lacks.

Further to the above, the application (WMIA, s 3.2) refers to the site storing and managing chemicals including, corrosives. Although detailed information on the specific corrosives is not provided, corrosives refer to strong acids and bases which are inorganic chemicals, and which also readily dissolve other inorganic chemicals. However the application (*Technical Specification* s3.3) also states dissolved inorganic chemicals "which would form particulates and build up in the base of the thermal oxidiser or be carried out with the stack gases" are not assumed to be in the liquid waste stream. The EPA is concerned that the TO may not be suitable for the liquid waste stream that is proposed to be processed.

Recommendation: The EPA recommends that the proponent review the proposed liquid waste treatment technology to be employed and provide information to demonstrate the proposed liquid waste management strategy is suitable and fit for purpose, including for each waste stream and associated contaminants.

2) The current and proposed waste reduction and management strategies require implementing and further review to ensure waste avoidance is maximised and waste treatment is avoided or minimised.

The WMIA and the Waste Management and Heat Recovery Report provide information on management actions and controls used, implemented over the last 5 years and proposed to minimise liquid flammable waste generated at Quantem's Site A and Site C Terminal's at Friendship Road, Port Botany. The report states that Quantem considers the current generation of waste at these sites as minimised as far as practicable and concludes:

- a) Further separation of product to recycle is not feasible due to various miscible products;
- b) Filtration to recycle is not feasible; and
- c) Reuse is not viable due to the range of products handled and infrastructure requirements are not possible with the footprint required.

The report also refers to energy recoverable from the TO stack gases and heat recovery uses contemplated.

However, the EPA notes the waste reduction review in the Waste Management and Heat Recovery Report (s3) does not consider all potential control measures and strategies to avoid or minimise liquid waste generation. In particular, the report does not consider possible opportunities and measures to segregate liquid wastes, alternative disposal options for those liquid wastes and the potential associated benefits of doing this. Segregation of certain liquid wastes generated onsite may eliminate the need for the waste to be thermally oxidised and may enable the management/treatment of the waste via preferred and more environmentally sound liquid waste management techniques.

For example rainwater entering the loading bays is automatically pumped to flammable waste when it may be possible to utilise other methods and systems to manage, segregate and ultimately dispose of, predominantly rainwater runoff waste - which could then be managed via liquid waste treatment technologies, rather than through the TO.

Management of liquid wastes associated with product spills at loading bay gantries is also not considered separately, which could minimise the generation of mixed solvent and VOC waste streams. First flush and other liquid waste control methods and technologies are not referred to and therefore do not appear to have been considered.

The EPA also notes that a trial to separate flammable waste from water was undertaken by Stephenson Applied Services, however the trial was based on separation of consolidated mixed solvent wastes (generated from line cleaning, tank maintenance and related operations) – most being miscible with water and thus difficult to separate. Liquid waste generated at loading bay gantries however may be able to be managed for example on a batch basis thus potentially enabling the segregation of non-miscible solvent wastes and miscible solvent wastes.

Recommendation: The EPA recommends that the proponent review the waste reduction and minimisation strategies employed and proposed for liquid waste generated the site and provide further information to demonstrate all potential options including those relevant to waste segregation and more tailored individual or specific liquid treatment strategies that may be applied to different types/batches of waste have been considered.

A table outlining each liquid waste source, its composition, waste reduction and minimisation strategies, disposal options, preferred approach and the reasoning for this would assist in demonstrating that waste avoidance is maximised and waste treatment is avoided or minimised.

3) The application lacks clarity with respect to the location, quantities, movement and management of wastes to be treated by the thermal oxidiser and stored, and the activities that generate liquid waste streams associated with the proposal.

The application refers to Site A which includes where the new TO will be constructed, and Site C where no works are proposed and will form a part of a complying development certificate (CDC) (section 3.5 Modification Report).

The Modification Report (s7.2.5) refers to a reduction of truck movements between the two sites by one truck a week however does not provide further information on the relationship between the sites or activities undertaken on Site C.

The HAZOP (s2) refers to liquid waste being sourced from Site A and Site C, and the Waste Management and Heat Recovery Report (s2) describes “the operational areas on both Sites A and C that generate flammable waste”. The WMIA (s3.1) refers to Site C being dedicated to ‘ground fuels’ with no water-based line cleaning or flushing.

The EPA notes the waste origins/locations for the non-flammable waste streams is not provided in the WMIA or elsewhere in the proposal application.

The application notes the new TO will have a throughput of approximately 972 tonnes per annum (based on 6.5 L/hr at 10 hrs/day 5 days/week and 50 weeks/year – (Technical Specification s3.3) or maximum 2722 tonnes per annum per annum if operated more frequently and for a longer duration (based on 6.5L/hr at 20hrs/day 7 days/week and 50 weeks/year. This is stated to be “well in excess of the anticipated liquid waste stream volume” (Response to EPA RFI, s3.1). A summary of the annual throughput and waste generation data is provided in the WMIA (s3.1) however quantitative information specific to each waste stream and source is not provided.

Further information on the origin/location of wastes (ie Site A or C and the source location for each waste) and their estimated quantities is required to verify the project’s design specifications are consistent with site operating conditions and scenarios, and subsequently to demonstrate the assessment of project impacts is adequate.

Recommendation: The EPA recommends that the proponent provide detailed information on the location, quantities, movement and management of wastes to be treated by the TO and stored onsite, and the activities that generate liquid waste streams associated with the proposal.

4) The use of thermal oxidisation at Quantem’s West Melbourne site and other locations is not demonstrated as consistent with the proposed use and NSW requirements

The WMIA notes (s3.5 and s3.6):

- a) Quantem operates a combustor at their West Melbourne site (since 2002) that undertakes thermal oxidation of VOC vapour streams, and from late 2007 onwards commenced thermal oxidation of the liquid waste stream from their site in addition to the vapour stream.
- b) The liquid waste stream processed at the West Melbourne site is of ‘comparable chemical composition’ to that proposed for thermal oxidation at Port Botany.
- c) The operational data from the West Melbourne site demonstrates no deleterious impacts from the introduction of the liquid waste stream, with the latest February 2020 test results showing a destruction efficiency of 99.99% for VOCs.
- d) With respect to best available techniques to treat the proposed liquid waste stream, thermal oxidisers that treat aqueous phase waste streams have been installed in facilities such as Queensland Alumina, APA Group, Leigh Creek Energy and Northern Oil Refinery.

The EPA notes the WMIA or other assessment documents do not provide any details of the West Melbourne plant (combustor), liquid waste and operational parameters or any direct comparison of the West Melbourne operations to the proposed TO and its operation at Port Botany. Therefore it is unclear if Quantem’s West Melbourne combustor also processes liquid waste from environmental effects (road and stormwater runoff) and routine and planned maintenance (including accumulated scale and sludge from tanks) that for example contain solid particles, are highly variable in physical and chemical composition, and may consist of close to 100 percent water.

The MWIA or other assessment documents do not provide details on the TOs installed at Queensland Alumina, APA Group, Leigh Creek Energy and Northern Oil Refinery and their operations and how they are applicable to the current proposal. The EPA however notes the circumstances and nature of the operation of these TOs are likely to be considerably different to that required at Terminals Port Botany, due to the differing nature of the operations, wastes generated and other factors. Consequently, it is not suitable or appropriate to use these sites to assist to demonstrate a thermal oxidation process is consistent with best practice for the current proposal.

The EPA also notes the required destruction efficiency for the TO operating at Port Botany is 99.9999%, due to the TO being used to treat air impurities originating from material containing principal toxic air pollutants such as benzene. However, the WMIA (s3.5) refers to a destruction efficiency of only 99.99% for VOCs in the latest testing results from the West Melbourne site combustor. Consequently, based on information gained from the West Melbourne site it is unclear if the proposed TO at Port Botany will be able to meet NSW air pollution control requirements.

Recommendation: The EPA recommends that the proponent provide further information on the use of thermal oxidation at Terminal's West Melbourne plant and elsewhere to demonstrate and support the proposed use of thermal oxidation alone to treat the proposed liquid waste streams, including predominantly aqueous wastes generated from environmental effects (gantry and storm water runoff), is consistent with current international best practice for the management of the proposed liquid wastes.