



Decision Document

Environmental Protection Act 1986, Part V

Proponent: Alcoa of Australia Limited

Licence: L6217/1983/15

Registered office: 181-205 Davy Street
Booragoon WA 6154

ACN: 004 879 298

Premises address: Wagerup Alumina Refinery
Willowdale Rd
WAROONA WA 6215

Issue date: Friday, 8 November 2013

Commencement date: Wednesday, 13 November 2013

Expiry date: Saturday, 12 November 2016

Decision

Based on the assessment detailed in this document the Department of Environment Regulation (DER), has decided to issue an amended licence. DER considers that in reaching this decision, it has taken into account all relevant considerations.

Decision Document prepared by: Chris Malley
Licensing Officer

Decision Document authorised by: Ed Schuller
Delegated Officer



Contents

Decision Document	1
Contents	2
1 Purpose of this Document	2
2 Administrative summary	3
3 Executive summary of proposal and assessment	4
4 Decision table	6
5 Advertisement and consultation table	14
6 Risk Assessment	16
Appendix A	17

1 Purpose of this Document

This decision document explains how DER has assessed and determined the application and provides a record of DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DER's assessment and decision making under Part V of the *Environmental Protection Act 1986*. Other approvals may be required for the proposal, and it is the proponent's responsibility to ensure they have all relevant approvals for their Premises.



2 Administrative summary

Administrative details											
Application type	Works Approval <input type="checkbox"/> New Licence <input type="checkbox"/> Licence amendment <input checked="" type="checkbox"/> Works Approval amendment <input type="checkbox"/>										
Activities that cause the premises to become prescribed premises	<table border="1"> <thead> <tr> <th>Category number(s)</th> <th>Assessed design capacity</th> </tr> </thead> <tbody> <tr> <td>46</td> <td>2.85 Mtpa</td> </tr> <tr> <td>52</td> <td>N/A</td> </tr> <tr> <td>64</td> <td>N/A</td> </tr> <tr> <td>67</td> <td>N/A</td> </tr> </tbody> </table>	Category number(s)	Assessed design capacity	46	2.85 Mtpa	52	N/A	64	N/A	67	N/A
	Category number(s)	Assessed design capacity									
	46	2.85 Mtpa									
	52	N/A									
64	N/A										
67	N/A										
Application verified	Date: 19/08/2015										
Application fee paid	Date: N/A										
Works Approval has been complied with	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>										
Compliance Certificate received	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>										
Commercial-in-confidence claim	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>										
Commercial-in-confidence claim outcome	The applicant requested the omission of some attachments and redaction of references to the attachments in letters. DER accepted the claim.										
Is the proposal a Major Resource Project?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>										
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the <i>Environmental Protection Act 1986</i> ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Referral decision No: Managed under Part V <input type="checkbox"/> Assessed under Part IV <input type="checkbox"/>										
Is the proposal subject to Ministerial Conditions?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Ministerial statement No: EPA Report No:										
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the <i>Environmental Protection Act 1986</i>)?	Yes <input type="checkbox"/> No <input type="checkbox"/> Department of Water consulted Yes <input type="checkbox"/> No <input type="checkbox"/>										
Is the Premises within an Environmental Protection Policy (EPP) Area	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992; and</i> <i>Environmental Protection (Swan Coastal Plain Lakes) Policy (EPP Lakes Policy).</i>										
Is the Premises subject to any EPP requirements?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> An EPP Lake is located approximately 1 km south west of the south western corner of the residue storage area. The EPP Lakes Policy requires that any EPP lakes within the Swan Coastal Plain shall not be degraded or destroyed by activities nearby.										



3 Executive summary of proposal and assessment

Alcoa of Australia Limited (Alcoa) operates the Wagerup Alumina Refinery ('the refinery') located on the Swan Coastal Plain in the Shire of Waroona approximately 120 km south of Perth, Western Australia. The nearest townships to the refinery are Hamel (located approximately 3 km north of the refinery) and Yarloop (located approximately 2.5 km south of the refinery). The nearest regional centre is Waroona (approximately 7 km north of the refinery). The site continues to have community interest in its emissions, discharges and overall performance.

In addition to this Part V of the *Environmental Protection Act 1986* (EP Act) licence, L6217/1983/15, the *Alumina Refinery (Wagerup) Agreement and Acts Amendment Act 1978* applies to the refinery as does Ministerial Statement 728 granted by the Minister for Environment under Part IV of the EP Act for the proposed refinery expansion to 4.7 million tonnes of alumina per year. Alcoa also has an *Environmental Protection (Wagerup Alumina Refinery Noise Emissions) Approval 2012* and *Environmental Protection (Wagerup Alumina Refinery Noise Emissions) Amendment Approval 2013* granted under the *Environmental Protection (Noise) Regulations 1998*.

The refinery turns crushed bauxite delivered via overland conveyor from its licensed Willowdale Minesite into alumina via the Bayer process. Alcoa also operates the licensed Kwinana Alumina Refinery and Pinjarra Alumina Refinery. The process used at Wagerup has the following key elements:

- Digestion – bauxite is milled to sand sized particles and mixed with hot concentrated caustic soda to form a slurry and dissolve available alumina within the bauxite;
- Clarification – Sand clay (red mud) is settled out leaving an alumina rich "green" liquor. Settled out sand and mud are washed and pumped to the residue area;
- Precipitation – hot "green" liquor is cooled and seed alumina hydrate crystals are added causing alumina hydrate to crystallise. Liquor and hydrate are separated, the crystals are sized and suitably sized ones removed with undersized crystals returned to the process as seed crystals;
- Calcination – sized hydrate is washed and dried, then heated to drive off chemically bonded water leaving aluminium oxide (alumina);
- Power – power and steam requirements are met by an on-site power station (natural gas-fired with diesel backup); and
- Residue & waste – residue sand and mud from the process is pumped as alkaline slurry to the residue drying area where excess caustic and liquor is collected and recycled through the process. Sodium oxalate not treated by the oxalate kiln is also stored in the residue area.

Alcoa submitted an application to amend licence L6217/1983/15 on 26 June 2015 primarily to amend condition A1(a) to allow an increase in alumina production from 2.65 million tonnes per annum (Mtpa) to 2.85 Mtpa. The Department of Environment Regulation (DER) wrote to Alcoa on 22 July 2015 requesting additional information and Alcoa submitted addendum supporting information on 19 August 2015. Alcoa also requested a number of other changes including:

- a correction to condition G1(iii);
- amendment of aggregate calciner priority volatile organic compound emission values in Table 1 of condition A2(a) and associated changes to the calculation methodology in Table 18 of Appendix A; and
- the alteration of condition A24(d) relating to the maintenance and operation of dust concentration meters on the calciner stacks. Alcoa requested the condition be replaced with the three part condition from its Pinjarra Refinery licence L5271/1983/14 condition A15(b) so allow consistency across its refineries and removes reference to the 'approved dust concentration strategy' which is dated; and
- an amendment to condition A6(ii) relating to the treatment of non-condensable gases in the powerhouse boilers.



Alcoa was granted works approval W5391/2013/1 in 2013 for a volatile organic compound (VOC) reduction project that involved redirecting gaseous emissions from the Calciner 1-3 low volume vent (LVV) into the combustion zone of Calciners 1-3. The project was to achieve a reduction in aggregate priority calciner VOC emissions that equate to at least 1.5 times the amount of aggregate priority calciner VOC emissions attributed to a production increase from 2.65 million tonnes per year (Mtpa) of alumina to 2.8 Mtpa. As part of regulatory controls on the works approval, Alcoa completed validation sampling of point source emissions to air in calcination during the commissioning phase and submitted a commissioning report to DER. The commissioning report, in particular noise emissions and point source air emissions validation data, has been considered in the context of Alcoa's licence amendment application. The air emissions validation sections of the commissioning report relate to Alcoa's requested changes to Table 1 in condition A2(a) and the calculation methodology in Table 18 of Appendix A.

As licence L6217/1983/15 expires on 12 November 2015, DER has opted to extend the expiry date of the licence by 12 months until 12 November 2016.

DER has risk assessed the emissions, discharges and impacts for the whole refinery (including the residue storage area) associated with the request to increase production to 2.85 Mtpa and also considered Alcoa's other requested changes. DER has opted to grant an amended licence based on the risk assessment in the section 4 decision table and in Appendix A where specified. The key change to the licence is amendment of the annual production limit in condition A1. As outlined in section 4, DER believes the amended licence contains regulatory controls to ensure the risk of emissions, discharges and impacts is at an acceptable level. A key change to note in the licence is the removal of former condition A4 relating to visible dust across the boundary which relates to a broader DER policy decision for all approvals granted under Part V of the EP Act. Interim of further assessment, DER has also renamed all references of 'targets' to 'response levels.'



4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987* and DER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the decision document.

DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L = Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
General conditions	N/A	N/A	N/A
Premises operation	L – A1	Alcoa requested an increase of the alumina production limit specified in condition A1 from 2.65 million tonnes to 2.85 million tonnes per licence year. DER has assessed the risk of emissions, discharges and impacts associated with the increase in the relevant sections of this decision table. The decision to allow the increase in production limit is based on those risk assessments.	Application supporting documentation
Point source emissions to air including monitoring	L – A5 Also refer to assessment in Appendix A, section 1	Refer to assessment in Appendix A, section 1 in relation to the proposed production increase. Alcoa requested a change to condition A6 on the existing licence unrelated to the production increase request. Condition A6 relates to the condensable/non-condensable gas system. Alcoa originally requested the amendment in 2011 that modified A6(ii) to facilitate shutdown of boilers for statutory safety inspections for a period of up to approx. 5 days. A lack of sufficient information to allow DER to adequately assess the risk of emissions, discharges and impacts from passive venting of non-condensable gases during the boiler outage has resulted in delays in progressing the requested amendment. More recently Alcoa submitted air emissions modelling. DER notes that Alcoa advice at a licence amendment scoping meeting on 4 August 2015 that it has recently completed field odour surveys relating to the VOC & Odour Monitoring and Modelling Plan (VOCOMMP), and this included surveys during air feed line maintenance scenarios currently permitted in condition A6(ii). Alcoa is finalising the field odour survey report, however it was not available in time for	Application supporting documents Refer to assessment in Appendix A, section 1 Wagerup VOC & Odour Monitoring and Modelling Plan, Alcoa, 16 August 2013 Licence



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Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>consideration as part of this licence amendment application. DER will await the submission of the report and determine the requested change to condition A6 (now condition A5) through a separate licence amendment determination.</p> <p>Alcoa also requested a change to condition A23(d) on the existing licence that requires the operation of a dust concentration meter and logging of readings of gases exiting each calciner stacks. The condition requires the meter(s) to be correlated and operated in accordance with the approved dust concentration strategy. Alcoa requested it be replaced with condition A15 on licence L5271/1983/14 for its Pinjarra Alumina Refinery. DER notes the change would also be consistent with condition A25(c), (d) and (e) on L6217/1987/15 for continuous monitoring on the liquor burner and oxalate kiln stacks. The change would also mitigate the existing reference to an 'approved dust concentration strategy.' DER has amended condition A24(b) consistent with condition A25 and also consistent with the Pinjarra Alumina Refinery licence. The change does not alter Alcoa's obligations.</p> <p>As a consequence of the VOC reduction project implemented pursuant to works approval W5391, DER will modify the calcination stack monitoring requirements in Table 14 of Appendix A. As the only remaining emissions through the Calciner 1-3 LVV are from the 50B Condensate Tank, there has been a significant reduction in air flow rate to the point where velocity measurements are expected to be below the reportable detection limit of the test method. As part of the validation sampling program approved in W5391, a new flow rate sample point has been established at the exit point from the 50B Condensate Tank. All other parameters will continue to be sampled at the Calciner 1-3 LVV exit point as per the existing requirement.</p>	L5271/1983/14, Pinjarra Alumina Refinery.
Point source emissions to surface water including monitoring	N/A	DER has considered the risk of point source emissions to surface water. The premises does not have point source emissions to surface water and the risk of point source emissions to surface water is low. Consideration of the licence amendment application does not change the risk profile therefore DER has not included conditions for point source emissions to surface water.	Application supporting documentation



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
Point source emissions to groundwater including monitoring	N/A	DER has considered the risk of point source emissions to groundwater. The premises does not have point source emissions to groundwater and the risk of point source emissions to groundwater is low. Consideration of the licence amendment application does not change the risk profile therefore DER has not included conditions for point source emissions to groundwater.	Application supporting documentation
Emissions to land including monitoring	N/A	DER has considered the risk of point source emissions to land. The premises does not have point source emissions to land and the risk of point source emissions to land is low. Consideration of the licence amendment application does not change the risk profile therefore DER has not included conditions for point source emissions to land.	Application supporting documentation
Fugitive emissions	N/A Refer to assessment in Appendix A, section 2.	<p>Former condition A4 on the existing licence requires the licensee to “ensure that no visible dust generated from the bauxite milling, storage, transfer or refining process crosses the boundary of the premises” has been removed.</p> <p>Generic fugitive dust conditions constitute a substantive offence under the EP Act. “Administrative changes implemented within the Department of Environment Regulation” on DER’s public website at www.der.wa.gov.au provides further clarity on the DER policy decision.</p> <p>Fugitive dust emissions can be adequately regulated via the general provisions of the EP Act with particular reference to s49 of the EP Act. DER expects that Alcoa will continue to have multilayered dust control measures (refer to summary in section 7 of the 2012 LTRMS). Alcoa is expected to continue implementation of its dust control strategies regardless of whether fugitive dust is regulated via a condition or the general provisions of the EP Act</p> <p>DER notes that this decision does not relate specifically to the application to increase production to 2.85 Mtpa.</p> <p>Refer to assessment in Appendix A, section 2 in relation to the amendment application.</p>	<p>Application supporting documentation</p> <p>DER public website at: www.der.wa.gov.au</p> <p><i>Long Term Residue Management Strategy, Wagerup, Alcoa of Australia Ltd, 2012</i></p> <p>EP Act – Part V</p>



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
Odour	L – A5 Also refer to assessment in Appendix A, section 1.	<p><u>Emission Description</u> <i>Emission:</i> Odour from the refining process and residue storage area. Table 4 in section 3.2 of Alcoa’s application supporting information predicts an increase in total odour of 7.9% or 1,398,357 OU/s to 1,419,237 OU/s increasing from 2.65 Mtpa to 2.85 Mtpa alumina production. The data source is Alcoa’s 2014 updated emissions inventory being prepared as committed in the VOCOMMP and extrapolation of data to 2.85 Mtpa based on assumptions including those in Table 2 of the supporting information and other sections. The 2014 updated inventory has not yet been submitted to DER. Section 3.1.2 contains Alcoa’s odour considerations. It makes reference to previous studies, particularly the Wagerup III expansion proposal ERMP with the following key points:</p> <ul style="list-style-type: none"> the main contributor to the 50 highest odour concentrations at receptors 3,4 and 5 were the 25A tanks vents; and low level sources (25A, 35A and 35J) were the main contributors to existing refinery odour levels , particularly during the night, with calciners having a greater contribution to overall odour levels during the day time. <p>DER notes that Alcoa is currently analysing its result of the first field odour surveys conducted in July 2015 in line with VOCOMMP commitments. <i>Impact:</i> Reduced air quality and amenity impacts. Acute health impacts in some individuals with particular sensitivity. <i>Controls:</i> The liquor burner and oxalate kiln are fitted with regenerative thermal oxidisers for VOC destruction. Destruction of VOCs occurs within the combustion zones of calciners. Non-condesable gas collection system on low level sources that direct gases to the powerhouse boilers for destruction.</p> <p><u>Risk Assessment</u> <i>Consequence:</i> Minor <i>Likelihood:</i> Possible</p>	<p>Application supporting documentation</p> <p>Wagerup VOC & Odour Monitoring and Modelling Plan, Alcoa, 16 August 2013</p>



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p><i>Risk Rating: Moderate</i></p> <p><u>Regulatory Controls</u> Condition A5 relates to the non-consendable gas treatment system. For conditions relating to VOC limits, response levels, monitoring and report, refer to Appendix A, section 1.</p> <p><u>Residual Risk</u> <i>Consequence: Minor</i> <i>Likelihood: Possible</i> <i>Residual Risk Rating: Moderate</i></p>	
Noise	N/A	<p>Alcoa's Noise Verification Report that forms Appendix E of the Commissioning Report submitted as per works approval W5391 was reviewed by DER's Noise Section. DER is satisfied the noise verification was conducted consistent with the approved Noise Verification Plan. The report found that the sound power levels (SWL) of the Calcination Unit are 0.2 – 0.6 db(A) lower than the levels calculated in the 2012 survey. Due to this small variation it was difficult to determine if such a slight noise reduction had been achieved. However, DER was satisfied that the sound power noise levels of the Calcination Unit are not higher than the 2012 levels, thus meeting the requirement of works approval W5391 that combined SWL not exceed 111.1 db(A).</p> <p>The risk of noise emissions and impacts associated with Alcoa's requested increase of alumina production to 2.85 Mtpa was assessed.</p> <p><u>Emission Description</u> <i>Emission: Noise emissions from the refinery and residue storage area and also vehicle movements. As the refinery operates 24 hrs and 7 days per week noise emissions are constant. Noise emissions may be higher during periods of equipment malfunction or process upset.</i></p> <p><i>Impact: Amenity and nuisance impact at offsite sensitive receptors. Elevated noise</i></p>	<p>Application supporting documentation</p> <p><i>Environmental Protection (Noise) Regulations 1998</i></p> <p><i>Environmental Protection (Wagerup Alumina Refinery Noise Emissions) Approval 2012</i> (Noise Approval)</p> <p><i>Environmental Protection (Wagerup</i></p>



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>during the night where ongoing and frequent emissions have the ability to contribute to sleep disruption and health/wellbeing issues.</p> <p><i>Controls:</i> Alcoa is required to comply with a noise approval issued under Regulation 17 of the <i>Environmental Protection (Noise) Regulations 1998</i>. This includes the <i>Environmental Protection (Wagerup Alumina Refinery Noise Emissions) Approval 2012</i> (Noise Approval) and <i>Environmental Protection (Wagerup Alumina Refinery Noise Emissions) Amendment Approval 2013</i> (Amended Noise Approval). The noise approval allows a variation in assigned noise limits and includes requirements that Alcoa establishes a noise monitoring program to monitor compliance and implements a plan to provide noise insulation for dwellings on noise-affected land. The noise approval also requires the submission of a noise amelioration plan that includes a land management plan setting out the procedures for the purchase by Alcoa of land with noise-affected dwellings, and for the noise insulation program.</p> <p><u>Risk Assessment</u> <i>Consequence:</i> Moderate <i>Likelihood:</i> Likely <i>Risk Rating:</i> High</p> <p><u>Regulatory Controls</u> An increase of production to 2.85 Mtpa is unlikely to alter noise emissions. Alcoa are still required to comply with the above-mentioned Noise Approval and Amended Noise Approval that are the appropriate mechanism to regulate noise emissions from the refinery, ameliorate localised noise impacts and resolve land use conflicts with noise affected properties.</p> <p><u>Residual Risk</u> <i>Consequence:</i> Moderate <i>Likelihood:</i> Likely <i>Residual Risk Rating:</i> High</p>	<p><i>Alumina Refinery Noise Emissions) Amendment Approval 2013</i> (Amended Noise Approval)</p>



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
Monitoring general	N/A	N/A	N/A
Monitoring of inputs and outputs	N/A	The licence does not contain regulatory controls for the monitoring of inputs and outputs. The assessment of risk of emissions, discharges and impacts in this decision table has not identified a change in the risk profile therefore DER has not included input/output monitoring conditions in the amended licence.	Application supporting documentation
Process monitoring	L - A25(e) and A26	The licence includes a requirement to continuously monitor temperature in the combustion zone of the liquor burner regenerative thermal oxidiser (RTO) and oxlate kiln RTO as specified in condition A25(e). Condition A26 also requires process monitoring of the mercury control system. The assessment of risk of emissions, discharges and impacts in this decision table has not identified a change in the risk profile therefore DER has not included additional process monitoring conditions in the amended licence.	Application supporting documentation
Ambient environmental quality monitoring		Refer to Appendix A, section 2 fugitive emissions risk assessment. Ambient environmental quality monitoring requirements for dust, groundwater and surface water will not be altered.	Application supporting documentation
Meteorological monitoring	L – G8	The assessment of risk of emissions, discharges and impacts in this decision table has not identified a change in the risk profile therefore DER has not included additional meteorological monitoring conditions in the amended licence. DER is in ongoing discussions with Alcoa regarding meteorological monitoring outside the scope of this amendment.	Application supporting documentation
Improvements		The assessment of risk of emissions, discharges and impacts in this decision table has not identified a change in the risk profile therefore DER has not included improvement conditions in the amended licence.	N/A
Information	L – G1(iii)	The assessment of risk of emissions, discharges and impacts in this decision table has not identified a change in the risk profile therefore DER has not included additional	Application supporting



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>reporting conditions in the amended licence.</p> <p>Alcoa requested an administrative change to condition G1(iii) to correct a typographical error. Condition G1 lists information to be included in the Annual Environmental Report, however G1(iii) includes the wording 'six monthly reports' which DER agrees is a typographical error from the renewal of L6217/1983/14 in 2013. The condition will be corrected as per Alcoa's request.</p>	documentation
Licence Duration		In parallel with a determination of the licence amendment application, licence L6127/1983/15 was due to expire on 12 November 2015. DER has extended the expiry date by 12 months so as to avoid the need to determine a licence renewal application immediately following the amended licence determination.	Application supporting documentation
Administrative Changes	L – G7	<ul style="list-style-type: none"> Condition G7 requires that the licensee <i>"notify the CEO as soon as practicable of any unplanned occasion when any pollution control equipment at the premises malfunctions or ceases to operate which has the potential to significantly impact on the environment."</i> The condition is a duplication of reporting conditions for matters that would otherwise be required to reported to the CEO under s72 of the EP Act. The condition has been deleted consistent with published advice on DER's website at www.der.wa.gov.au. Further information on reporting pollution and obligations under s72 of the EP can be found at www.der.wa.gov.au/your-environment/reporting-pollution. The licence contains numerous references to 'targets.' Interim of further detailed assessment of any existing limits and targets, the term 'response level' has been adopted in place of 'target.' Condition A27 contains a typographical error that refers to 'Table 3.' This has been corrected to 'Table 8.' Condition numbering and condition numbering references has been altered to reflect deletion or addition of conditions. 	<p>DER public website at: www.der.wa.gov.au</p> <p>s72 of the EP Act</p>



5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
14/09/2015	Application advertised in the <i>West Australian</i> newspaper	No submissions were received.	N/A
14/09/2015	Electronic transmission of direct interest stakeholder letter with a copy of the application sent to two direct interest stakeholders including the Shire of Waroona and a local community group. Hardcopies sent on 15/09/2015.	An extension of 7 days was provided to one direct interest stakeholder organisation with a closing date of 12/10/2015, however no submissions were received.	N/A
15/09/2015	Electronic notification of the public advert sent to the Wagerup Community Consultative Network.	No submissions were received.	N/A
19/10/2015	Licensee notified of proposed changes to licensee with 21 day consultation period.	<p>The Licensee submitted comments in the form of a marked version of the draft conditions. The following comments and requested changes were included:</p> <ol style="list-style-type: none"> 1. Correcting the general condition numbering and general condition number references; 2. Retaining the word <i>'period'</i> in condition G1(iii); 3. Inserting <i>'calculated in accordance with Table 18 of Appendix A'</i> within condition A2(a); 4. Inserting <i>'of Appendix A'</i> in condition A7; 5. Request for revision of wording condition A12 (mercury control system process parameter response levels) as Alcoa believes the proposed wording 	<p>The outcome of considering Alcoa's comments is as follows:</p> <ol style="list-style-type: none"> 1. These were typographical errors and corrected; 2. This was a typographical error and corrected; 3. DER agreed the added reference to the approved methodology provided clarification and included the change; 4. The requested change added clarity and was consistent with other similar conditions in the licence; 5. DER acknowledged Alcoa's comment, however disagreed with the proposed wording suggested by Alcoa using the phrase "reasonable and practicable." DER further modified the condition consistent with the existing condition



Date	Event	Comments received/Notes	How comments were taken into consideration
		<p>changes the parameters from targets to limits;</p> <p>6. Deleting '<i>emission</i>' from condition A14; and</p> <p>7. Inserting '<i>by</i>' in Column 3 for Calciner 1.</p> <p>The Licensee waived the 21 day consultation period subject to the above comments.</p>	<p>A11 wording and believes this addresses Alcoa's concern;</p> <p>6. This was a typographical error most likely from inclusion of the oxlate kiln conditions as part of the 2012 licence renewal. It was corrected;</p> <p>7. This was a typographical error and corrected.</p>



6 Risk Assessment

Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management

Table 1: Emissions Risk Matrix

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High



Appendix A

1. POINT SOURCE EMISSIONS TO AIR INCLUDING MONITORING

As an overview, point source emissions fall into two main categories, Bayer and non-Bayer process sources. Bayer process sources are all those associated with the Bayer process liquor used to digest the bauxite to produce alumina. These sources generate a variety of substances and emissions typical of the alumina refining process, as well as other substances that are more generic in industrial and mineral processing. It is these emissions that produce the characteristic odour associated with Bayer process refineries. Non-Bayer process emissions include products of combustion of natural gas fired boilers and gas turbines, and those related to constituents in the fuels consumed in the refinery.

Source: Section 3 of the report Overview of Wagerup Refinery Emission Inventory and proposed updates, Alcoa of Australia Ltd, December 2013 ("2013 Inventory Overview").

Alcoa's application supporting information states in section 3.1 that its assessment of air emissions is a holistic approach for the entire refinery and residue area and includes licensed monitoring point data along with low volume source data. Data has been incorporated from the 2014 emission inventory (not yet received by DER) and extrapolated to 2.8 Mtpa and 2.85 Mtpa. The data are an extension of the 2012 emissions inventory within the 2013 Inventory Overview referenced above. Alcoa states that the 2014 emissions inventory includes the following amendments:

- Inclusion of additional southern refinery sources (B50 cooling towers, 44-1 vents, 44-2 vents, calcinery 4 LVV and 48A tank vent);
- Reduction achieved on Calciner 1-3 LVV (i.e. works approval W5391);
- Updated monitoring data from 2012 – 2014 licensed sources; and
- Updated flow data of licensed sources to reflect current flow rates.

Section 3.1 of the supporting information states that as data has been extracted from the emission inventory, for simplicity it broke this into three sections; total odour, total VOCs and refinery particulates (excludes residue fugitive dust addressed separately in section 4 of the supporting information). The point source emissions to air assessment looks at total VOCs and refinery particulates related to an increase to 2.85 Mtpa production. DER notes that predicted changes to emissions as a consequence of the production increase may also be attributed to additional sources included and refined in the inventory.

Point source VOCs

Total VOCs are defined by Alcoa as acetaldehyde, acetone, acrolein, BAP equivalent, benzene, 2-butanone, ethylbenzene, formaldehyde, styrene, toluene, 1,2,4 trimethyl benzene, 1,3,5 trimethyl benzene, vinyl chloride and xylenes. The 2013 Inventory Overview references the report *Compound Selection Procedure: Wagerup Refinery Unit Three Expansion*, ENVIRON 2005 on the procedure for why these VOCs are targeted.

Point sources of air emissions were broadly summarised by Alcoa in Table 2 of section 3.1.1 of its supporting information along with assumptions as air emissions implications from a production increase to 2.85 Mtpa. Table 2 is extracted below.



Table 2 – Summary of key assumptions for emission sources

Emissions source (as per emissions inventory)	Emissions change
Liquor Burning	Already running at maximum capacity with no emission increase
Calciners 1 – 4 and associated vac pump vents	Emissions will increase with production, however are offset with VOC emission reduction project
Oxalate Kiln	Oxalate kiln will be running – emissions will not increase. Alternative technology via BioX (biological oxalate destruction) being explored
45K and B50 cooling towers	Emissions will increase in direct proportion to production. Increased cooling is predicted as production increases and has been factored into the calculations.
Building 44 vents	Emissions will not increase, same process conditions
48A Tank exhaust	Emissions will not increase, same process conditions
Milling (Milling vent 3 -5)	Emissions to increase in direct proportion to production due to proportional increase in up-time
25A Vents	Emissions will not increase, vented tanks at same process conditions
35J Tank Vents	Emissions will not increase, vented tanks at same process conditions
Digestion	Emissions from flash train will increase, but will be captured by existing non condensable system and destroyed in powerhouse
Heat Interchange	Emissions from flash train will increase, but will be captured by existing non condensable system and destroyed in powerhouse
Evaporation	Emissions from flash train will increase, but will be captured by existing non condensable system and destroyed in powerhouse

Source: Table 2 in Section 3.1.1 of Alcoa’s application supporting documentation

Alcoa’s supporting application (section 3.1.1) provided additional justification on why emissions from non-combustion sources such as vented tanks won’t increase as a result of increasing production to 2.85 Mtpa. Emissions from these sources are stated to be conditional to the process conditions within the tank. The vapour flow of emissions from a tanks head space through the vent is proportional to the temperature and pressure within the tank and not influenced by the flow rate of liquid or slurry through the tank. Increased flow rate through some process tanks may occur, however no increase in emissions is expected as the operating temperatures and pressures of the vented tanks remains unchanged. This includes naturally vented or heated process tanks. DER is satisfied with the justification that emissions from these sources will not increase as a result of increasing production to 2.85 Mtpa.



Alcoa assumed the flow rate of vapour (non-condensable gases) from pressure vessels such as flash tanks would increase with production (e.g. additional production through the digestion flash tanks requires additional bauxite input which results in additional generation of non condensable gases). However non-condensable gases from flash tanks (digestion, evaporation and heat exchange) are captured via the non condensable treatment system which directs these gases to the powerhouse for thermal destruction. Alcoa expect no net increase in emissions from these systems as a consequence. DER is satisfied with the justification that emissions from these sources will not increase as a result of increasing production to 2.85 Mtpa.

DER is also satisfied that emissions from the oxalate kiln and liquor burner are unlikely to change as a consequence of increasing production to 2.85 Mtpa. Refer to section 1.2.2 below for further assessment of the change to calciner priority VOC emissions.

In section 3.2 of Alcoa's supporting information, it has predicted an 8% increase (i.e. 3.6 g/s to 3.89 g/s) of total VOCs from 2.65 Mtpa to 2.85 Mtpa from point sources based on 2014 emissions inventory information. The predicted increase is unlikely to be solely attributed to the production increase, given that the 2014 updated emissions inventory will include additional sources of emissions. The increase in point source total VOCs associated with the production increase appears to be primarily related to the milling vents and cooling towers.

Calciner Priority VOCs

Calciner priority VOCs (acetaldehyde, acetone, 2-butanone, formaldehyde and benzene) will increase with production through the calciners. Without intervention, an increase in production would more than likely cause Alcoa to exceed the aggregate calciner priority VOC limits specified in condition A2(a) of the licence for the licence year and each quarter. The aggregate mass emission of priority VOCs from calcination is calculated using the methodology in Table 18 of Appendix A in the licence.

Alcoa implemented a VOC reduction project pursuant to works approval W5391. The project involved redirecting emissions from the Calciner 1-3 low volume vent (Calciner 1-3 LVV) into the combustion zone of Calciner 1, 2 or 3 to combust VOCs. The aim of the project was not just to offset the increase of priority emissions associated with a production increase from 2.65 Mtpa to 2.8 Mtpa, but reduce priority VOC emissions from calcination by a further 50% (i.e. reduction in aggregate priority calciner VOC emissions that equates to at least 1.5 times the amount of aggregate priority calciner VOC emissions attributed to a production increase to 2.8 million tonnes of alumina per year).

Alcoa submitted a commissioning report pursuant to the conditions of works approval W5391 that included a validation of the extent of priority VOC reduction achieved. Alcoa's commissioning report concluded it had reduced priority VOCs that equated to 1.5 times the amount attributed to a production increase to 2.85 Mtpa (as opposed to 2.8 Mtpa). As part of its licence amendment application, Alcoa supplied new aggregate calciner priority VOC mass emissions limits applicable to 2.85 Mtpa as per calculations in its commissioning report.

Alcoa propose a change to Table 1 in condition A2(a) to reflect a production of 2.85 Mtpa as follows:



Period of the licence	Current aggregate calciner priority VOC emissions in kg	New aggregate calciner priority VOC emissions in kg
Licence year	31219	29501
1 st 90 days up to and including 10 February in each calendar year	7698	7274
1 st 180 days up to and including 11 th May in in each calendar year	15396	14548
1 st 270 days up to an including 9 th August in each calendar year	23094	21823

Alcoa also supplied revised values for Table 18 in Appendix A of the licence as follows:

Calxiner (Calx)	Average priority VOC emissions in g/t of daily throughput , based on NATA accredited analysis of isokinetic stack sampling pursuant to licence conditions		Daily Calxiner priority VOC emissions (Calx emissions)	
	Current	New	Current	New
1	10.5	13.35	Calxiner 1 ADT ¹ multiplied by 10.5	Calxiner 1 ADT multiplied by 13.35
2	10.22	12.73	Calxiner 2 ADT multiplied by 10.22	Calxiner 2 ADT multiplied by 12.73
3	10.90	9.49	Calxiner 3 ADT multiplied by 10.90	Calxiner 3 ADT multiplied by 9.49
4	10.16	7.30	Calxiner 4 ADT multiplied by 10.16	Calxiner 4 ADT multiplied by 7.30
LVV's	1.81	0.28	LVV's ADT multiplied by 1.81	LVV's ADT multiplied by 0.28

Note 1: ADT is the average daily throughput of alumina for each calciner as applicable

DER reviewed air emission sections of the commissioning report (i.e. Appendix C – Air Emissions Verification Report & Appendix D – Air Verification monitoring data) and considered technical advice from its Air Quality Section. DER is satisfied that Alcoa implemented the air emissions validation monitoring program as specified in works approval W5391 and has correctly used the new data to recalculate aggregate calciner priority VOC emissions for a production of 2.85 Mtpa. DER is also satisfied that the commission report adequately demonstrates the required aggregate calciner priority VOC offset for both a production of 2.8 Mtpa and 2.85 Mtpa.

Combustion Gases

Combustion gases include nitrogen oxides (NOx) and carbon monoxide (CO) which are released from refinery vessels such as the powerhouse boilers, calciners, liquor burner and oxlate kiln. DER does not expect any significant change to the emission of combustion gases. Alcoa will be required to continue stack monitoring of combustion gases from the liquor burner stack, oxalate kiln stack, boiler stacks and calciner stacks (including the C1-3 low volume vent). Alcoa will still be subject to a NOx limit of 350 mg/m³ from the calciner stacks, liquor burner stack and boiler stacks (when fired on gas



and averaged over boilers 1,2 and 3. A CO limit of 1000 mg/m³ applies to emissions from the liquor burner stack.

A response level of <100 ppm applies to the liquor burner stack and oxalate kiln stack linked to management actions. In addition to stack monitoring, Alcoa is required to operate and maintain a CEMS for CO emissions from the oxalate kiln stack. DER is satisfied there will be no significant change in the emission of combustion gases and existing regulatory controls have not been reassessed.

POINT SOURCE EMISSIONS TO AIR – RISK ASSESSMENT

Emission: Particulates emitted to air from combustion point sources include the liquor burner stack, oxalate kiln and the four calciner stacks (normal and abnormal operation). During normal operating conditions, the concentration of particulates from an individual calciner stack or the liquor burner are less than 80 mg/m³. In the case of the liquor burner, concentrations will generally be less than 30 mg/m³. Emissions may exceed 80 mg/m³ for short periods of time (i.e. up to 60 mins) during abnormal operations such as ESP failures, and process upsets. Particulate emissions may also exceed this concentration during start-up/shut down scenarios. During normal operating conditions, the concentration of particulates from the oxalate kiln stack will be less than 30 mg/m³. Particulate emissions may exceed this level for up to 60 mins during process upset and during start-up and shutdown scenarios. Section 3.2 of the supporting information predicts an increase in refinery particulates from an existing production of 2.65 Mtpa to 2.85 Mtpa of 9.4% (2.8 g/s to 3.06 g/s) however, it is noted the 2014 updated inventory data includes additional sources not previously included in the emissions inventory. Emissions from the liquor burner and oxalate kiln are unlikely to change, however particulate emissions from the calciner stack increase with increasing production. Alcoa advised the predicted increase in particulate emissions are based on the 2014 updated emissions inventory and extrapolated forward, utilising predicted stack flows through the calciners at 2.8 Mtpa and 2.85 Mtpa (Source: email communication from Jocelyn Zimmerman, Alcoa of Australia Ltd, 08/09/2015).

Impact: Reduced air quality in local area. Particulates greater than PM₁₀ are generally considered to have a nuisance or amenity related impact and particulates less than PM₁₀ are respirable fractions with a small enough aerodynamic diameter to reach deep into the lungs.

Controls:

- Calciners have electrostatic precipitators (ESP) and multiclones to reduce particulate emissions and continuous dust concentration meters to monitor emissions. Alarm systems and interlocks are linked to continuous monitoring.
- The liquor burner has an ESP to remove particulate matter in addition to a quench duct and dehumidifier that aids in final particulate polishing. A continuous dust concentration meter monitors emissions. Alarm systems and interlocks are linked to continuous monitoring.
- The Oxalate kiln has a wet scrubber to reduce particulate emissions and continuous dust concentration meters to monitor emissions. Alarm systems and interlocks are linked to continuous monitoring.

Risk Assessment

Consequence: Minor

Likelihood: Unlikely

Risk Rating: Moderate



Regulatory Controls

- *Limits & response levels*
 - Condition A27 sets a particulate limit of 80 mg/m³ for the liquor burner stack and Calciners 1,2,3 and 4 as individual emission points.
 - Conditions A7 and A12 set particulate response level of 30 mg/m³ for the liquor burner and oxalate kiln respectively.
- *Management actions*
 - Conditions A28 and A29 specify management actions for exemption events and cease feed scenarios for calciners.
 - Liquor burner – Conditions A8, A9(c) and A11 specify management actions for exemption events and cease feed scenarios for the liquor burner.
 - Oxalate kiln – Conditions A16(c) and A18 and A19 specify management actions for exemption events and cease feed scenarios for the oxalate kiln.
- *Monitoring*
 - Condition A24 and A25 require stack sampling of the four calciner stacks, Calciner 1-3 LVV, liquor burner and oxalate kiln on a quarterly basis for particulates.
 - Conditions A24(d), A25(c), A25(d) and A25(e) require operation and maintenance of continuous dust concentration meters on calciner stacks, liquor burner stack and oxalate kiln stack.
- *Reporting*
 - Limit exceedance reporting is specified in condition G5 and response level exceedance reporting is specified in condition G6.

Despite a relatively small predicted increase in overall particulate mass emission from point sources to air attributable to the increase in production through calcination, Alcoa will still be required to comply with the specified limits and response levels. There are no identified changes required to the existing management actions, stack or continuous monitoring and reporting requirements. The risk of particulate point source emissions to air attributed to a production increase to 2.85 Mtpa can be managed through the existing regulatory controls.

Alcoa is continuing implementation of the VOC & Odour Monitoring and Management Plan (VOCOMMP) it agreed to as an outcome of a licence amendment determination in 2012. The VOCOMMP includes submissions of an updated air emissions inventory, modelling and potentially a review of the existing Health Risk Assessment.

Residual Risk

Consequence: Minor

Likelihood: Unlikely

Residual Risk Rating: Moderate



Emission: VOCs from point sources to air (refer to Table 2 above). Mass emission of VOCs from cooling towers, milling vents and calcination are predicted to increase as a consequence of increasing production to 2.85 Mtpa. Gases from the Calciner 1-3 LVV (excluding the 50B condensate tank) are now redirected through Calciner 1, 2 or 3 combustion zones to achieve a reduction in aggregate calciner priority VOC from calcination to offset an otherwise increase in VOCs that would occur from calcination as a result of increasing production. Total VOCs are predicted to increase from 3.6 g/s to 3.89 g/s but in addition to the assumed changes to emissions, it is noted that the 2014 updated inventory data used as a source for predictions, includes additional sources of emissions not previously considered. The increase in emissions from milling vents relates to portional increase in running time with increasing production.

Impact: Abnormal operations for VOC point sources includes situations such as RTO bypass events, air feed line maintenance on boilers causing unabated release of non-consensable gases and calciner process upset conditions reducing VOC destruction efficiency. Such situations are likely to result in decreased local air quality and increased odour potential. There is potential for acute health impacts in certain individuals with elevated sensitivity. On review of the 2014 Annual Environmental Report, there have been no reportable (i.e. beyond the allowable time limit) RTO bypass events in at least the last 12 months.

Controls:

- The liquor burner and oxalate kiln each have a regenerative thermal oxidiser (RTO) for VOC destruction.
- Automated shutdown of liquor burner and oxalate kiln RTO's in the event of RTO bypass.
- Monitor and maintain minimum exit temperature of RTO's.
- The calciner combustion zones destroy a portion of VOC from calcination. Calciner 1-3 LVV gases (excluding the 50B condensate tank emissions) are redirected through Calciner 1,2 or 3 for VOC destruction.
- The 25A vents, 35J tank vents, digestion, heat interchange and evaporation condensables are extracted by condensers and directed to the lower dam, lakewater circuit or reused as process water. Non-condensables are directed to the air feed of the powerhouse boilers for destruction.

Risk Assessment

Consequence: Minor

Likelihood: Unlikely

Risk Rating: Moderate

Regulatory Controls

- *Limits and response levels*
 - Condition A2(a) sets aggregate calciner priority VOC limits from calcination as calculated using the method in Table 18 of Appendix A.
 - Condition A27 sets a limit of 1000 mg/m³ for carbon monoxide (CO) from the liquor burner facility stack.
 - Condition A6 and A11 sets CO and temperature reponse levels of ≤100 ppm and ≥750°C respectively for the liquor burner facility oxalate kiln facility. Carbon monoxide is a surrogate parameter for combustion efficiency and minimum temperatures are required for VOC destruction.



- *Management actions*
 - Conditions A28 and A29 specify management actions for exemption events and cease feed scenarios for calciners.
 - Liquor burner – Conditions A7, A8, A9 and A10 specify management actions for exemption events and cease feed scenarios for the liquor burner.
 - Oxalate kiln – Conditions A15, A16, 17 and A18 specify management actions for exemption events and cease feed scenarios for the oxalate kiln.
 - Condition A5 requires direction of gases and vapour from digesters and flashtanks through a condenser and any gases/vapour not extracted by the condenser are to be directed to the boilers for destruction of VOCs.
- *Monitoring*
 - Condition 22 requires stack monitoring of CO from boiler stacks;
 - Condition A23 requires stack monitoring of CO and priority VOCs from calciners 1-4 and Calciner 1-3 LVV.
 - Condition 25 requires stack monitoring of CO and priority VOCs from the liquor burner stack and oxalate kiln stack.
 - Condition A25 requires continuous monitoring of CO in the oxalate kiln stack and temperature in the combustion zone of the liquor burner and oxalate kiln regenerative thermal oxidiser.
- *Reporting*
 - Limit exceedance reporting is specified in condition G5 and response level exceedance reporting is specified in condition G6.

While there is predicted to be a relatively minor overall increase in mass emission VOCs from point sources, this also includes additional sources identified during the 2014 Emissions Inventory update. Alcoa will still be required to comply with the specified limits and response levels. The aggregate calciner priority VOC limits in condition A2(a) will be reduced due to the reduction in VOCs achieved by the works approval W5391 VOC reduction project as outlined above. There are no identified changes required to the existing management actions, stack or continuous monitoring and reporting requirements. The risk of point source VOC emissions to air attributed to a production increase to 2.85 Mtpa can be managed through the existing regulatory controls.

Alcoa is continuing implementation of the VOC & Odour Monitoring and Management Plan (VOCOMMP) it agreed to as an outcome of a licence amendment determination in 2012. The VOCOMMP includes submissions of an updated air emissions inventory, modelling and potentially a review of the existing Health Risk Assessment.

Residual Risk

Consequence: Minor

Likelihood: Unlikely

Residual Risk Rating: Moderate



2. FUGITIVE EMISSIONS – RISK ASSESSMENT

Emission: Dust from RSAs including both residue drying surfaces, embankments and trafficable areas in and around RSA. Also dust from bauxite stockpiles. Dust emissions can occur during normal operations such as surface dozing, light vehicle movement and embankment construction. Dust emissions can occur over short periods (i.e. < 24 hours) due to wind erosion under high winds which would be considered abnormal operations or an emergency situation. Significant dust emission events have occurred during abnormal operations in 2002, 2006 and 2011 and subject to enforcement action. As stated in the 2012 Wagerup Long Term Residue Management Strategy (2012 LTRMS), dust generated from the residue area mostly consists of fine clay particles and some sodium carbonate crystals precipitated on the surface of residue as entrained moisture evaporates. Residue dust is slightly alkaline. Winds speeds in exceed of 6.5 m/s (23 km/h) can pick up and transport fine residue and carbonate particles from dry residue surfaces. The months from October to April are the period of greatest risk of airborne dust. The proposed increase of production to 2.85 Mtpa is not directly associated with any current proposals for new drying areas in the RSA. These are subject to relevant approvals pursuant to s53 of the EP Act on a case by case basis. Section 4 of Alcoa’s application addressed fugitive dust emissions from RSA and bauxite stockpiles. It references NPI reporting data for PM10 and PM 2.5 for 2007 – 2014 and points to a decreasing trend in fugitive emissions that Alcoa relates to improved dust management practices and points out that production has increased in this period. Alcoa is currently updating fugitive dust emissions data as part of the VOCOMMP process.

Impact: Reduced air quality in local area. Bauxite residue is alkaline, therefore dust lift off from the RSA is corrosive. Particulates greater than PM₁₀ are generally considered to have a nuisance or amenity related impact and particulates less than PM₁₀ are respirable fractions with a small enough aerodynamic diameter to reach deep into the lungs. The *Health Risk Assessment of Atmospheric Emissions Expansion of Wagerup Refinery to 4.7 Mtpa*, ENVIRON, 2005 relates to a baseline emissions scenario of 2.41 Mtpa production and a scenario representative of emissions from the Wagerup III expansion project (4.7 Mtpa production). The executive summary notes that the potential for emissions from the baseline or expanded refinery scenarios to cause acute health effects is low and primarily driven in part by particulate emissions from the RSA.

Controls: The 2012 LTRMS contains a summary of dust management strategies in section 7 that are categorised into long-term controls (annual), mid-term controls (weekly) and day to day controls. These are summarised in Table 3.

Table 3: summary of RSA dust control measures as detailed in the 2012 LTRMS

Long-term controls	<p>During winter each year, dust control measures for the upcoming year are planned to ensure that:</p> <ul style="list-style-type: none"> • Activities with higher dust generation risk (i.e. sand stockpiling and sand construction activities) are performed in winter months; • Dust control mechanisms are in place for any newly constructed or exposed embankments; and • Frequency for application of dust suppressants to exposed surfaces, such as roadways, is specified.
Mid-term controls	<ul style="list-style-type: none"> • Weekly review meetings; • Inspections and surveys; • Specialist consulting company contracted for provision of seven day and seasonal weather forecasts which are reviewed weekly; • Regular turning of mud in drying area to leave wet mud on the surface; • Spraying of exposed banks and roads with dust suppressants; • Restricting vehicle access to exposed areas; and



	<ul style="list-style-type: none"> Internal ambient monitor dust targets triggering investigation and intervention.
Day to day controls	<ul style="list-style-type: none"> One and three day weather forecasts on a daily basis; Dust risk rating system; Sprinkler system operated according to dust risk rating system, forecasts, ambient monitoring data and residue area conditions; and Internal alarms linked to ambient monitors that trigger sprinkler system.

Risk Assessment (normal operations)

Consequence: Moderate

Likelihood: Unlikely

Risk Rating: Moderate

Risk Assessment (abnormal operations)

Consequence: Moderate

Likelihood: Unlikely

Risk Rating: Moderate

Regulatory Controls

As per the 'fugitive emissions' section of the decision table, DER has deleted condition A4 relating to visible dust across the boundary. Fugitive dust is now to be regulated by the general provisions of the EP Act.

Condition A21 requires the implementation of a continuous ambient dust monitoring program at five locations around the RSA. Condition A22 requires the analysis of a downwind Hi-vol filter paper for alkalinity, pH and metals if dust concentrations exceed 100 µg/m³ (background corrected).

Condition A27 sets a total suspended particulate (TSP) limit of 200 µg/m³ (24 hr average, background corrected) that is not to be exceeded for more than 18 days during the annual licence period. A limit of 260 µg/m³ (24 hr average, background corrected) shall never be exceeded.

Residual Risk (normal operations)

Consequence: Moderate

Likelihood: Unlikely

Residual Risk Rating: Moderate

Residual Risk (abnormal operations)

Consequence: Moderate

Likelihood: Unlikely

Residual Risk Rating: Moderate

Emission: Fugitive VOCs emitted from area sources within the Residue Storage Area (RSA) include the lower dam, cooling pond, oxalate pond, RDA2-1 Liquor southern, RDA2-2 Wet Mud, ROCP, ROWS, Wet Mud, Superthickener, Wet Sand, Dry Mud 1 and Dry Mud 2. Section 3.1.1 of Alcoa's supporting information refers to use of emissions data from the 2005 ERMP 'Air Quality Summary Report' for the assessment of fugitive VOCs from a production of 2.85 Mtpa. Alcoa referenced other reports which represent further scientific investigations since the 2005 report and that these were taken into account in revising or updating several emissions estimates. Table 3 of Alcoa's supporting information provided estimated updated emission rates for VOCs. Overall, Alcoa expected that combined with the changes that have taken place to the size of individual areas within the RSA together with additional drying areas built since 2006, overall mass emission rates of VOCs from area sources were expected to have increased over those predicted in the Wagerup III ERMP. The precise extent of the increase has not yet been quantified. Alcoa states in section 3.1.3 that it will



be updating the emissions inventory and modelling as part of the VOCOMMP process. DER will continue to review information submitted by Alcoa and reassess where necessary. Assuming meteorological factors were to remain the same as in the original modelling and given changes to unit area emission rates, Alcoa predicted the following:

- Drying areas within the residue storage areas will increase by approx. 2.5% from 2014, and if we scale their emissions linearly a similar increase in VOC emissions can be expected;
- Individual VOCs may increase by more or less than the average rate (i.e. toluene will increase greater than proportionally due to wet sand increases);
- Cooling pond area does not change significantly, however some VOCs will increase in emissions due to the emission rate changes noted above, while changes to individual emissions from the Lower Damwill lead to decreases in other VOCs (e.g. formaldehyde); and
- Overall the increase expected in total VOCs from fugitive sources is expected to be slightly higher than the estimated 2.5% in drying area surface.

Impact: Reduction in local air quality, odour impacts, may cause sensitivity and acute health impacts in particularly sensitive individuals.

Controls: Not known.

Risk Assessment

Consequence: Minor

Likelihood: Possible

Risk Rating: Moderate

Regulatory Controls

The existing licence does not contain regulatory controls for area source VOCs emissions.

Alcoa are currently continuing implementation of the VOCOMMP that is a non-regulatory process. Relevant steps include update of the air emissions inventory and field odour surveys and should increase understanding of current fugitive VOC emissions.

Residual Risk

Consequence: Minor

Likelihood: Possible

Residual Risk Rating: Moderate

Emission: Fugitive emissions of contaminated waste emitted to surface water or groundwater from the RSA. Residue is produced at a rate of approximately two dry tonnes per tonne of alumina. Residue consists of a coarse sand fraction ('red sand') and a fine silt fraction ('red mud'). Approximately 37% of the residue is sand and 63% is mud. The mud is thickened prior to discharge into composite lined residue drying areas. The sand is stockpiled and used for internal construction activities. Oxalate is an organic by-product of the Bayer process and also stored in designed areas of the residue storage area. More broadly the residue storage area also includes support infrastructure such as a cooling pond (cools process liquor and stores rainfall runoff) and a run-off water storage (ROWS) pond for containing accumulated run-off from a 1:100 wet year and recycling back to the refinery via the cooling pond. The key characteristic of residue is its alkalinity, typically between 20 and 30 g/L expressed as sodium carbonate and a pH of 13. *Source: Wagerup LTRMS, Alcoa 2012.* An increase in production of alumina to 2.85 Mtpa increases the production of wastes such as residue, oxalate and liquor.

Impact: Seepage, leakage and overflow contaminating surface water, soil and groundwater.

Controls: Alcoa's Long Term Residue Management Strategy is designed to inform local and state governments and the wider community of its management strategies and commitments for bauxite



residue management. It outlines short term (5-7 year), mid term (25 year) and life-of-mine (2045) management strategies for locating future residue infrastructure, height requirements and management of environmental risks. Residue Storage Areas and ponds are composite lined. Alcoa's application states that the 2012 LTRMS allows for growth and is consistent with a production increase to 2.85 Mtpa. The next residue storage area for Wagerup is in the planning phase with approximate implementation in 2020/2021, well within the current 5 and 25 year planned residue footprint.

Risk Assessment

Consequence: Moderate

Likelihood: Unlikely

Risk Rating: Moderate

Regulatory Controls

Water pollution control conditions are conditions W1 – W4 and relate to drainage below RSAs, containment of contaminated water, ambient surface water monitoring (and criteria) and ambient groundwater monitoring.

No additional regulatory controls associated with RSA are required for an increase in production to 2.85 Mtpa. Containment infrastructure in the RSA has been constructed subject to approvals issues under Part V of the EP Act so as to minimise the risk to soil, groundwater and surface water. An increase in production to 2.85 Mtpa can be managed within the existing RSA, short/medium/long-term management outlined within the 2012 LTRMS and the current conditions of licence. An increase in production to 2.85 Mtpa does not require additional regulatory controls for ambient environmental quality monitoring (surface water and groundwater).

The refinery including the RSA is classified under the *Contaminated Sites Act 2004* as *Contaminated – remediation required*. Further information on this is available through DER's Contaminated Sites Database at www.der.wa.gov.au.

Residual Risk

Consequence: Moderate

Likelihood: Unlikely

Residual Risk Rating: Moderate