Your Reference:
Our Reference: 011017APHBH

4th October 2017

Ms Christine McDonald
Secretary
Environment and Communications References Committee
PO Box 6100
Parliament House
ACT Canberra 2600

Dear Christine,

RE: RESULTS OF BASELINE AIR QUALITY MONITORING STATUS ON THE BURRUP PENNINSULA

In line with Yara Pilbara's willingness to share information with the Committee regarding its operations I am pleased to provide the latest analysis from monitoring of ambient air concentrations at rock art monitoring sites near the Yara Pilbara Technical Ammonium Nitrate (TAN) Plant.

Attached to this letter is a summary of the findings based on the ambient air concentrations of ammonia (NH3), nitrogen dioxide (NO2), sulphur dioxide (SO2) and nitric acid (HNO3) and calculation of dry deposition rates of these gases onto the surface of rock art on the Burrup. A brief synopsis of the enhancements to Yara Pilbara's Air Quality Monitoring program is also discussed.

Given the speculation regarding the potential impact emissions from the TAN plant on rock art it should be noted that:

- Historical modelling carried out for the TAN Plant environmental approval predicted a maximum dry deposition rate of 68 mill equivalents/m^2/year from a combination of plant emissions and background concentrations.
- The CSIRO identified a critical loading value of 200 mill equivalents/m^2/year, below which harmful impacts to rock art were unlikely to occur.
- Dr John Black, who has also presented his theories to the Inquiry proposed a critical loading value of 25 mill equivalents/m^2/year as appropriate for protection of rock art from atmospheric emissions. It should be noted that the proposed critical loading value provided by Dr Black has not been validated by field studies.
- The dry deposition rates outlined in the attached analysis by Strategen Environmental are all well below the CSIRO critical loading value and the maximum predicted deposition rate from the modelling for environment approval of the plant.
- The rates range between 12-34 mill equivalents/m^2/year for the three rock art monitoring sites and for the 3 years of monitoring conducted for the baseline study.
- Six of the nine deposition rates are below the value suggested by Dr Black.
- Importantly, none of the dry deposition rates exceed the critical loading (200 mill equivalents/m^2/year) identified by the CSIRO.

Yara Pilbara is continuing to work with the Murujuga Aboriginal Corporation and other stakeholders to support current and future Rock Art monitoring and management programs on the Burrup Peninsula.

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To this end Yara Pilbara has completed the first phase of equipment upgrades to all three offsite Air Quality Monitoring stations.

The second phase is due to commence in November 2017. This phase which will see the implementation of advanced point source emission monitoring technologies and the additional infrastructure required to support any future equipment for Yara and potentially, other external stakeholders

Please do not hesitate to let me know if we can provide any further clarification or information to the Committee.

Yours Sincerely,

Brian Howarth

Health, Environment, Safety & Quality Manager
Yara Pilbara Fertilisers Pty Ltd / Yara Pilbara Nitrates Pty Ltd

Encl: *Yara Pilbara Baseline Deposition Briefing Note*

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To: Brian Howarth

Company: Yara Pilbara Nitrates Pty Ltd

Date: 3 October 2017

Inquiries: Peter Forster

Revised briefing note - Deposition rates from Baseline study
Yara Pilbara Technical Ammonium Nitrate Plant

1. Background

Yara Pilbara Nitrates (YPN) has been monitoring ambient air concentrations of ammonia (NH_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and nitric acid (HNO_3) at rock art monitoring locations (Sites 5, 6 and 7) since September 2013. Dust deposition rates have also been measured at those sites. The monitoring of those gases and dust deposition measurements has been conducted as per the requirements of Condition 9 of the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval.

The gas concentration data have facilitated calculation of dry deposition rates of these gases onto the surface of rock art on the Burrup. This memo provides an update on dry deposition rates from measurements reported to the Department of Environment and Energy (DoEE) in the Baseline Report required under Condition 9 of the EPBC approval. The results of the dust deposition measurements are also discussed.

2. Dry deposition rates - gases

Dry deposition rates have been calculated for each month of monitoring, with an annual total calculated from the summation of monthly rates for each 12 month period of baseline monitoring. The annual deposition rates in units of milliequivalents per square metre per year (meq/m^2/year) have been compared with critical loading values proposed by CSIRO (200 meq/m^2/year) and Dr Black (25 meq/m^2/year). For comparison, modelling carried out for the Technical Ammonium Nitrate (TAN) Plant environmental approval predicted a maximum deposition rate of 68 meq/m^2/year from a combination of TAN Plant emissions and background concentrations.

The CSIRO critical value was derived from consideration of a range of ecosystem sensitivities to acid deposition published by Cinderby, et al, in 1998, with a relatively high value (200 meq/m^2/year) assigned on the basis of CSIRO's conclusion that Burrup ecosystem is relatively insensitive to acid deposition. Dr Black's value (25 meq/m^2/year) is the lowest of the sensitivity classes assigned by Cinderby, et al, and represents the most sensitive ecosystem tolerance for acid deposition. The suitability of these values to inform risks to rock art has not been tested in an appropriately constituted study and as such both values (and values in between) have been considered for assessment of measured dry deposition rates.

The results of dry deposition rate measurements are shown in Table 1. These values were calculated from the combined rates for HNO_3, SO_2, NH_3 and NO_2.

Table 1: Annual deposition rates (meq/m^2/year)

Location	Sept 2013-Aug 2014	Sept 2014-Aug 2015	Sept 2015-Aug 2016
Site 5 (Burrup Rd)	23	20	23
Site 6 (Water Tanks)	28	22	30
Site 7 (Deep Gorge)	16	12	34

These deposition rates are all well below the CSIRO critical loading value (200 meq/m^2/year) and the maximum predicted deposition rate from the modelling (68 meq/m^2/year). Six of the nine (67%) rates are below the value suggested by Dr Black (25 meq/m^2/year), with the three rates in exceedance of Dr Black's proposed loading value only marginally greater and well below the CSIRO critical loading value.

Notwithstanding the significant difference in the respective critical loadings proposed for the Burrup by the CSIRO and Dr Black, the results which are below or just above the lower critical value proposed by Dr Black suggest a low risk of adverse impacts to the rock art was provided by the ambient concentrations of the above gases during the baseline study.

3. Dry deposition rates – particulates

Dry deposition rates for "dust" as insoluble particulates are summarised in Table 2.

Table 2: Annual average of monthly deposition rates (g/m^2/month) for insoluble particulates

Location	Sept 2013-Aug 2014	Sept 2014-Aug 2015	Sept 2015-Aug 2016
Site 5 (Burrup Rd)	0.84	0.99	0.86
Site 6 (Water Tanks)	0.76	0.95	0.81
Site 7 (Deep Gorge)	0.86	1.33	1.04

Reference deposition rates are not available to determine the significance of these results in respect of potential impacts to rock art from deposition of ambient dust. For information, the former NSW Department of Environment and Conservation (now part of NSW Environment Protection Authority) specifies a deposition rate guideline of 4 g/m^2/month calculated on an annual basis for insoluble dust fraction as acceptable in respect of impacts to amenity.[1] It is Strategen's experience that the measured deposition rates nearby to industrial facilities such as oil and gas, and petrochemical plants are often largely representative of background dust levels and do not reflect significant contributions from those industrial activities.

Monthly dry deposition rates of (water) soluble cations and anions including ammonium, sulfate and nitrate were not measured in the Baseline study. Yara commenced those measurements in Q1 2017 in anticipation of a requirement from the DoEE in a Directed Variation to the EPBC approval. The results from those initial measurements are currently being collated and interpreted.

4. Work in progress

Yara continues to monitor the four gases at the three off-site locations to determine dry deposition rates. In addition, monitoring of key anions (including ammonium, nitrate and sulfate) in deposited dust commenced in 2017 and is expected to be ongoing as a Directed Variation condition issued by Department of the Environment and Energy. Although not included in the EPBC approval, an upgrade of rain water sampling equipment is in progress to facilitate reliable measurements of wet deposition rates at off-site locations.

[1] http://www.epa.nsw.gov.au/resources/air/07001amsaap.pdf

Dr Peter Forster
Affiliate and Principal
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