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Memorandum

To	NSW Environment Protection Authority	Page	14
CC	Weston Aluminium Pty Ltd		
Subject	EPA Comments: Modification to Weston Aluminium facility for Pharmaceutical and Illicit Drug Processing		
From	David Rollings, Associate Director – Air Quality		
File/Ref No.	60486360	Date	2-Nov-2017

The following memorandum has been prepared in response to a submission received from the NSW Environment Protection Authority (EPA) dated 25 August 2017. The submission raises a number of matters in relation to the air quality impact assessment (AQIA) prepared in support of the Environmental Assessment (EA) and modification application to Weston Aluminium's (WA) Development Consent for their proposed Pharmaceutical and Illicit Drug Waste (Modification) Processing Project, dated 10/7/2017. The matters raised by the EPA (as detailed in *Attachment A* of the EPA submission) are summarised as follows:

1. Stack emissions data not provided;
2. Stack discharge parameters are not consistent with the AQIA for the Thermal Waste Processing Project (SSD_7396);
3. Stack 5 emissions during operation of the Reverbatory (Reverb) furnace not provided; and
4. Predicted 1 hour average ambient nitrogen dioxide (NO_2) concentrations do not comply with the impact assessment criteria of 246µg/m^3.

The following sections provide a response to these matters raised by the EPA.

1.0 Stack Emissions Data Not Provided

As requested by the EPA, full Stack 1 emissions testing reports associated with pharmaceutical and illicit drug waste trial monitoring events have been included as **Appendix A**.

Annual stack testing data for the facility operating under normal approved conditions for 2013-2016 (4 reports) have also been included as **Appendix B**.

2.0 Clarification of Stack Exit Velocities

Stack velocities listed in the 2017 Pharmaceutical and Illicit Drug Waste Modification AQIA (modification AQIA) (AECOM, 2017) were different to those listed in the August 2016 Thermal Waste Processing Project (SSD_7396) AQIA (AECOM, 26 August 2016). **Table 1** lists the velocities used for the modelling in the 2017 modification AQIA and the 2016 SSD_7396 AQIA.

The differences between the velocities for the SSD_7396 AQIA and the modification AQIA were investigated. A discrepancy in the calculations made in the SSD_7396 AQIA emissions inventory was identified. This was corrected in the modification AQIA emissions inventory prior to undertaking the dispersion modelling and as a result, the velocities used in the modification AQIA modelling are representative of the expected stack emission velocities at the site. Accordingly, the findings of the Modification AQIA can be relied upon without further assessment. The AQIA for the SSD 7396 has been rectified with correct discharge velocities following correspondence with the EPA post submission of the SSD 7396 AQIA.

In addition, the Stack 5 velocity shown in the modification AQIA was incorrectly transcribed from the model (shown as 14.7m/s in Table 6 of the modification AQIA), yet was confirmed to be modelled

using the correct value of 18.8m/s, which is consistent with the Stack 5 velocity in the SSD_7396 AQIA.

Table 1 Stack Exit Velocities Used in the Air Dispersion Modelling for Respective AQIA's

Stack ID	Velocity (m/s)	
	SSD_7396 (AECOM, August 2016; AQIA Table 9)	**Modification** (AECOM, July 2017; AQIA Table 6)
Stack 1	26.0	15.4
Stack 2	22.9	12.0
Stack 3	23.9	12.6
Stack 4	31.8	17.0
Stack 5	18.8	18.8
Stack 6	21.9	18.4
Stack 7	35.1	8.8

3.0 Stack 5 Emissions During Operation Of The Reverbatory Furnace

Dispersion modelling of an additional scenario examining the processing of pharmaceutical and illicit drug waste with the concurrent operation of the Reverb furnace was undertaken to provide data requested by the EPA. Modelling showed that all pollutants complied with their relevant assessment criteria and the facility is not expected to result in adverse impacts regardless of whether the WA facility operates the SSD_7396 facility (as shown in the modification AQIA) or the Reverb furnace when processing pharmaceutical and illicit drug waste.

Additional discussion on the inputs and data used for the modelling are provided in the following section and in **Appendix C**.

For context to this section, background information regarding Stack 1 and Stack 5 is provided as follows:

Stack 1 (EPL Point 1) services rotary furnace exhaust air associated with existing SPL and aluminium dross processing activities, and is part of the currently approved WA operation. The pharmaceutical and illicit drug waste material is proposed to be processed within the same processing circuit, with process air similarly vented through Stack 1 and utilising the same pollution control equipment;

Quantities of pharmaceutical and illicit drug waste to be processed are small compared with the quantity of SPL or aluminium dross processed during a typical production charge (batch). Refer to Table 1 and Section 2 of the Modification EA for expected pharmaceutical and illicit drug waste processing quantities; and

Stack 5 (EPL Point 13) services process air emissions associated with the approved Reverb furnace scrap aluminium remelt operations. Stack 5 will also (non-concurrently) service process air emissions associated with the proposed SSD_7396 project. The reverb furnace operation venting through Stack 5 is currently approved whilst regulatory approval for the proposed SSD_7396 project is pending.

Modelling for the modification AQIA was undertaken assuming emissions from the SSD_7396 facility along with the maximum emissions from the pharmaceutical and illicit drug waste trials (4 tests between 2015 and 2016). Although this scenario represents the expected long term operating conditions (as the SSD activity will dominate operations compared to Reverb furnace operating intervals), additional dispersion modelling has been undertaken assuming emissions from the Reverb furnace (Stack 5) along with maximum emissions from the pharmaceutical and illicit drug waste processing (Stack 1).

Inputs for the additional scenario were as follows:

- Stack 1 Emissions:
  - Flow and temperature data were obtained from the 5 emission monitoring tests (pharmaceutical and illicit drug trials) undertaken between 2015 and 2017 (additional

emission monitoring data from June 2017 has been included, which was not available at the time of preparing the modification AQIA). A summary of the emission monitoring data has been provided in the attached summary sheets (**Appendix C**) and is included in the Stack emissions monitoring reports appended to this document (**Appendix A**).
    - Maximum emissions data for each pollutant measured during the 5 stack emission monitoring events between 2015 and 2017 for the pharmaceutical and illicit drug waste trials were modelled as Stack 1 emissions.
- Stack 5 emissions:
    - Flow and temperature data were obtained from the 4 annual emission monitoring events for Stack 5 undertaken between 2013 and 2016. A summary of the testing data has been provided in the attached summary sheets and is included in the Stack emissions testing reports appended to this document (**Appendix A**).
    - Emissions concentrations are based on the average of the annual stack testing data for Stack 5. This assumption regarding background stack emissions is consistent with the methodology adopted and accepted by the EPA for the background stack emissions for the SSD_7396 AQIA and SPL AQIA.
- Stacks 2, 3, 4, 6 and 7 emissions:
    - Flow and emissions data were modelled at average emission rates consistent with the last approved AQIA for the SPL processing modification (which is also consistent with modelled data for the SSD_7396 AQIA).

Given that Stack 5 will service process emissions from either the SSD_7396 facility or the Reverb furnace operations, the analysis of this additional scenario addresses any data gaps in terms of plant operations.

Results of the dispersion modelling show that all pollutants comply with their relevant air quality impact assessment criteria at all surrounding receptor locations. A summary of the modelling results is attached to this document as **Appendix C**.

4.0 Predicted 1 hour Average Ambient NO_2 Concentrations do not Comply with the Impact Assessment Criterion of 246 µg/m^3

The maximum cumulative NO_2 concentration predicted in the modification AQIA was 263.7mg/m^3, which is higher than the EPA criterion of 246mg/m^3. The predicted maximum contribution from the WA facility in isolation from other sources was low (21.9mg/m^3) at the closest modelled receptor. The vast majority of the cumulative concentrations of NO_2 are from sources outside of the control of WA as described below.

The following discussion adds context to the predicted concentrations, the background concentrations assumed and the ability of the proposed modification to comply with the EPA criterion:

- The 263.7mg/m^3 cumulative NO_2 concentration referenced by EPA consists of the following contributions (as shown in Table 14 of the modification AQIA):
    - 21.9 g/mm^3 is the contribution from WA under modification operational conditions (8.3% of total concentration). A conservative estimate of WA contribution given that existing WA operations would be a part of the existing background NO_2 concentration;
    - 168.5 g/mm^3 is the forecast contribution from the proposed Battery Recycling Facility (BRF) facility (63.9% of total concentration); and
    - 73.3 g/mm^3 is represents the existing background (27.8% of total concentration).

    These NO_2 contributions have been examined in further detail as follows:

The highest contribution of NO_2 to the cumulative concentration is from the proposed BRF facility, proposed to be developed adjacent to WA. Note that this facility is only proposed and is not yet approved or operating but has been included to provide a comprehensive and conservative cumulative assessment. An examination of the highest predicted NO_2 receptor location from the BRF showed that the peak location for the NO_2 ground level pollutant concentrations was the WA site itself, which is not considered to be a sensitive receptor for this assessment. The second highest cumulative NO_2 concentration was 148.7mg/m^3 located outside of the WA facility boundary to the south, (refer to Receptor 13 in the Kurri Kurri Battery Recycling Facility Air Quality and Greenhouse Gas Assessment

report prepared by Ramboll Environ in October 2016). Thus it is considered appropriate to adopt the maximum ground-level concentration of 148.7mg/m^3 (below the EPA criterion of 246mg/m^3) when assessing the cumulative impacts of the modification at nearby receptors;

Further analysis of the concentrations predicted in the BRF AQIA showed that although results in the BRF AQIA listed the concentrations as "project-only increment impacts", WA data was actually included in the modelling predictions. The BRF AQIA summed the "project-only increment impacts" value with the background NO_2 data from Beresfield (73.3mg/m^3) to obtain a cumulative concentration for assessment against EPA criteria;

Emissions data for the WA plant was listed in the BRF AQIA showing a concentration of 10.7mg/m^3 for the Stack 1 NO_X emissions, which is higher than the measured Pharmaceutical and illicit drug waste trial data concentration of 7.8mg/m^3 but slightly less than the average Stack 1 emissions under the approved operations of 10.8mg/m^3. Given the similarities between the WA and BRF air quality models, it is considered reasonable to reduce the predicted BRF NO_2 concentrations at the closest receptor to account for WA pharmaceutical and illicit drug waste trial NO_2 emissions. As the BRF report does not provide WA contribution data at their discrete receptor locations, this data cannot be easily estimated. However, it would be expected to be similar to (if not a little higher than) the predicted maximum NO_X concentrations predicted for the modification, i.e. ~21.9mg/m^3.

When the reduction in the BRF NO_2 contribution is considered (reduction from 168.5mg/m^3 to 148.7mg/m^3) along with the further reduction in NO_2 concentration due to WA data actually being included with the BRF data (reduction of 21.9mg/m^3), the maximum cumulative 1 hour NO_2 concentration becomes 222.0 mg/m^3 which is below the assessment criterion of 246mg/m^3: ((148.7mg/m^3 – 21.9mg/m^3) + 21.9mg/m^3 + 73.3mg/m^3 = 222.0 mg/m^3);

For reference, the NO_2 concentration predicted for the additional scenario discussed in Section 3 was 25.5 mg/m^3. Using the same logic as above, the cumulative concentration for the additional scenario would be calculated as follows; (148.7mg/m^3 – 21.9mg/m^3) (BRF Contribution) + 25.5mg/m^3 (WA Contribution) + 73.3mg/m^3 (Background NO_2) = 225.6mg/m^3. The additional scenario NO_2 concentration complies with the assessment criteria of 246mg/m^3.

It is noted in the EPA comments that "the facility may have been causing exceedances of the impact assessment criterion even before the processing of illicit drugs and pharmaceutical wastes". This comment is incorrect (for reasons stated above) and as it assumes that the BRF facility is built and has been operating for a period of time. This is not the case; and

The WA facility has been operating for over 20 years and the investigation shows that even with conservative modelling taken into account that cumulative NO_2 values (excluding the contribution of the BRF facility) would be at worst in the range of 90-110mg/m^3. It is the proposed operation of the BRF facility that has the potential to significantly increase the local area's NO_2 concentrations and the emissions resulting from the BRF plant would be the cause for any potential exceedances, not WA who are emitting much lower levels of NO_X.

On the basis of the above discussion NO_2 is not considered to be a cause for concern.

5.0 Closure

This memorandum responding to EPA's submission relating to the modification AQIA for WA's Pharmaceutical and Illicit Drug Waste Processing project addressed the following items:

- Provided additional stack emission monitoring data, including stack emissions testing reports associated with pharmaceutical and illicit drug waste Trial monitoring events as well as historical stack emission monitoring events during 2013-2015 representing conventional operations;
- Provided clarification on the stack exit velocity data listed in the modification AQIA reaffirming that velocity data used in the dispersion modelling for the modification AQIA was correct and a discrepancy in the velocity data in the SSD_7396 AQIA had been rectified following correspondence with EPA post submission;
- Provided data on an additional scenario modelling, being the emissions from the pharmaceutical and illicit drug waste processing with the Reverb furnace, which showed this combination of

sources did not result in pollutant concentrations above the relevant ground level pollutant concentrations; and

- Concluded that the predicted maximum cumulative hourly NO_2 concentration was not considered to be a cause for concern for the treatment of pharmaceutical and illicit drug waste with either the SSD_7396 operations or the Reverb furnace operations.

Please contact the undersigned should any clarifications be required.

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Appendix A

Stack Emission Reports (4 reports)

Pharmaceutical and Illicit Drug Waste Trials 2015 – 2017 (5 reports)

Appendix B

Stack Emission Reports

Annual Stack Emission Monitoring Reports 2013 – 2016 (4 reports)

Appendix C

Dispersion Modelling Input Data and Results

Dispersion modelling input data for the additional modelling scenario incorporating the emissions from the Reverb furnace assumed the following:

- The same meteorological data was used as for the pharmaceutical and illicit drug waste modification AQIA, the SSD_7396 AQIA and the SPL Mod AQIA;
- The same sensitive receptors used in the previous AQIAs;
- Flow data for Stacks 1 and 5 for the additional scenario is shown in **Table 2** (Stack 1 data) and **Table 3** (Stack 5 data); and
- Emission data is shown in **Table 4** (Stack 1 data) and **Table 5** (Stack 5 data).

Table 2 Stack 1 Flow Data (EPA Identification No. 1)

Test Date	Parameter			
	Duct Diameter	Stack Gas Flowrate	Stack gas temperature	Velocity
	mm	Nm3/s	°C	m/s
Dec 2015	1650	24	74.9	15
	1650	24	74.8	15
	1650	24	73.6	15
	1650	24	79.2	15
Mar 2016	1650	26	74.5	16
	1650	25	71	16
	1650	26	69.5	16
	1650	25	76	16
Jun 2016	1650	25	59	14
	1650	27	54	15
	1650	25	63.5	15
	1650	26	49.5	15
Sep 2016	1650	26	80.7	16
	1650	26	76.1	16
	1650	26	71.9	16
	1650	26	76.5	16
Jun 2017	1650	26	50	15
	1650	26	53.6	15
	1650	27	45.5	15
	1650	27	47.7	15
Average Data	1650	25.6	66.1	15.4

Table 3 Stack 5 Flow Data (EPA Identification No. 13)

Test Date	Parameter			
	Duct Diameter	Stack Gas Flowrate	Stack gas temperature	Velocity
	mm	Nm3/s	°C	m/s
2013	1490	22	70	17
	1490	23	61.6	17
	1490	23	61.3	17
	1490	23	73.6	17
2014	1490	23	83.1	17
	1490	23	78.8	17
	1490	23	76.6	17
	1490	23	85.3	17
	1490	23	83.1	17
2015	1490	23	51.4	16
	1490	25	42.5	17
	1490	25	51.9	17
	1490	26	42.5	18
2016	1490	23	69	17
	1490	25	51.5	17
	1490	27	31.5	18
	1490	25	49	17
Average Data	1490	23.8	62.5	17.1

Table 4 Stack 1 Emission Data Summary

Pollutant	Max Concentrations / Emission Rates	
	mg/Nm^3	g/s
Total Particulate	8.7	0.22
Particulate Matter less than 10 microns (PM_{10})	3.7	0.095
Particulate Matter less than 2.5 microns ($PM_{2.5}$)	0.435	0.011
Carbon Monoxide	87.4	2.23
Sulfur Dioxide (SO_2 as SO_3)	4.8	0.12
NOX (as NO_2)	14	0.36
Total Fluoride	0.52	0.014
Lead	0.0015	0.0000383
Sulfuric Acid Mist (H_2SO_4 as SO_3)	4.25	0.11
Hydrogen Chloride	4.65	0.12
Volatile Organic Compounds (VOC)	5.2	0.13
Antimony	0.000085	0.0000022
Arsenic	0.000085	0.0000022
Cadmium	0.031	0.0007921
Mercury	0.00038	0.0000097
Beryllium	0.000085	0.0000022
Chromium	0.023	0.0005877
Cobalt	0.000085	0.0000022
Manganese	0.0056	0.0001431
Nickel	0.0069	0.0001763
Selenium	0.0039	0.0000996
Tin	0.0015	0.0000383
Vanadium	0.00023	0.0000059
Copper	0.0031	0.0000792
Dioxins and Furans	5.3E-09	1.35E-10
Total PAH	0.29	0.0074
Cyanide	0.38	0.010

Table 5 Stack 5 Emission Data Summary

Pollutant	Average Concentrations / Emission Rates	
	mg/Nm^3	g/s
Total Particulate	2.5325	0.060
Particulate Matter less than 10 microns (PM_{10})	0.8775	0.021
Particulate Matter less than 2.5 microns ($PM_{2.5}$)	0.127	0.003
Carbon Monoxide (CO)	13.325	0.317
Sulfur Dioxide (SO2 as SO3)	7.125	0.170
NOX (as NO2)	9.75	0.232
Total Fluoride	0.26975	0.006
Lead	0.0221	0.000526
Sulfuric Acid Mist (H2SO4 as SO3)	1.4	0.033
Hydrogen Chloride (HCl)	2.1375	0.051
Volatile Organic Compounds (VOC)	0.295	0.007
Antimony	0.0035	0.000083
Arsenic	0.0025	0.000060
Cadmium	0.0102	0.000242
Mercury	0.000229875	0.000005
Beryllium	0.0001	0.000002
Chromium	0.099575	0.002372
Cobalt	0.0071	0.000168
Manganese	0.06352125	0.001513
Nickel	0.0164	0.000390
Selenium	0.0017	0.000040
Vanadium	0.00723375	0.000172
Copper	0.046225	0.001101
Dioxins and Furans (Middle Bound)	2.525E-09	6.02E-11
Total Polycyclic Aromatic Hydrocarbons	0.02995	0.00071

Results for the individually modelled pollutants are shown in **Table 5**.

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Table 6 Modelling Results for Additional Scenario (Reverb furnace operating during processing of pharmaceutical and illicit drug waste)

Pollutant	Averaging Period	Maximum Ground Level Concentrations (µg/m^3)				
		WA Increment Max Concentration	Cumulative Data Calculations			
			BRF Max Incremental Concentration	Background Concentration	Maximum Cumulative Concentration	Criteria
TSP	Annual Average	0.204	-	48.3	48.5	**90**
PM_{10}	24 Hour Maximum	1.33	2.1	45.4	48.8	**50**
	Annual Average	0.10	0.5	19.3	19.9	**25**
$PM_{2.5}$	24 Hour Maximum	0.011	1.5	19	20.5	**25**
	Annual Average	0.001	0.3	7.5	7.8	**8**
CO	1 Hour Maximum	68	-	-	68	**30,000**
	8 hour Maximum	41.9	-	3000	3041.9	**10,000**
SO_2	10 Minute Max	53.6	318	116.2	487.8	**712**
	1 Hour Maximum	33.5	222.3	81.2	337.0	**570**
	24 Hour Maximum	3.61	72.1	18.3	94.0	**228**
	Annual Average	0.239	14.5	2.6	17.4	**60**
NO_2[2]	1 Hour Maximum	25.5	126.8	73.3	226.0	**246**
	Annual Average	0.318	14.6	16.9	31.8	**62**
HF	90 days	0.04	-	0.11	0.15	**0.5**
	30 days	0.14	-	0.16	0.30	**1.5**
	7 days	0.44	-	0.2	0.64	**1.7**
	24 hours	1.24	-	-	1.24	**2.9**
Pb	Annual Average	0.00019	0.1	-	0.10	**0.5**

Pollutant	Averaging Period	Maximum Ground Level Concentrations (µg/m^3)				
		WA Increment Max Concentration	Cumulative Data Calculations			
			BRF Max Incremental Concentration	Background Concentration	Maximum Cumulative Concentration	Criteria
H_2SO_4	1 Hour, 99.9th Percentile	2.92	7.9	-	10.8	**18**
HCl	1 Hour, 99.9th Percentile	2.72	-	-	2.7	**140**
VOCs (as benzene)	1 Hour, 99.9th Percentile	3.84	0.0056	-	3.8456	**29**
Sb	1 Hour, 99.9th Percentile	0.00085	-	-	0.000850	**9**
As	1 Hour, 99.9th Percentile	0.00063	0.083	-	0.0836	**0.09**
Cd	1 Hour, 99.9th Percentile	0.018	-	-	0.018	**0.018**
Hg	1 Hour, 99.9th Percentile	0.00022	-	-	0.000220	**0.18**
Be	1 Hour, 99.9th Percentile	0.000051	-	-	0.000051	**0.004**
Cr (as Cr VI)	1 Hour, 99.9th Percentile	0.032	-	-	0.032	**0.09**
Co	1 Hour, 99.9th Percentile	0.0017	-	-	0.0017	**0.2**
Mn	1 Hour, 99.9th Percentile	0.017	-	-	0.017	**18**
Ni	1 Hour, 99.9th Percentile	0.0064	-	-	0.0064	**0.18**
Se	1 Hour, 99.9th Percentile	0.0022	-	-	0.0022	**2**
V	1 Hour, 99.9th Percentile	0.0018	-	-	0.0018	**2**
Cu	1 Hour, 99.9th Percentile	0.012	-	-	0.012	**3.7**
Dioxins and Furans	1 Hour, 99.9th Percentile	3.0E-09	3.7E-07	-	3.7E-07	**2.0E-06**
PAHs (as B(a)P)	1 Hour, 99.9th Percentile	0.166	-	-	0.166	**0.4**
Cyanide	1 Hour, 99.9th Percentile	0.224	-	-	0.224	**90**