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13 September 2021

Thomas Bertwistle
Department of Planning, Industry and Environment
GPO Box 39
SYDNEY NSW 2001
Via email: thomas.bertwhistle@planning.nsw.gov.au
CC:

Dear Mr Bertwhistle,

RE: MP08_0129 Mod 5 – Orica Kooragang – Prill Tower Scrubber - Request for further information

NSW EPA

I refer to the request for additional information dated 9 September 2021. Please find below Orica's response to the information requests below.

1. ***Clarification that the concentrations provided in Table 12 of the Air Quality Impact Assessment are dry concentrations. If they are not, the mass rates should be recalculated based on dry concentrations;***

   Inlet and outlet pollutant concentrations provided by the vendor were based on the available moisture content anticipated to be ~2% on average. The air quality consultant has advised that while inlet and outlet concentration inputs to the model were on a wet basis, the volumetric flow rates utilised were on a dry basis, which resulted in a slight overestimation of the pollutant mass emissions rates (approximately 2% overestimate). Given the single stack nature of the dispersion model the impact of the wet basis inputs can be proportionally applied to the modelling results which would reduce the ground level concentrations. Given the above, the air quality impact assessment is considered to provide a slightly overstated but conservative estimate of ground level concentrations which does not alter the conclusions of the air quality impact assessment, and recalculation is not therefore considered warranted. Ground level pollutant concentrations for the scrubbed system are well below the existing predicted concentrations and well below NSW EPA assessment criteria for all pollutants.

2. ***The Vendor or Manufacturer's guarantee for particulate and ammonia emission concentrations(dry) from the scrubber;***

   The technology vendor has provided a conditional guarantee based is a set of assumptions

and predictive modelling of anticipated performance of the proposed system as follows:

Scrubber configuration

- 88 candle filters/beds (20 ft, lower efficiency pack)

Gas conditions at scrubber inlet

- Flowrate 490,000Nm3/h
- Temp 37 degrees C
- Pressure -1 kPa gauge
- Moisture 2.3% by weight

Scrubber solution conditions

- 40% Ammonium nitrate
- pH 2.0-3.0
- Temp 40 degrees C

On this basis the system will deliver PM2.5 (as part of PM10/TSP) concentrations of less than 5mg/Nm3 (wet), provided inlet concentrations remain below 100mg/Nm3 (wet) and assuming the PM10/PM2.5 fraction constitutes 30% of total particulates or 15mg/m3 whichever is the greater. As noted in the report, based on available process data, it is anticipated that input concentrations to the scrubber will be typically below 20mg/m^3 (Scenario 2A) 99% of the time, and typically below 50mg/m^3 (Scenario 2B) 99.9% of the time. Input concentrations to the scrubber will be below 100mg/m^3 (Scenario 2A) 99.99% of the time based on the best available historical information. Based on the above thresholds, modelling provided in the EA considered three scenarios:

Typical Scenario – Assumed typical inlet scrubber concentration of 20mg/Nm^3 TP (NH_4NO_3-solid) (wet), 15mg/Nm^3 (wet) (NH_4NO_3-solid) PM_{10}/$PM_{2.5}$ and 3.0mg/Nm^3 NH_3 (gas)

Conservative Scenario – Assumed conservative inlet scrubber concentration of 50mg/Nm^3 TP (NH_4NO_3-solid) (wet), 15mg/Nm^3 (wet) (NH_4NO_3-solid) PM_{10}/$PM_{2.5}$ and 3.0mg/Nm^3 NH_3 (gas)

Reasonable Worst Case Scenario – Assumed Reasonable Worst Case inlet scrubber concentration of 100mg/Nm^3 (NH_4NO_3-solid) TP (wet), 30mg/Nm^3 (NH_4NO_3-solid) (wet) PM_{10}/$PM_{2.5}$ and 10.0mg/Nm^3 NH_3 (gas)

While these assumptions are reasonable, the final actual performance of the system is subject to validation through post implementation stack testing.

3. Discussion and demonstration that the only pollutants of concern from the scrubber are ammonia and particulates; and

The prill tower consists of a vibrating prill head dropping heated 88% ammonium nitrate solution (as droplets) down an enclosed shaft with counter current air flow to cool and

solidify the solution into prill (solid AN). As such the only pollutant produced by the process is particulates (ammonium nitrate as particulate) and any ammonia fume that dissociates from that solution during cooling.

Dissociation of ammonia fume from the recirculating scrubber liquor, (weak ammonium nitrate solution - 40%) is minimised using an acid dosing and control system to manage pH within specified ranges.

4. ***Justification of the ammonia emission concentrations used in each scenario, noting that discharge point 16 on the Licence does not have an ammonia emission limit and, no monitoring reports have been provided in the SEE.***

Orica KI undertook 15 rounds of ammonia testing on the Prill Tower in January 2013 as part the early phases of the investigation into options for control of PM2.5 and particulates via a scrubbing system for the Prill Tower. This data was collected prior to improvements made in scrubber control (ie. fan speed management) and was collected in summer at full fan speeds (when ambient temperatures are highest and cooling is least efficient) to simulate a range of performance, including poor operation, and therefore the data set is considered a conservative estimate of typical performance. These historical results were used as the basis for design and modelling of inputs to and outputs from the proposed scrubbing system, with high range concentrations of ~10mg/m3 (this would be considered abnormally high) and typical concentrations of 3mg/Nm3 wet (the average of the data set, even including the high range results was 2.5mg/Nm3). Further testing was conducted in June 2021 to confirm the validity of the historical results, with an ammonia concentration of 2.1mg/m3 consistent with the typical range used for modelling and design.

As noted above in response 3, control of scrubber liquor pH will be the key process control for ammonia fume. Ammonia gas is highly hydrophilic, and given the proposed scrubbing technology is a wet technology, the scrubber will be an effective control in removing ammonia fume to acceptable levels as confirmed by the technology vendors modelling and the air dispersion modelling. The final actual performance of the system is subject to validation through post implementation stack testing.

Safework

I refer to the request for additional information dated 26 August 2021 (Ref: 20-17 2019/005574). Please find below Orica's response to the information requests below.

1. ***Request Orica perform hazard identification and risk assessment for construction activities.***

Orica KI has a safety management system in place that includes work and contractor management process to ensure all Safety, Health, Environment and Security (SHES) risks are assessed prior to undertaking work, as part of Permit To Work (PTW) and Job safety and Environment Analyses (JSEA's). In addition, a project specific Construction Safety and Environmental Management Plan will be developed.

Orica also complete pre-construction HAZCON and constructability reviews and part of its hazard management process to identify SHES risks and refine the construction methodology.

2. ***Request Orica pay special attention to overhead crane use and ensure any crane failure does not impact ammonium nitrate store or ammonia storage tank integrity.***

As noted above Orica KI has a safety management system in place that includes work and contractor management process to ensure all Safety, Health, Environment and Security (SHES) risks are assessed prior to undertaking work as part of permit to work and Job safety and Environment Analyses (JSEA's). This includes preparation of lifting plans as part of crane operations, to ensure all lifts are planned and appropriately supported.

The Ammonia Storage Tank (V101) is located approximately 300m away from the Prill Tower Scrubber project area. The Ammonia Nitrate Store (bulk bin) is on the western (opposite) side of the ANP1 Dry Building and approximately 50m away, so is not in the close vicinity of the project area.

3. ***Request Orica ensure any construction activities do not compromise housekeeping in the ammonium nitrate store, with special attention to: dust accumulation in AN store, oil leak from vehicles, other machinery result in contaminating AN store***

None of the proposed works relate to the AN store/bulk bin.

City of Newcastle

The comments relating to traffic and stormwater are dealt with in the existing consent 08_0129.

Please contact me if you require any further information.

Yours sincerely

Nathan Robinson

Senior Specialist Environment – Kooragang Island