WESTERN AUSTRALIA

DEPARTMENT OF ENVIRONMENT REGULATION

Environmental Protection Act 1986

AMENDED LICENCE

LICENCE NUMBER: L6217/1983/15 **FILE NUMBER: 2012/007237**

NAME AND ADDRESS OF OCCUPIER:
Alcoa of Australia Limited
181-205 Davy Street
BOORAGOON WA 6154
ACN: 004 879 298

NAME AND LOCATION OF PREMISES:
Wagerup Alumina Refinery
Willowdale Rd
WAROONA WA 6215
(as depicted in Appendix B)

Environmental Protection Regulations 1987
CLASSIFICATION(S) OF PREMISES:

Category 46 – Bauxite refinery
Category 52 – Electric power generation
Category 64 – Class II or III putrescible landfill site
Category 67 – Fuel burning

COMMENCEMENT DATE OF LICENCE: Wednesday, 13 November 2013

EXPIRY DATE OF LICENCE: Saturday, 12 November 2016

CONDITIONS OF LICENCE:
As described and attached:

DEFINITION(S)
GENERAL CONDITION(S) (7)
AIR POLLUTION CONTROL CONDITION(S) (29)
WATER POLLUTION CONTROL CONDITION(S) (4)
SOLID WASTE CONTROL CONDITION(S) (3)
ATTACHMENT(S) (3)

Date signed: 30 October 2015
.....
Officer delegated under Section 20
of the *Environmental Protection Act 1986*

Date of Issue: Friday, 8 November 2013
Date of Amendment: Friday, 30 October 2015

WESTERN AUSTRALIA

DEPARTMENT OF ENVIRONMENT REGULATION

Environmental Protection Act 1986

LICENCE NUMBER: L6217/1983/15 FILE NUMBER: 2012/007237

CONDITIONS OF LICENCE

SECTION 1: DEFINITIONS

In these conditions of licence, unless inconsistent with the text or subject matter:

"advise" means advise in writing (letter, facsimile or e-mail) from time to time;

“ANZECC 2000” means the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand, October 2000;

"approved" means approved in writing from time to time;

"AS" means Australian Standard;

“AS 3814-2009” means Australian Standard AS 3814 *Industrial and commercial gas-fired appliances*;

“AS/NZS 3580.1.1:2007” means Australian Standard AS/NZS 3580.1.1 *Methods for sampling and analysis of ambient air – Guide to siting air monitoring equipment;*

“AS/NZS 3580.9.3:2003” means the Australian Standard AS/NZS 3580.9.3 *Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – Total suspended particulate matter (TSP) – High volume sampler gravimetric method*;

“AS 3580.14-2011” means the Australian Standard AS 3580.14 *Methods for sampling and analysis of ambient air – Meteorological monitoring for ambient air quality monitoring applications*;

“AS 4323.1-1995” means the Australian Standard AS 4323.1 *Stationary Source Emissions Method 1: Selection of sampling positions*;

“AS 4323.3:2001” means the Australian Standard AS 4323.3 *Stationary source emissions – Determination of odour concentration by dynamic olfactometry*;

“AS/NZS 5667.1:1998” means the Australian Standard AS/NZS 5667.1 *Water Quality – Sampling – Guidance of the Design of sampling programs, sampling techniques and the preservation and handling of samples*;

“background concentration” means lowest TSP concentration recorded from any of the RDA licensed dust monitors for each day;

“background corrected” means the TSP concentration recorded from each of the RDA licensed dust monitors minus the background concentration for that day;

“calciner low volume stack” means Calciner 1-3 vacuum pump and hydrate filter hoods;

“CEMS” means Continuous Emissions Monitoring System;

“CEMS Code” means the code of practice that details design, installation, performance, maintenance & verification for CEMS, as well as quality assurance upon acquired data. The Code is titled *Department of Environment and Conservation Continuous Emission Monitoring System (CEMS) Code for Stationary Source Air Emissions, October 2006;*

"CEO" means Chief Executive Officer of the Department of Environment Regulation;

"CEO" for the purposes of correspondence means;

Chief Executive Officer
Department Administering the *Environmental Protection Act 1986*
Locked Bag 33
CLOISTERS SQUARE WA 6850
Email: info@der.wa.gov.au;

"complaints" includes those complaints received directly by the licensee and any it is notified of in writing by an Inspector;

"ESP" means Electrostatic Precipitator;

"Landfill Waste Classification and Waste Definitions 1996" means the document entitled *Landfill Waste Classification and Waste Definitions 1996 (As amended December 2009*, produced by Western Australia Department of Environment and Conservation, published on 17 December 2009;

"LBF" means the liquor burning facility;

"Licence Year" means the period starting on 13 November in each year up to and including 12 November of the following year;

"mg/L" means milligrams per litre;

"mg/m^3" means milligrams per cubic metre;

"NATA" means National Association of Testing Authorities;

"NATA accredited" means in relation to the analysis of a sample that the laboratory is NATA accredited for the specified analysis at the time of the analysis;

"NO" means nitrogen oxide;

"NO_2" means nitrogen dioxide;

"NOx" means oxides of nitrogen, as the sum of NO and NO_2 expressed as NO_2;

"normal operating conditions" means any operation of a particular process excluding start up and shut down conditions;

"normal operating conditions (relative to stack sampling)" means that the relevant plant within the prescribed premises is operating in a normal mode i.e. excluding start up and shut down conditions, temporarily modified operating state or emergency conditions;

"OU" means odour units;

"partial failure of an ESP" is defined as loss of a full zone of an ESP;

"Priority VOCs" means the combined emissions of Acetaldehyde, Acetone, 2-butanone, Formaldehyde and Benzene;

"RDA" means residue disposal area(s) on the premises, located to the west of South West Highway and depicted as Residue Disposal Area in Appendix B;

"RTO" means Regenerative Thermal Oxidiser;

"SO_2" means sulphur dioxide;

"start-up" being the period when plant or equipment is brought from inactivity to normal operating conditions;

"shut-down" being the period when plant or equipment is brought from normal operating conditions to inactivity;

"TEOM" means Tapered Element Oscillating Microbalance;

"TSP" means total suspended particulates;

"upset" means an unplanned deviation from normal operating conditions;

"TDS" means Total Dissolved Solids;

"$\mu g/m^3$" means micrograms per cubic metre;

"$\mu S/cm$" means micro Siemens per centimetre;

"USEPA" means United States Environment Protection Agency;

'Usual Business Day" means the days Monday to Friday inclusive, excluding public holidays; and

Other terms take their meaning preferentially from the *Environmental Protection Act 1986*

END OF SECTION

SECTION 2: REPORTING AND RECORD KEEPING REQUIREMENTS

MONITORING PROGRAM - ANNUAL REPORT

G1 The licensee shall provide to the CEO, three copies of an annual report (one electronic) containing data required by the conditions of this licence. The report shall contain data collected from **1 January to 31 December** and shall be provided by **1 April** the following year**.** The report shall include, but not be limited to:

(i) an assessment of the data against any limits or response levels set in this licence and data from previous years' monitoring. It shall identify any data exceeding those limits or response levels and provide information on why the exceedance occurred (if known) and action taken by the licensee to prevent recurrence of such exceedances;

(ii) a list of any monitoring methods used to collect and analyse data required by any condition of this licence to demonstrate they comply with the methods specified in this licence;

(iii) the total amount of alumina produced at the refinery over the reporting periods and the average daily amount of alumina production (averaged over a month) from the refinery over the reporting period (measured by a weightometer as alumina leaves the calciners);

(iv) an analysis of only complaints received directly by the licensee including; but not limited to, total number of complaints and number of complainants and the percentage distribution of complainants against total complaints, monthly complaints profiles and a summary of any

correlations identified between complaints data and meteorological conditions/process variables;

(v) unavailability of continuous monitoring equipment required under this licence in excess of availability response levels as specified in conditions G7(c), A20(iv), A24(b), A25(d) and W3(e); and

(vi) progress on Oxalate Management including implementation of the Alcoa World Alumina Australia-Wagerup Refinery Oxalate Management Strategy.

ANNUAL AUDIT COMPLIANCE REPORT

G2 The licensee shall by 1 April in each year, provide to the CEO an annual audit compliance report in the form in Appendix C to this licence, signed and certified in the manner required by Section C of the form, indicating the extent to which the licensee has complied with the conditions of this licence, and any previous licence issued under Part V of the Act for the Premises, during the period beginning 1 January the previous year and ending on 31 December in that year.

CALIBRATION OF MONITORING EQUIPMENT

G3 The licensee shall ensure that monitoring equipment used in a monitoring program under this licence is:

(i) maintained and calibrated in accordance with the manufacturers recommendations;

(ii) as specified in the licence; or

(iii) in accordance with the approved dust concentration strategy (as applicable).

MONITORING PROGRAM - COMPLAINTS REPORTING

G4(a) The licensee shall maintain database(s) to record the following information (if known or provided) of complaints received at the premises concerning any environmental impact of the activities undertaken at the premises:

(i) name and address of the complainants;

(ii) date and time both of the complaint and of any environmental impact reported by the complainant;

(iii) general description of the nature of any environmental impact reported by the complainant to which the complaint relates;

(iv) wind direction, wind speed and temperature at the time of any environmental impact reported by the complainant to which the complaint relates if able to be determined;

(v) action taken in response to the complaint including results of any investigation(s) and action(s) to verify any environmental impact to which the complaint relates;

(vi) whether the complainant(s) reported any adverse health effects; and

(vii) description of exceptional plant operating conditions within six hours prior to the time of any environmental impact reported by the complainant.

G4(b) The licensee shall, every month, provide the CEO and cause to be published in a newspaper local to the Yarloop community, a monthly summary of the complaints data received by the licensee in the preceding month in accordance with condition G4(a). The summary should include the number, date and type of complaint (both daily and total) and number of complainants, but exclude the name and address of the complainant(s). The CEO shall also be provided evidence that the data has been published.

G4(c) The licensee shall make available to an Inspector on request, information collected in accordance with condition G4(a) excluding the name and address of the complainant(s), but providing the general location of the complainant (eg North Yarloop, Hamel, x km east of premises) to assist in complaint data assessment.

REPORTING REQUIREMENTS – LIMIT EXCEEDANCES

G5(a) The licensee shall advise the CEO, as soon as practicable, when it becomes aware of an exceedance of any measurement which indicates that any discharge limit specified in A1(a), A2(a) A27 or W3(c) has been exceeded.

G5(b) In the event of a discharge limit exceedance reported under condition G5(a), the licensee shall also provide written advice to the CEO within 24 hours of its staff becoming aware of the exceedance. The report shall include:

(i) the date, time and probable reason for the exceedance;
(ii) an estimate of the period over which the limit was or is likely to be exceeded; and
(iii) an estimate of the extent of the discharge over that period and indication of known or potential environmental impacts.

G5(c) The licensee shall provide a full report on its investigations into any discharge limit exceedance reported under condition G5(a) within seven days of it becoming aware of the exceedance, and it shall include, but not be limited to:

(i) the date, time and reason for the exceedance;
(ii) the period over which the exceedance occurred;
(iii) the nature, cause and extent of the discharge over that period and potential or known environmental consequences;
(iv) corrective action taken or planned to mitigate adverse environmental consequences; and
(v) corrective action taken or planned to prevent a recurrence of the exceedance.

REPORTING REQUIREMENTS – RESPONSE LEVEL EXCEEDANCES

G6(a) The licensee shall advise the CEO before 5pm on the next Usual Business Day after becoming aware of any occasion where a management action as specified in Conditions A8, A9, A15(a), A15(b), A15(c) or Section (iii) of Table 17 was initiated in response to a response level exceedance.

G6(b) The licensee shall submit a report to the CEO on any management action initiated as reported under G6(a) within seven (7) working days of it becoming aware of the exceedance. The report shall include, but not be limited to:

(i) The date and time of the exceedance;
(ii) The cause of the exceedance;
(iii) The extent of the exceedance; and
(iv) Corrective actions taken or planned corrective actions to prevent a recurrence of the exceedance.

METEOROLOGICAL STATION

G7(a) The licensee shall use and maintain the meteorological station (adjacent to Bancell Road) as shown in Appendix B to continuously measure wind speed and direction and air temperature. The devices shall:

(i) comply with AS 3580.14-2011, as appropriate and where practicable;
(ii) contain sensitive accurate sensors (as specified in AS 3580.14-2011);
(iii) contain wind speed and direction sensors located at least 10 metres above the ground; and
(iv) either provide instantaneous data about wind speed and direction on a paper chart, or provide six minute averages in electronic format.

G7(b) The licensee shall retain data acquired in G7(a) for a minimum period of three months.

G7(c) The licensee shall use and maintain the meteorological monitoring station referred to in condition G7(a) so as to provide reliable data on each meteorological parameter as required under G7(a) for a response level of greater than 90 percent of the time over a calendar year, based on six minute averages over a calendar year.

END OF SECTION

SECTION 3: AIR POLLUTION CONTROL - GENERAL MEASURES FOR THE PURPOSE OF MINIMISING POLLUTION

LICENSED PRODUCTION

A1(a) The licensee shall ensure that the refinery is operated in the following manner:

(i) production of alumina shall not exceed 2.85 million tonnes in each licence year; and

(ii) daily production of alumina shall not exceed 8400 tonnes.

All production figures shall be measured by weightometer as alumina leaves the calciner.

A1(b) The licensee shall provide a report to the CEO showing compliance with condition A1(a) by 21 November in each calendar year for the period 13 November the previous year to 12 November in that year.

CALCINER EMISSIONS MANAGEMENT

A2(a) The licensee shall ensure that the calciners are operated so that for the period shown in Column 1 of Table 1 Aggregate Calciner Priority VOC emissions, as calculated in accordance with Table 18 of Appendix A, shall not exceed the amount shown in Column 2 of Table 1.

Table 1: Calciner Operation

Column 1	**Column 2**
Period of the licence	**Aggregate Calciner Priority VOC emissions in kg**
Licence year	29501
1st 90 days up to and including 10th February in each calendar year	7274
1st 180 days up to and including 11th May in each calendar year	14548
1st 270 days up to and including 9th August in each calendar year	21823

A2(b) The licensee shall provide a report showing its compliance in respect of conditions A1(a)(ii) and A2(a) to the CEO within 21 working days of the end of the relevant periods set out in Column 1 of Table 1 in Condition A2(a). The licensee shall, when requested submit an audit of all data and calculations necessary for showing compliance with the above conditions.

STACKS - EXHAUST GAS EXIT VELOCITY

A3 The licensee shall ensure that a minimum operational exhaust gas exit velocity of 12 metres per second is maintained for any exhaust stack(s) required to be monitored under conditions A22(a), A23(a) and A25(a).

DUST CONTROL - ALUMINA LOADING FACILITY

A4 The licensee shall ensure that spilt alumina is removed from alumina rail carriages prior to the train leaving the premises.

CONDENSER – CONDENSABLE/NON-CONDENSABLE EMISSIONS

A5 The licensee shall ensure that gases and vapour emitted from the digesters and flash tanks at the refinery are passed through a condenser (unless the condenser is under maintenance) and:

(i) condensate extracted by the condenser is directed to the lower dam at the refinery for oxidation and/or the condensate is directed to the Lakewater circuit at the refinery and/or used as process waters at the refinery; and

(ii) gases and vapour not extracted by the condenser are directed to the air feed of the boilers within the powerhouse at the refinery for incineration, unless maintenance is being undertaken on the air feed line to the boilers.

AIR QUALITY RESPONSE LEVELS – LIQUOR BURNER STACK

A6 The Licensee shall, upon becoming aware that a parameter listed in Column 2 of Table 2 from a source in Column 1 of Table 2 has not met the response level for that parameter, in Column 3 of Table 2, undertake the response level exceedance response required by conditions A7, A8 and A10.

Table 2: LBF Response Levels.

Column 1	**Column 2**	**Column 3**
Source	**Parameter**	**Response Levels**
Liquor Burner stack	Particulates	≤ 30 mg/m^3
LBF RTO Outlet Ducting	CO	≤ 100 ppm
LBF RTO Combustion Zone	Temperature	≥ 750^{o}C

LIQUOR BURNER – START-UP/SHUT DOWN AND ESP FAILURE

A7 The Licensee is exempt from compliance with the LBF Emission Response Level specified in Table 2 in the events specified in Table 17 of Appendix A, if the Licensee's response is in accordance with the corresponding actions to be taken described in Table 17 for each event.

LIQUOR BURNER – REQUIREMENT TO SHUT DOWN

A8(a) If the temperature in the combustion zone of the Liquor Burner RTO falls below **750^{o}C** for more than 60 consecutive minutes during operation of the Liquor Burner, the Licensee shall for each individual occurrence:
(i) immediately cease feed to the Liquor Burner Kiln.

A8(b) If the CO in the RTO Outlet Ducting of the Liquor Burner exceeds **100ppm** for more than 60 consecutive minutes during operation of the Liquor Burner, the Licensee shall for each individual occurrence:
(i) immediately cease feed to the Liquor Burner Kiln.

A8(c) If the particulate levels in exhaust stack of the Liquor Burner exceeds **30mg/m^{3}** for more than 60 consecutive minutes during operation of the Liquor Burner, the Licensee shall for each individual occurrence:
(i) immediately cease feed to the Liquor Burner Kiln.

LIQUOR BURNER – MANAGEMENT OF RTO BYPASS

A9 The Licensee shall immediately cease feed to the Liquor Burner Kiln if the RTO has been bypassed for more than 10 consecutive minutes.

LIQUOR BURNER – RECOMMENCEMENT OF FEED AFTER SHUTDOWN

A10 Where feed has ceased to the Liquor Burner Kiln in accordance with conditions A7, A8 or A9 the Licensee shall not recommence feed to the Liquor Burner Kiln until:
(i) The cause of the response level exceedance has been rectified; or
(ii) A plan is submitted to the CEO outlining the troubleshooting actions to be undertaken.

AIR QUALITY RESPONSE LEVEL – OXALATE KILN RTO STACK

A11 The Licensee shall, upon becoming aware that a parameter listed in Column 2 of Table 3 from a source in Column 1 of Table 3 has not met the response level for that parameter, in Column 3 of Table 3, undertake the response level exceedance response required in conditions A15(a), A15(b), A15(c) and A18.

Table 3: Oxalate Kiln Response Levels.

Column 1	**Column 2**	**Column 3**
Source	**Parameter**	**Response Level**
Oxalate Kiln RTO stack	Particulates	≤ 30 mg/m^{3}
Oxalate Kiln RTO stack	CO	≤ 100 ppm
Oxalate Kiln RTO Combustion Zone	Temperature	≥ 750^{o}C

A12 The Licensee shall, upon becoming aware that a mercury control system parameter listed in Column 2 of Table 4 from a source in Column 1 of Table 4 has not met the response level for that parameter in Column 4 of Table 4, undertake the management actions required in Table 5 of condition A13.

Table 4: Mercury Control System Response Levels

Column 1	**Column 2**	**Column 3**	**Column 4**
Source	**Parameter**	**Averaging Period**	**Response Level**
Oxalate Belt Filter cake	Mercury (as measured dry)	N/A	≤ 1000 ppb
Oxalate polysulfide Dosing pump	Polysulfide dosing rate	7-day average	≥ 6 L/hr
Digester vapour condenser exit gas	Temperature	Annual average[1]	≤ 35 ^{o}C
Evaporation vapour condenser exit gas			

1. The annual average is calculated over a calendar year (1st January to 31st December inclusive in each year).

A13 The Licensee shall, pursuant to Table 4 in condition A12, take the relevant management action in the case of an event in Table 5.

Table 5: Mercury Control System Management Actions

Event	**Management Action**
Mercury in the Oxalate Belt Filter Cake exceeds the response level specified in Table 4	The Licensee shall: (a) increase the sulfide dosing rate above 6 L/hr (b) resample the oxalate belt filter cake for mercury within 7 days; (c) notify the CEO of the results within 4 weeks; and (d) Repeat parts (a) to (c) until the mercury in the Oxalate Belt Filter Cake is less than the response level specified in Table 4.
The oxalate polysulfide dosing rate is less than the response level specified in Table 4	The Licensee shall increase the sulfide dosing rate.
The annual average digester and/or evaporation vapour condenser exit gas temperature exceeds the response level specified	The Licensee shall: (a) submit to the CEO within two weeks of becoming aware, an action plan to reduce the annual average exit temperature; (b) implement the action plan specified in

in Table 4.	part (a); and (c) summarise the monthly and annual average exit gas temperatures in the annual report required by condition G1.

OXALATE KILN RTO STACK – START-UP/SHUT DOWN AND WET SCRUBBER FAILURE

A14 The Licensee is exempt from compliance with the Oxalate Kiln Response Levels specified in Table 3 in the events specified in Table 6, if the Licensee's response is in accordance with the corresponding actions to be taken described in Table 6 of each event.

Table 6: Oxalate Kiln Exemption Events

Section	Event Title	Action to be Taken
(i)	Oxalate Kiln start up	CO and Particulates All practicable measures to minimise the discharge of particulate matter and CO into the environment
(ii)	Oxalate Kiln shut down	CO and Particulates All practicable measures to minimise the discharge of particulate matter and CO into the environment.

OXALATE KILN - REQUIREMENT TO CEASE FEED

A15(a) If the temperature in the combustion zone of the Oxalate Kiln RTO falls below 750^{o}C for more than 60 consecutive minutes during operation of the Oxalate Kiln, the Licensee shall immediately cease feed to the Oxalate Kiln.

A15(b) If the CO in the RTO Stack of the Oxalate Kiln exceeds 100ppm for more than 60 consecutive minutes during operation of the Oxalate Kiln, the Licensee shall immediately cease feed to the Oxalate Kiln.

A15(c) If the particulate levels in the RTO Stack of the Oxalate Kiln exceeds 30 mg/m^3 for more than 60 consecutive minutes during operation of the Oxalate Kiln, the Licensee shall immediately cease feed to the Oxalate Kiln.

A15(d) If the oxalate polysulfide dosing pump is offline for more than 72 consecutive hours during operation of the Oxalate Kiln, the Licensee shall immediately cease feed to the Oxalate Kiln.

OXALATE KILN – MANAGEMENT OF RTO BYPASS

A16 The Licensee shall immediately cease feed to the Oxalate Kiln if the RTO has been bypassed for more than 10 consecutive minutes.

OXALATE KILN – MANAGEMENT OF WET SCRUBBER FAILURE

A17 The Licensee shall immediately cease feed to the Oxalate Kiln if the Wet Scrubber has completely failed for more than 10 consecutive minutes.

OXALATE KILN - RECOMMENCEMENT OF FEED AFTER SHUTDOWN

A18 Where feed has ceased to the Oxalate Kiln in accordance with conditions A15, A16 and A17, the Licensee shall not recommence feed to the Oxalate Kiln until:

(i) the cause of the response level exceedance has been rectified;
(ii) the cause of any cease of feed has been rectified; or
(iii) a plan is submitted to the CEO outlining the troubleshooting action to be undertaken.

END OF SECTION

SECTION 4: MONITORING REQUIREMENTS

STACK SAMPLING REQUIREMENTS

A19(a) The licensee shall ensure that sampling required under conditions A22(a), A23(a), A23(b), and A25(a) is undertaken in accordance with AS 4323.1-1995, where practicable.

A19(b) The licensee shall ensure that all sampling and analysis undertaken pursuant to conditions A22(a), A23(a), A23(b) and A25(a) for the parameters specified in Tables 13, 14 and 15 of Appendix A is undertaken by the holder of NATA accreditation for the relevant procedures utilised.

MONITORING PROGRAM – RDA DUST

A20 The licensee shall operate a dust monitoring program to measure dust levels generated from the RDA's. The dust monitoring program will incorporate the following features:

(i) use TEOM's, or high volume samplers that meet AS/NZS 3580.9.3:2003;
(ii) have monitors of the following designations, located at the following locations - BRW, RE, RW, RNE and RNW in positions identified in Appendix B;
(iii) have monitors located in accordance with AS/NZS 3580.1.1:2007 ;
(iv) run continuously (with a response level of 95% availability for each calendar year for each monitor); and
(v) where high volume samplers are used, renew filter papers daily.

MONITORING PROGRAM – RDA CHEMICAL DUST ANALYSIS

A21 The licensee shall have analysed, the filter paper from at least one of the high volume samplers from the dust monitoring program (located downwind at the time of sampling), that can be demonstrated to be representative of dust emissions from the RDA's in accordance with Table 12 of Appendix A.

MONITORING PROGRAM - HEAT RECOVERY STEAM GENERATOR (HRSG) AND BOILERS

A22(a) The licensee shall monitor the HRSG stack and boiler stack(s) for the parameters specified in Table 13 of Appendix A at the intervals specified in Table 13 of Appendix A, during normal operating conditions.

A22(b) The licensee shall provide the CEO with a report of the results of the monitoring program specified under condition A22(a) comprising concentrations of the parameters specified in Table 13 of Appendix A and the calculated mass emissions of the parameters specified in Table 13 of Appendix A using measured flow rates at the time of sampling of the parameter, and include the operational range for each operational parameter.

A22(c) The licensee shall continuously monitor the colour of the power house stack emissions using the Australian Miniature Smoke Chart (AS 3543 - 1989) when the power house is initially run on fuel oil or diesel until the smoke colour is lighter than shade 2 on the chart.

A22(d) Pursuant to condition A22(c) the licensee shall record in a log book the date and start and finish times of the period during which the smoke colour is the same as shade 2 on the chart or darker.

MONITORING PROGRAM - CALCINERS

A23(a) The licensee shall conduct a monitoring program which measures the parameters specified in Table 14 of Appendix A at the intervals specified in Table 14 of Appendix A of the calciner 1, 2, 3 and 4 stacks during normal operating conditions.

A23(b) The licensee shall conduct a monitoring program which measures the parameters specified in Table 14 of Appendix A at the intervals specified in Table 14 of Appendix A of the calciner low volume stack during normal operating conditions.

A23(c) The licensee shall provide the CEO with a report of the results of the monitoring program specified under conditions A23(a) and A23(b) comprising concentrations of the parameters specified in Table 14 of Appendix A and the calculated mass emissions of the parameters specified in Table 14 of Appendix A using measured flow rates at the time of sampling of the parameter, and include the operational range for each operational parameter.

A24(a) The licensee shall monitor particulates from the calciners with a monitoring system that is regularly maintained and calibrated in accordance with Section 2 Quality Assurance/Quality Control of the CEMS code.

A24(b) The licensee shall ensure that monitoring systems required by condition A24(a) are operated to achieve at least a 90% availability on a monthly basis, while the source is operational.

A24(c) The licensee shall log the particulate data produced from the CEMS required in condition A24(a).

MONITORING PROGRAM - LIQUOR BURNING FACILITY (LBF) AND OXALATE KILN

A25(a) The licensee shall conduct a monitoring program which measures the parameters specified in Table 15 of Appendix A at the intervals specified in Table 15 of Appendix A of the LBF stack and Oxalate Kiln RTO stack during normal operating conditions.

A25(b) The licensee shall provide the CEO with a report of the results of the monitoring program specified under condition A25(a) comprising concentrations of the parameters specified in Table 15 of Appendix A and the calculated mass emissions of the parameters specified in Table 15 of Appendix A using measured flow rates at the time of sampling of the parameter, and include the operational range for each operational parameter.

A25(c) The Licensee shall monitor the parameters listed in Column 2 of Table 2 and Column 2 of Table 3 with a monitoring system that is regularly maintained and calibrated in accordance with Section 2 Quality Assurance / Quality Control of the CEMS Code.

A25(d) The Licensee shall ensure that monitoring systems required by condition A25(c) are operated to achieve at least a 90% availability on a monthly basis while the source is operational.

A25(e) The licensee shall log the following data produced from the CEMS required in condition A25(c):

(i) the particulate concentration of gases exiting the LBF stack and Oxalate Kiln RTO stack;

(ii) the CO concentration of gases measured in the RTO outlet ducting and Oxalate Kiln RTO stack; and

(iii) the temperature in the combustion zone of the LBF RTO and Oxalate Kiln RTO.

MONITORING PROGRAM – MERCURY CONTROL

A26 The Licensee shall monitor the parameters specified in Column 2 of Table 7 at the locations specified in Column 1 of Table 7, in the units specified in Column 3 of Table 7 and at the frequency specified in Column 4 of Table 7.

Table 7: Mercury Control System Monitoring

Column 1	**Column 2**	**Column 3**	**Column 4**
Monitoring Location	**Parameter**	**Units**	**Frequency**
Oxalate Belt Filter	Mercury in Oxalate Belt Filter Cake	ppb	Quarterly
Oxalate polysulfide dosing pump (Building 47)	Sulfide dosing rate	L/hr	Continuous
Digester mercury vapour condenser exit gases	Temperature	^{o}C	Continuous

Evaporation mercury vapour condenser exit gases			

END OF SECTION

SECTION 5: AIR POLLUTION CONTROL - EMISSIONS LIMITS

AIR EMISSIONS – LIMITS

A27 Subject to condition A28, the licensee shall not exceed any limit for an emission source as specified in Table 8.

Table 8: Licence Limits

Emission Source(s)	Parameter	Licence Limit
RDA	TSP (daily average, background corrected)	200 μg/m$^{3\#}$ not more that 18 days during the Licence Year.
		260 μg/m$^{3\#}$ never to be exceeded.
Calciners 1, 2, 3 and 4 as individual emission points	Particulates	80 mg/ m$^{3\,*\,\times}$
	NO_x	350 mg/ m$^{3\,*}$
LBF	Particulates	80 mg/ m$^{3\,*\,\times}$
	CO	1000mg/ m$^{3\,*\,\times}$
	NO_x	350 mg/ m$^{3\,*}$
Boilers when fired on gas (average over boilers 1, 2 and 3)	NO_x	350 mg/ m$^{3\,*}$

* expressed dry at 0 degrees Celsius and 1.0 atmosphere (101.325 kilopascals).

$^{\times}$ the addition of diluting gases shall not be used to achieve compliance with emissions limits.

$^{\#}$ expressed at 0 degrees Celsius and 1.0 atmosphere (101.325 kilopascals) as outlined in AS/NZS 3580.9.3:2003.

CALCINERS – START-UP/SHUT DOWN AND ESP FAILURE

A28 The licensee is exempt from compliance with the calciner particulate limit specified in Table 8 of condition A27 in the events specified in Table 16 of Appendix A, if the licensee's response is in accordance with the corresponding actions to be taken described in Table 16 of Appendix A for each event.

CALCINERS – REQUIREMENT TO SHUT DOWN

A29(a) The licensee shall shut-down feed to calciner 1, 2, 3 or 4 if the dust concentration meter for that calciner records a dust concentration that exceeds the equivalent of the calciner particulate limit specified in Table 8 of condition A27 for more than 60 minutes and not recommence feed to that calciner until the cause of the high dust concentration is rectified.

A29(b) In the event of a partial failure of a calciner ESP continuing for more than 60 minutes, the licensee shall immediately shut off the feed to the calciner experiencing the partial failure of the ESP and not recommence feed to the calciner until the ESP is fully restored.

A29(c) In the event of a complete failure of a calciner ESP continuing for more than 10 minutes, the licensee shall:

(i) immediately shut off the feed to the calciner experiencing the failure, if the failure has not been at least partially remedied within that time, and not recommence feed to the calciner until the ESP is fully restored; or

(ii) manage the failure in accordance with condition A29(b), if the failure has been at least partially remedied within that time.

END OF SECTION

SECTION 6: WATER POLLUTION CONTROL CONDITIONS

INSTALLATION OF DRAINAGE BELOW RESIDUE DISPOSAL DAM

W1 The licensee shall maintain low permeability (10^{-9} metres per second) base and embankment seals and gravity base drainage systems on RDA's to minimise seepage and collect leachate.

CONTAINMENT OF CONTAMINATED OR POTENTIALLY CONTAMINATED WATERS

W2 The licensee shall minimise the release of contaminated water to the environment by providing containment systems to capture any spillages and minimise contact of process liquors to the ground.

WATER QUALITY MONITORING AND CRITERIA

W3(a) The licensee shall collect representative water samples at the frequencies specified in Table 9 from surface point 12 (SP12) depicted in Appendix B, and have them analysed for the parameters specified in Table 9. The licensee shall present the results of the analysis in the annual report.

Table 9: SP12 Water Quality Monitoring

Parameter	Frequency	Guideline
pH	Monthly when flowing	5.0 – 9.5
Electrical Conductivity (or equivalent TDS measurement)		Less than 2000 μS/cm
Nephelometric Turbidity units		no criteria set
Aluminium	6-monthly (during April – May , October – November)	5.0 mg/L
Arsenic		0.5 mg/L
Mercury		0.002 mg/L
Selenium		0.02 mg/L
Vanadium		0.1 mg/L
Manganese		1.0 mg/L
Molybdenum		0.15 mg/L
Uranium		0.2 mg/L

Note: Guideline for metals are taken from the livestock watering guidelines given in ANZECC 2000.

W3(b) Where analysis of a sample collected in accordance with condition W3(a) measures a pH and an electrical conductivity (or equivalent TDS measurement) above the guideline specified in Table 9, the licensee shall also analyse the same sample for sodium, chloride and alkalinity (as calcium carbonate) and calculate the sodium:chloride ratio.

W3(c) The licensee shall manage activities at the premises to ensure that its activities are not responsible for water samples collected and analysed in accordance with condition W3(a) and W3(b) to exceed the limits specified in Table 10.

Table 10: SP12 Water Quality Monitoring

Parameter	Frequency	Limit
Sodium:chloride ratio, alkalinity	In circumstances where both pH and EC are in excess of the guideline in Table 9.	sodium:chloride ratio no greater then 0.8 as well as alkalinity no greater than 50 mg/L as Calcium Carbonate.

W3(d) The licensee shall operate and maintain a flow metering device to measure the cumulative volume of stream flow (in cubic metres per month) at surface water station SP12 depicted at Appendix B. The licensee shall provide results on flow monitoring in the annual report.

W3(e) The licensee shall maintain the flow metering device referred to in condition W3(d) so as to provide reliable data for a response level of greater than 90 percent of the total time when the stream is flowing, over a calendar year.

W3(f) The licensee shall collect representative water samples from the groundwater monitoring bores (1G, 1W, 2G, 2W, 8G, 11G, 23G, 23W, 25G, 25W, 79G, 219S, 219G, 219W) depicted in Appendix B and have them analysed for the parameters and at the frequency specified in Table 11. The licensee shall present the results of the analysis in the annual report.

Table 11: Groundwater Quality Monitoring

Parameter	Frequency
pH, Electrical Conductivity (or equivalent TDS measurement), alkalinity, sodium:chloride ratio, Standing Water Level, Uranium	6 - monthly

W3(g) When any sample collected and analysed in accordance with condition W3(f) exceeds the guideline value for that parameter listed in Table 9 of condition W3(a), the licensee shall advise the CEO as soon as practicable.

W3(h) The licensee shall advise the CEO within 14 days of any surface water monitoring location described in condition W3(a) or groundwater monitoring bore described in condition W3(f) that is de-commissioned or rendered unusable.

GENERAL MONITORING REQUIREMENTS

W4(a) The licensee shall collect all water samples in accordance with the relevant part of AS 5667.1:1998.

W4(b) The licensee shall submit all water samples to a laboratory with current NATA accreditation for the specified parameters for analysis in accordance with the current "Standard Methods for Examination of Water and Wastewater-APHA-AWWA-WEF".

W4(c) The licensee shall keep the original laboratory analysis reports (or copies thereof) on record, and shall provide copies of these reports to an Inspector on request.

END OF SECTION

SECTION 7: SOLID WASTE CONTROL CONDITIONS

WASTE ACCEPTANCE

S1(a) The licensee may dispose of the following types of waste(s) to the RDA's (depicted in Appendix B), that have been generated at the premises, the licensee's Willowdale Minesite and Bunbury Rail Terminal and Port Loading Facility or the Alinta Wagerup Cogeneration Power Plant:

(i) waste meeting acceptance criteria specified for Class II landfills in the document titled "Landfill Waste Classifications and Waste Definitions 1996 ", or hydrocarbon contaminated wastes; and

(ii) wastes generated from alumina production and associated activities, excluding:

(a) elemental mercury collected as a waste stream;
(b) asbestos materials;
(c) packaged laboratory chemical waste; and
(d) clinical waste.

WASTE MANAGEMENT

S2(a) The licensee shall accept and bury waste referred to in condition S1(a)(i) by:

(i) placing the waste in a defined trench or within an area enclosed by earthen bunds; and

(ii) covering the waste with clean fill, residue or sand (or other similar material) on a weekly basis.

S2(b) The licensee shall not burn or allow the burning of waste referred to in condition S1(a) on the premises.

STORAGE OF OXALATE

S3(a) The licensee shall ensure oxalate separated from the process stream that is to be stored on site, shall be contained, either within a tank or tanks at the refinery or within the approved oxalate storage areas located in the RDA's.

S3(b) The licensee shall ensure that oxalate is in a moist state when discharged into the approved oxalate storage areas located in the RDA's.

S3(c) The licensee shall, within 12 hours of oxalate being discharged into the approved oxalate storage ponds, ensure the oxalate is kept moist or maintained under water or beneath a full surface cover that ensures dust is not generated from oxalate storage and does not impinge on the ability to fully recover the oxalate.

APPENDIX A

Table 12: Monitoring Program - RDA Dust

Analysis	Parameters to be measured	Frequency	Analytical Method	Units
Filter paper from at least 1 high volume sampler around the RDA's (daily sample)	• aluminium, arsenic, boron, barium, cadmium, cobalt, chromium, copper, mercury, molybdenum, nickel, lead, vanadium, zinc, gallium, thallium, selenium, lithium, beryllium, alkalinity and pH. • analysis to be performed of filter paper blanks for each filter paper batch and reported together with any results.	4 samples taken between October and March if; • dust concentration is greater than 100ug/m3 (background corrected), • other samples as directed by the CEO.	Metals method (NATA accredited) plus Alkalinity, pH methods (NATA accredited)	ug/m^3

APPENDIX A

Table 13: Monitoring Program – HRSG and Boilers

Emissions Testing	Parameters to be measured	Frequency	Units	Method
HRSG stacks; and Boilers (1, 2, & 3), whilst fired on natural gas	NO	3 – monthly	mg/m^3	USEPA Modified Method 7E
	NO_2		mg/m^3	USEPA Modified Method 7E
	NOx		mg/m^3	USEPA Modified Method 7E
	CO		mg/m^3	USEPA Modified Method 10
	fuel feed rate over the duration of the test		m^3/hr	N/A
	steam output over the duration of the test		tonnes/hr	N/A
	Stack velocity		m/sec	USEPA Method 2
	Stack flow rate		m^3/min	USEPA Method 2
	Confirm if non-condensables are flowing to boilers 2 or 3		n/a	Confirmation ID fan operating and log book entry
Boiler stacks 2 & 3, fired on diesel (when operating for one month or greater)	NO	The number of tests shall be adequate to define the relationship between- • mass discharge rate for NO; and mass discharge rate for NO_2; and • steam output over the range of ambient temperatures that may reasonably be expected to occur over the course of one year.	mg/m^3	USEPA Modified Method 7E
	NO_2		mg/m^3	USEPA Modified Method 7E
	NOx		mg/m^3	USEPA Modified Method 7E
	SO_2		mg/m^3	USEPA Modified Method 6C
	CO		mg/m^3	USEPA Modified Method 10

APPENDIX A

Table 14: Monitoring Program - Calciners

Emissions Testing	Parameters to be measured	Frequency	Units	Method
Exit gases from: Calciner 1 stack; Calciner 2 stack; Calciner 3 stack; and Calciner 4 stack.	Particulates	3 – monthly	mg/m^3	USEPA Method 5 or method 17
	NOx		mg/m^3	USEPA Modified Method 7E
	SOx		mg/m^3	USEPA Modified Method 6C
	CO		mg/m^3	USEPA Modified Method 10
	Acetaldehyde		mg/m^3	USEPA MMTO5[1]
	Acetone		mg/m^3	
	2-butanone		mg/m^3	
	Formaldehyde		mg/m^3	
	Benzene		mg/m^3	USEPA M18 tube
	Odour concentration		OU	AS 4323.3:2001
	Stack flow rate		m^3/min	USEPA Method 2
	Stack velocity		m/sec	USEPA Method 2
	Gas flow rate	Daily average rate	m^3/min	N/A
	Calciner furnace temp.	Daily average temp	°C	N/A
Calciner 1-3 Low Volume Stack	NOx	3 – monthly	mg/m^3	USEPA Modified Method 7E
	SOx		mg/m^3	USEPA Modified Method 6C
	CO		mg/m^3	USEPA Modified Method 10
	Acetaldehyde		mg/m^3	USEPA MMTO5[1]
	Acetone		mg/m^3	
	2-butanone		mg/m^3	
	Formaldehyde		mg/m^3	
	Benzene		mg/m^3	USEPA M18 tube
	Odour concentration		OU	AS 4323.3:2001
Exit gases from the 50B condensate tank	Flow rate		m^3/min	USEPA Method 2

1. Or other modified method approved by the CEO.

APPENDIX A

Table 15: Monitoring Program - Liquor Burning Facility and Oxalate Kiln

Emissions Testing	Parameters to be measured	Frequency	Units	Method
Exit gases from the LBF chimney stack	Particulates	3 – monthly	mg/m^3	USEPA Method 5 or 17
	CO		mg/m^3	USEPA Modified Method 10
	NOx		mg/m^3	USEPA Modified Method 7E
	SOx		mg/m^3	USEPA Modified Method 6C
	Acetaldehyde		mg/m^3	USEPA MMTO5[1]
	Acetone		mg/m^3	
	2-butanone		mg/m^3	
	Formaldehyde		mg/m^3	
	Benzene		mg/m^3	USEPA M18 tube
	Odour concentration		OU	AS 4323.3:2001
	Temperature		°C	USEPA Method 2
	Stack velocity		m/sec	
	Stack flow rate		m^3/min	
	Dryer feed rate	Daily average	m^3/hr	N/A
	Kiln pressure	Daily average	kPa	N/A
	Dehumidifier pressure drop	Daily average	kPa	N/A
Exit gases from the Oxalate Kiln RTO stack	Particulates	3-monthly	mg/m^3	USEPA Method 17
	CO			USEPA Modified Method 10
	NOx			USEPA Modified Method 7E
	SOx			USEPA Modified Method 6C
	Acetaldehyde			USEPA MMTO5[1]
	Acetone			
	2-butanone			
	Formaldehyde			
	Benzene			USEPA M18 tube
	Odour concentration		OU	AS 4323.3:2001
	Temperature		°C	USEPA Method 2
	Stack velocity		m/sec	
	Stack flow rate		m^3/min	

1. Or other modified method approved by the CEO.

APPENDIX A

Table 16: Calciner Exemption Events

Section	Event Title	Action to be Taken	Comments
(i)	Calciner start up	All practicable measures to minimise the discharge of particulate matter into the environment	AS3814-2009: Industrial and commercial gas-fired appliances, requires that ESP's and associated vessels be purged with at least 5 air changes before starting any combustion process associated with an ESP as a safety requirement to avoid potential explosion caused by sparking within the ESP.
(ii)	Calciner shut down	All practicable measures to minimise the discharge of particulate matter into the environment.	When shutting calciners down, the efficiency of the ESP is reduced due to unstable operating conditions caused by the reduction of the gas/products and air flows.
(iii)	Calciner partial failure of ESP.	In the event of a partial failure of an ESP continuing for more than 60 minutes feed shall be immediately shut off and not resumed until the ESP is fully restored.	
(iv)	Calciner complete failure of ESP.	In the event of a complete failure of an ESP, operation of the associated calciners may continue for not more than 10 minutes following which: (a) If the failure has not been at least partially remedied within that time, feed shall be shut off and not be resumed until the ESP is fully restored, or (b) If the failure has been partially remedied within that time, operations may continue in accordance with section (iii).	
(v)	dust concentration meter correlation	Prior notification to the CEO on each and every occasion correlation is to be undertaken.	
(vi)	dust concentration meter above limit	If the dust concentration meter for calciner 1, 2, 3 or 4 records a dust concentration that exceeds the equivalent of the calciner Particulate limit specified in Table 8 of condition A27 for more than 60 minutes, immediately cease feed to that calciner and not recommence feed until the problem has been rectified.	

APPENDIX A

Table 17: Liquor Burner Exemption Events

Section	Event Title	Action to be Taken
(i)	LBF start up	CO and Particulates All practicable measures to minimise the discharge of particulate matter and CO into the environment
(ii)	LBF shut down	CO and Particulates All practicable measures to minimise the discharge of particulate matter and CO into the environment.
(iii)	LBF complete failure of ESP.	Particulates only In the event of a complete failure of an ESP, operation of the LBF may continue for not more than 10 minutes following which: (a) If the failure has not been at least partially remedied within that time, feed shall be shut off and not be resumed until the ESP is fully restored, or (b) If the failure has been partially remedied within that time, operations may continue for up to 60 minutes, after which time feed shall be immediately ceased and not resumed until the ESP is fully restored

APPENDIX A

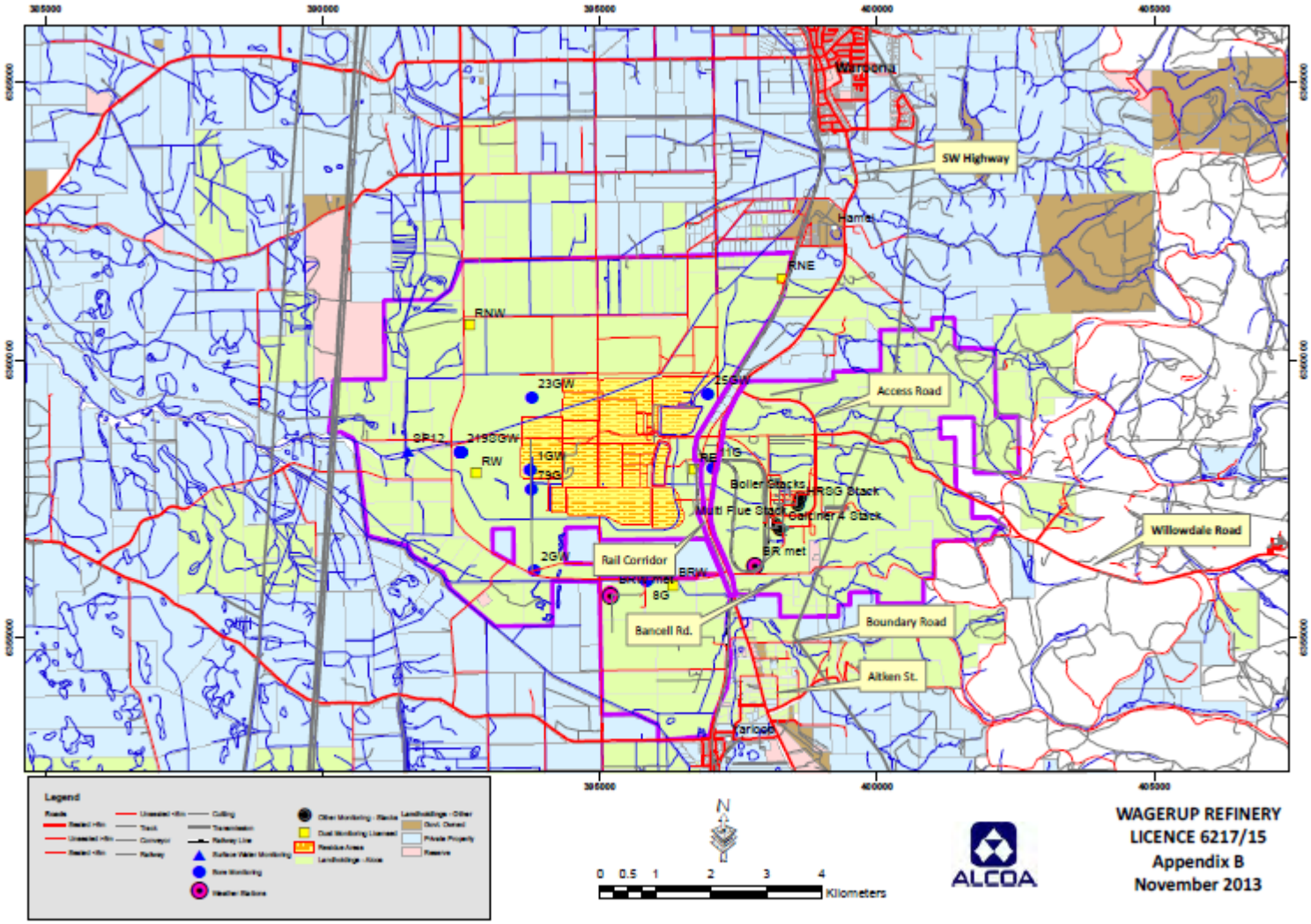
Table 18: Calciner & Low Volume Vents Emissions Management

Aggregate Calciner Priority VOC emissions are calculated by summing the daily calciner VOC emissions from each of calciner 1,2,3 & 4, and from the low vol vents then multiplying the sum by the relevant number of days for A2(a), where individual calciner VOC emissions are calculated in accordance with the Column 3 below.		
Note: "ADT" is average daily throughput of alumina for each calciner as applicable.		
Column 1	Column 2	Column 3
Calciner (Cal_x)	Average Priority VOC emissions in grams per tonne of daily throughput, based on NATA accredited analysis of isokinetic stack sampling pursuant to licence conditions.	Daily Calciner Priority VOC emissions (Cal_x emissions)
1	13.35	Calciner 1 ADT multiplied by 13.35
2	12.73	Calciner 2 ADT multiplied by 12.73
3	9.49	Calciner 3 ADT multiplied by 9.49
4	7.30	Calciner 4 ADT multiplied by 7.30
Low Vol Vents	0.28	Low Vol Vents ADT multiplied by 0.28

END OF APPENDIX A

APPENDIX B

Premises location and licence monitoring stations



END OF APPENDIX B

WESTERN AUSTRALIA

DEPARTMENT OF ENVIRONMENT REGULATION

Environmental Protection Act 1986

LICENCE NUMBER: L6217/1983/15 FILE NUMBER: 2012/007237

APPENDIX C

SECTION A

LICENCE DETAILS

Licence Number:	Licence File Number:
Company Name: Trading as:	ABN:
Reporting period: _____ to _____	

STATEMENT OF COMPLIANCE WITH LICENCE CONDITIONS

1. Were all conditions of licence complied with within the reporting period? (please tick the appropriate box)

Yes ☐ Please proceed to Section C

No ☐ Please proceed to Section B

Each page must be initialed by the person(s) who signs Section C of this annual audit compliance report

INITIAL:_____

WESTERN AUSTRALIA

DEPARTMENT OF ENVIRONMENT REGULATION

Environmental Protection Act 1986

LICENCE NUMBER: L6217/1983/15 FILE NUMBER: 2012/007237

SECTION B

DETAILS OF NON-COMPLIANCE WITH LICENCE CONDITION**.**

Please use a separate page for each licence condition that was not complied with.

a) Licence condition not complied with?	
b) Date(s) when the non compliance occurred, if applicable?	
c) Was this non compliance reported to DER?	
☐ Yes ☐ Reported to DER verbally Date _____ ☐ Reported to DER in writing Date _____	☐ No
d) Has DER taken, or finalised any action in relation to the non compliance?	
e) Summary of particulars of non compliance, and what was the environmental impact?	
f) If relevant, the precise location where the non compliance occurred (attach map or diagram)	
g) Cause of non compliance	
h) Action taken or that will be taken to mitigate any adverse effects of the non compliance	
i) Action taken or that will be taken to prevent recurrence of the non compliance	

Each page must be initialed by the person(s) who signs Section C of this annual audit compliance report

INITIAL:_____

WESTERN AUSTRALIA

DEPARTMENT OF ENVIRONMENT REGULATION

Environmental Protection Act 1986

LICENCE NUMBER: L6217/1983/15 FILE NUMBER: 2012/007237

SECTION C
SIGNATURE AND CERTIFICATION

This Annual Audit Compliance Report may only be signed by a person(s) with legal authority to sign it. The ways in which the Annual Audit Compliance Report must be signed and certified, and the people who may sign the statement, are set out below.

Please tick the box next to the category that describes how this Annual Audit Compliance Report is being signed. If you are uncertain about who is entitled to sign or which category to tick, please contact the licensing officer for your premises.

If the licence holder is		The Annual Audit Compliance Report must be signed and certified:
an individual	□	by the individual licence holder, or
	□	by a person approved in writing by the Chief Executive Officer of the Department of Environment Regulation to sign on the licensee's behalf.
A firm or other unincorporated company	□	by the principal executive officer of the licensee; or
	□	by a person with authority to sign on the licensee's behalf who is approved in writing by the Chief Executive Officer of the Department of Environment Regulation.
A corporation	□	by affixing the common seal of the licensee in accordance with the Corporations Act 2001; or
	□	by two directors of the licensee; or
	□	by a director and a company secretary of the licensee, or
	□	*if the licensee is a proprietary company that has a sole director who is also the sole company secretary – by that director, or*
	□	*by the principal executive officer of the licensee; or*
	□	by a person with authority to sign on the licensee's behalf who is approved in writing by the Chief Executive Officer of the Department of Environment Regulation.
A public authority (other than a local government)	□	by the principal executive officer of the licensee; or
	□	by a person with authority to sign on the licensee's behalf who is approved in writing by the Chief Executive Officer of the Department of Environment Regulation.
a local government	□	by the chief executive officer of the licensee; or
	□	by affixing the seal of the local government.

It is an offence under section 112 of the *Environmental Protection Act 1986* for a person to give information on this form that to their knowledge is false or misleading in a material particular. There is a maximum penalty of $50,000 for an individual or body corporate.

I/We declare that the information in this annual audit compliance report is correct and not false or misleading in a material particular.

SIGNATURE: _____

NAME: (printed) _____

POSITION: _____

DATE: _____/_____/_____

SIGNATURE: _____

NAME:(printed) _____

POSITION: _____

DATE: _____/_____/_____

SEAL (if signing under seal)

Government of Western Australia
Department of Environment Regulation

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

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 ☐ New Licence ☐ Licence amendment ☒ Works Approval amendment ☐	
Activities that cause the premises to become prescribed premises	**Category number(s)**	**Assessed design capacity**
	46	2.85 Mtpa
	52	N/A
	64	N/A
	67	N/A
Application verified Application fee paid	Date: 19/08/2015 Date: N/A	
Works Approval has been complied with Compliance Certificate received	Yes☐ No☐ N/A☒ Yes☐ No☐ N/A☒	
Commercial-in-confidence claim	Yes☒ No☐	
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☐ No☒	
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986*?	Yes☐ No☒	Referral decision No: Managed under Part V ☐ Assessed under Part IV ☐
Is the proposal subject to Ministerial Conditions?	Yes☐ No☒	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 *Environmental Protection Act 1986*)?	Yes☐ No☐ Department of Water consulted Yes ☐ No ☐	
Is the Premises within an Environmental Protection Policy (EPP) Area Yes☒ No☐ *Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992; and* *Environmental Protection (Swan Coastal Plain Lakes) Policy* (EPP Lakes Policy).		
Is the Premises subject to any EPP requirements? Yes☒ No☐ 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 resdue 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 milllion 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 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

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		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. 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. 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.	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.	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. 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. 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 DER notes that this decision does not relate specifically to the application to increase production to 2.85 Mtpa. Refer to assessment in Appendix A, section 2 in relation to the amendment application.	Application supporting documentation DER public website at: www.der.wa.gov.au *Long Term Residue Management Strategy, Wagerup*, Alcoa of Australia Ltd, 2012 EP Act – Part V

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.	Emission Description *Emission:* 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: • 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. DER notes that Alcoa is currently analysing its result of the first field odour surveys conducted in July 2015 in line with VOCOMMP commitments. *Impact:* Reduced air quality and amenity impacts. Acute health impacts in some individuals with particular sensitivity. *Controls:* 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. Risk Assessment *Consequence:* Minor *Likelihood*: Possible	Application supporting documentation Wagerup VOC & Odour Monitoring and Modelling Plan, Alcoa, 16 August 2013

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		Risk Rating: Moderate Regulatory Controls 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. Residual Risk *Consequence*: Minor *Likelihood:* Posible *Residual Risk Rating:* Moderate	
Noise	N/A	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). The risk of noise emissions and impacts associated with Alcoa's requested increase of alumina production to 2.85 Mtpa was assessed. Emission Description *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. *Impact:* Amenity and nuisance impact at offsite sensitive receptors. Elevated noise	Application supporting documentation *Environmental Protection (Noise) Regulations 1998* *Environmental Protection (Wagerup Alumina Refinery Noise Emissions) Approval 2012* (Noise Approval) *Environmental Protection (Wagerup*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
		during the night where ongoing and frequent emissions have the ability to contribute to sleep distruption and health/wellbeing issues. *Controls:* Alcoa is required to comply with a noise approval issued under Regulation 17 of the *Environmental Protection (Noise) Regulations 1998.* This includes the *Environmental Protection (Wagerup Alumina Refinery Noise Emissions) Approval 2012* (Noise Approval) and *Environmental Protection (Wagerup Alumina Refinery Noise Emissions) Amendment Approval 2013* (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. Risk Assessment *Consequence:* Moderate *Likelihood*: Likely *Risk Rating:* High Regulatory Controls 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. Residual Risk *Consequence*: Moderate *Likelihood:* Likely *Residual Risk Rating:* High	*Alumina Refinery Noise Emissions) Amendment Approval 2013* (Amended Noise Approval)

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**
		reporting conditions in the amended licence. 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.	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	• Condition G7 requires that the licensee *"notify the CEO as soon as practicable of any unplanned occasion when any pollution control equipment at the premises manfunctions or ceases to operate which has the potential to significantly impact on the environment."* 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.	DER public website at: www.der.wa.gov.au s72 of the EP Act

5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
14/09/2015	Application advertised in the *West Australian* 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 extention 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.	The Licensee submitted comments in the form of a marked version of the draft conditions. The following comments and requested changes were included: 1. Correcting the general condition numbering and general condition number references; 2. Retaing the word *'period'* in condition G1(iii); 3. Inserting '*calculated in accordance with Table 18 of Appendix A'* within condition A2(a); 4. Inserting *'of Appendix A'* in condition A7; 5. Request for revision of wording condition A12 (mercury control system process parameter response levels) as Alcoa believes the proposed wording	The outcome of considering Alcoa's comments is as follows: 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
		changes the parameters from targets to limits; 6. Deleting *'emission'* from condition A14; and 7. Inserting *'by'* in Column 3 for Calciner 1. The Licensee waived the 21 day consultation period subject to the above comments.	A11 wording and believes this addresses Alcoa's concern; 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; 7. This was a typographical error and corrected.

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 characterisitic 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 equivalents, benzene, 2-butanone, ethylbenzene, formaldehyde, styrene, toluene, 1,2,4 trimethyl benzene, 1,3,5 trimethyl benzene, vinly 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 speace 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 are 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 Calciners 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 priorty 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 Mpta 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
1st 90 days up to and including 10 February in each calendar year	7698	7274
1st 180 days up to and including 11th May in in each calendar year	15396	14548
1st 270 days up to an including 9th August in each calendar year	23094	21823

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

Calciner (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 Calciner priority VOC emissions (Calx emissions)	
	Current	New	Current	New
1	10.5	13.35	Calciner 1 ADT[1] multiplied by 10.5	Calciner 1 ADT multiplied by 13.35
2	10.22	12.73	Calciner 2 ADT multiplied by 10.22	Calciner 2 ADT multiplied by 12.73
3	10.90	9.49	Calciner 3 ADT multiplied by 10.90	Calciner 3 ADT multiplied by 9.49
4	10.16	7.30	Calciner 4 ADT multiplied by 10.16	Calciner 4 ADT multiplied by 7.30
LVVs	1.81	0.28	LVVs ADT multiplied by 1.81	LVVs 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/m^3 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/m^3 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/m^3. In the case of the liquor burner, concentrations will generally be less than 30 mg/m^3 Emissions may exceed 80 mg/m^3 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/m^3. 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 PM_{10} are generally considered to have a nuisance or amenity related impact and particulates less than PM_{10} are respirable fractions with a small enough aerodynamic diameter to reach deep into the lungs.

Controls:

- Calciners have electrostatitic 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/m^3 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/m^3 for the liquor burner and oxalate kiln respectively.

- *Management actions*
  - Conditons 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 extemption 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 maintainenance 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 particaluate 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 (exclusing 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 consensate tank emissions) are redirected through Calciners 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/m^3 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^{o}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*

  - Conditons 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 extemption 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 calcincers 1-4 and Calciner 1-3 LVV.
  - Condition 25 requires stack monitoring of CO and priority VOCs from the liquor burner stack and oxlate kiln stack.
  - Condition A25 requires continuous monitoring of CO in the oxalate kiln stack and temerpate in the combustion zone of the liquor burner and oxlate 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 resdue 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 resdue 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 PM_{10} are generally considered to have a nuisance or amenity related impact and particulates less than PM_{10} 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	During winter each year, dust control measures for the upcoming year are planned to ensure that: • Activities with higher dust generation risk (i.e. sand stockpiling and sand construction activities) are performed in winter months; • Dust control mechansims 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	• Weekly review meetings; • Inspections and surveys; • Specialist consulting company contracted for provision of seven day and seasonal weather forceasts which are reviewed weekly; • Regular turning of mud in drying area to leave wet mud on the surface; • Srpaying of exposed banks and roads with dust suppressants; • Restricting vehicle access to exposed areas; and

	• Internal ambient monitor dust targets triggering investigation and intervention.
Day to day controls	• 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/m^3 (background corrected).

Condition A27 sets a total suspended particulate (TSP) limit of 200 µg/m^3 (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/m^3 (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 meterological 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 witin 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 characterisitic 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 goverments 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: Unllikely
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 mimise 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