



Licence number	L6217/1983/15	
Licence holder	Alcoa of Australia Limited	
ACN	004 879 298	
Registered business address	Wagerup Alumina Refinery, South West Highway Waroona, Western Australia	
DWER file number	2012/007237-7~2	
Duration	13/11/2013 to	12/10/2035
Date of issue	08/11/2013	
Date of amendment	10/11/2020	
Premises details	Wagerup Alumina Refinery Willowdale Road, Waroona WA, 6215 Legal description - Lot 700 on Plan 59305, Certificate of Title Volume 2708 Folio 955 Lot 205 on Plan 34250 Certificate of Title Volume 2540 Folio 866	

Prescribed premises category description (Schedule 1, <i>Environmental Protection Regulations 1987</i>)
Category 46 – Bauxite refinery
Category 52- Electric power generation
Category 64 – Class II or III putrescible landfill site
Category 67 – Fuel burning

This amended licence is granted to the licence holder, subject to the attached conditions, on 10 November 2020:

Manager Process Industries

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Licence history

Date	Reference number	Summary of changes
30/10/2015	L6217/1983/15	Amended licence - Increase in alumina production capacity to 2.85mtpa
29/04/2016	L6217/1983/15	Notice of amendment - Licence expiry date extended to 12 October 2035
26/07/2019	L6217/1983/15	Amendment Notice 1 - construction and operation of an emergency spillway on runoff water storage (ROWS) pond.
10/11/2020	L6217/1983/15	Amended licence – Increase in alumina production capacity to 2.9 Mtpa, operational changes to causticisation and cooling towers, changes to aggregate calciner priority VOC limits, consolidation of previous amendments and administrative updates

Interpretation

In this licence:

- (a) the words ‘including’, ‘includes’ and ‘include’ in conditions mean “including but not limited to”, and similar, as appropriate;
- (b) where any word or phrase is given a defined meaning, any other part of speech or other grammatical form of that word or phrase has a corresponding meaning;
- (c) where tables are used in a condition, each row in a table constitutes a separate condition;
- (d) any reference to an Australian or other standard, guideline, or code of practice in this licence:
 - (i) if dated, refers to that particular version; and
 - (ii) if not dated, refers to the latest version and therefore may be subject to change over time;
- (e) unless specified otherwise, any reference to a section of an Act refers to that section of the EP Act; and
- (f) unless specified otherwise, all definitions are in accordance with the EP Act.

NOTE: This licence requires specific conditions to be met but does not provide any implied authorisation for other emissions, discharges, or activities not specified in this licence.

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 form" means the AACR Form template approved by the CEO for use and available via DWER's external website;

"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 Water and Environmental Regulation;

"CEO" for the purposes of correspondence means;

Director General

Department of Water and Environmental Regulation

Department Administering the *Environmental Protection Act 1986*
Locked Bag 10
JOONDALUP DC WA 6919
Email: info@dwer.wa.gov.au;

“complaints” includes those complaints received directly by the licence holder 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/m³” means milligrams per cubic metre;

“Mtpa” means million tonnes per annual period

“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;

“NO₂” means nitrogen dioxide;

“NO_x” means oxides of nitrogen, as the sum of NO and NO₂ expressed as NO₂;

“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;

“ROWS” means Run Off Water Storage;

“RSA” means Residue Storage Area;

“RTO” means Regenerative Thermal Oxidiser;

“SO₂” means sulphur dioxide;

“Spillway” means a structure to provide the controlled discharge from the Residue Storage Area;

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

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“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;

“µg/m³” means micrograms per cubic metre;

"µS/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;

“Wet Winter” means rainfall from 1 May to 30 September in each calendar year that is greater than or equal to 880mm as measured by the on-site meteorological weather station referred to in Licence L6217/1983/15; 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 licence holder 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 licence holder 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 licence holder 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);
 - (vi) progress on Oxalate Management including implementation of the Alcoa World Alumina Australia-Wagerup Refinery Oxalate Management Strategy; and
 - (vii) a record of data of time periods when the cooling tower make up water is supplied from the Upper Dam water supply as specified in condition A2(f)

ANNUAL AUDIT COMPLIANCE REPORT

- G2 The licence holder must:
- (a) undertake an audit of their compliance with the conditions of this licence during the preceding annual period beginning 1 January and ending 31 December; and
 - (b) prepare and submit to the CEO by no later than 1 April in each year after that preceding annual period, an Annual Audit Compliance Report in the approved form.

CALIBRATION OF MONITORING EQUIPMENT

- G3 The licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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:

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- (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 licence holder 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 licence holder 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 licence holder 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 licence holder shall retain data acquired in G7(a) for a minimum period of three months.
- G7(c) The licence holder 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 licence holder shall ensure that the refinery is operated in the following manner:
- (i) production of alumina shall not exceed 2.9 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 licence holder 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 licence holder 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	30017

- A2(b) The licence holder 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 period set out in Column 1 of Table 1 in Condition A2(a). The licence holder shall, when requested submit an audit of all data and calculations necessary for showing compliance with the above conditions.
- A2(c) The licence holder shall have in operation no more than three of the following causticisation tanks at any one time J13; J14; J15; J24 and J25.
- A2(d) The licence holder shall keep a record of the operational time for causticisation tanks J13; J14; J15; J24 and J25.
- A2(e) The licence holder shall ensure that make-up water for the precipitation cooling towers is supplied from the Upper Dam water supply for a minimum period of 141 hours between the 1 May and 30 September during each licence period.
- A2(f) The licence holder shall keep a record of the time periods when cooling tower make up water is supplied from the Upper Dam water supply in accordance with condition A2(e).

END OF SECTION

STACKS - EXHAUST GAS EXIT VELOCITY

- A3 The licence holder 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 licence holder 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 licence holder 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 licence holder 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°C

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

- A7 The licence holder 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 licence holder'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°C** for more than 60 consecutive minutes during operation of the Liquor Burner, the licence holder 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 licence holder 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/m³** for more than 60 consecutive minutes during operation of the Liquor Burner, the licence holder shall for each individual occurrence:
- (i) immediately cease feed to the Liquor Burner Kiln.

LIQUOR BURNER – MANAGEMENT OF RTO BYPASS

- A9 The licence holder 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 licence holder 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 licence holder 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 Source	Column 2 Parameter	Column 3 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°C

- A12 The licence holder 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 Source	Column 2 Parameter	Column 3 Averaging Period	Column 4 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	<u>Annual average</u> ¹	≤ 35 °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 licence holder 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 licence holder shall: <ol style="list-style-type: none"> increase the sulfide dosing rate above 6 L/hr resample the oxalate belt filter cake for mercury within 7 days; notify the CEO of the results within 4 weeks; and 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 licence holder shall increase the sulfide dosing rate.
The annual average digester and/or evaporation vapour condenser exit gas temperature exceeds the response level specified in Table 4.	The licence holder shall: <ol style="list-style-type: none"> submit to the CEO within two weeks of becoming aware, an action plan to reduce the annual average exit temperature; implement the action plan specified in part (a); and 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 licence holder is exempt from compliance with the Oxalate Kiln Response Levels specified in Table 3 in the events specified in Table 6, if the licence holder'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	<u>CO and Particulates</u> All practicable measures to minimise the discharge of particulate matter and CO into the environment

(ii)	Oxalate Kiln shut down	<u>CO and Particulates</u> All practicable measures to minimise the discharge of particulate matter and CO into the environment.
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OXALATE KILN - REQUIREMENT TO CEASE FEED

- A15(a) If the temperature in the combustion zone of the Oxalate Kiln RTO falls below 750°C for more than 60 consecutive minutes during operation of the Oxalate Kiln, the licence holder 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 licence holder 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/m³ for more than 60 consecutive minutes during operation of the Oxalate Kiln, the licence holder 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 licence holder shall immediately cease feed to the Oxalate Kiln.

OXALATE KILN – MANAGEMENT OF RTO BYPASS

- A16 The licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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.

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- A22(d) Pursuant to condition A22(c) the licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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.

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A25(d) The licence holder 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 licence holder 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 licence holder 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	°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 licence holder 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 than 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 * ×
	NO _x	350 mg/ m ³ *
LBF	Particulates	80 mg/ m ³ * ×
	CO	1000mg/ m ³ * ×
	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).

× 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 licence holder 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 licence holder'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 licence holder 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 licence holder 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 licence holder shall:
- 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
 - 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 licence holder 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 licence holder 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 licence holder 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 licence holder 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 μ S/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 licence holder shall also analyse the same sample for sodium, chloride and alkalinity (as calcium carbonate) and calculate the sodium:chloride ratio.
- W3(c) The licence holder 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 than 0.8 as well as alkalinity no greater than 50 mg/L as Calcium Carbonate.

- W3(d) The licence holder 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 licence holder shall provide results on flow monitoring in the annual report.
- W3(e) The licence holder 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 licence holder 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 licence holder 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 licence holder shall advise the CEO as soon as practicable.
- W3(h) The licence holder 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 licence holder shall collect all water samples in accordance with the relevant part of AS 5667.1:1998.
- W4(b) The licence holder 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 licence holder shall keep the original laboratory analysis reports (or copies thereof) on record, and shall provide copies of these reports to an Inspector on request.

ROWS POND SPILLWAY OPERATION

- W5 The licence holder must ensure that all emissions specified in Table 19 Appendix A are discharged only from the corresponding discharge point and only at the corresponding discharge point location.
- W6 The licence holder must ensure that the spillway listed in Table 20 Appendix A and located at the corresponding spillway location is maintained and operated in accordance with the corresponding operational requirement set out in Table 20.

END OF SECTION

SECTION 7: SOLID WASTE CONTROL CONDITIONS

WASTE ACCEPTANCE

- S1(a) The licence holder 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 licence holder'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 licence holder 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 licence holder shall not burn or allow the burning of waste referred to in condition S1(a) on the premises.

STORAGE OF OXALATE

- S3(a) The licence holder 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 licence holder 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 licence holder 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.

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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)	<ul style="list-style-type: none"> 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; <ul style="list-style-type: none"> dust concentration is greater than 100ug/m³ (background corrected), 	Metals method (NATA accredited) plus Alkalinity, pH methods (NATA accredited)	ug/m ³
		<ul style="list-style-type: none"> other samples as directed by the CEO. 		

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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
	NO _x		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
	NO _x		mg/m ³	USEPA Modified Method 7E
	SO ₂		mg/m ³	USEPA Modified Method 6C
	CO		mg/m ³	USEPA Modified Method 10

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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 MMT05 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 MMT05 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.

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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 MMT05 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 MMT05 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.

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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.	

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(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.	
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Table 17: Liquor Burner Exemption Events

Section	Event Title	Action to be Taken
(i)	LBF start up	<u>CO and Particulates</u> All practicable measures to minimise the discharge of particulate matter and CO into the environment
(ii)	LBF shut down	<u>CO and Particulates</u> All practicable measures to minimise the discharge of particulate matter and CO into the environment.
(iii)	LBF complete failure of ESP.	<u>Particulates only</u> 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

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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	(v) Calciner 2 ADT multiplied by 12.73
3	9.49	(vi) Calciner 3 ADT multiplied by 9.49
4	7.30	(vii) Calciner 4 ADT multiplied by 7.30
Low Vol Vents	0.28	Low Vol Vents ADT multiplied by 0.28

Table 19: Authorised Discharge Points

Emission	Discharge Point	Discharge Point Location
Process water and potentially contaminated stormwater	ROWS pond spillway	As shown in Appendix C

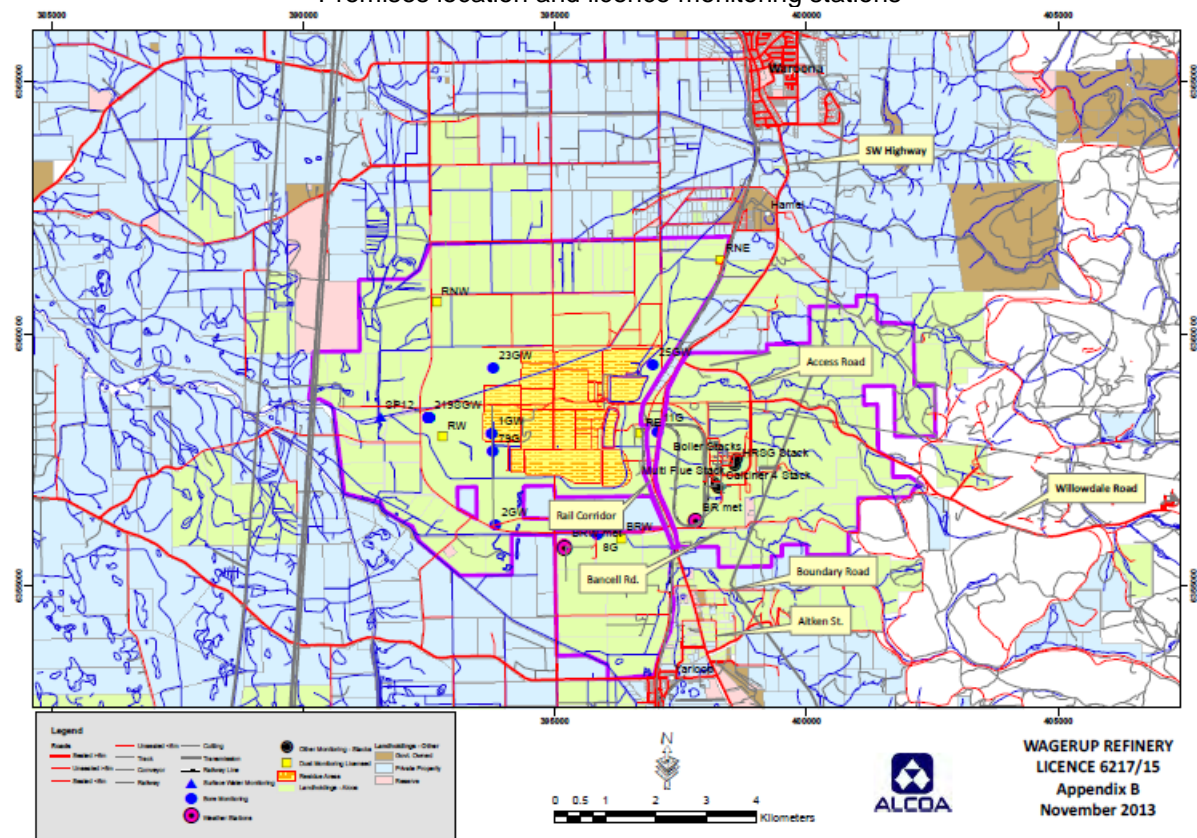
Table 20: Infrastructure and Equipment Requirements

Site Infrastructure and Equipment	Operational Requirements	Infrastructure Location
ROWS pond spillway	The Licence Holder must manage the ROWS pond such that it does not activate the spillway other than as a result of a Wet Winter.	As shown in Appendix C
ROWS pond spillway	The spillway shall not be activated after 15 December in each calendar year.	As shown in Appendix C

END OF APPENDIX A

END OF APPENDIX B

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APPENDIX C

Location of ROWS spillway



END OF APPENDIX C