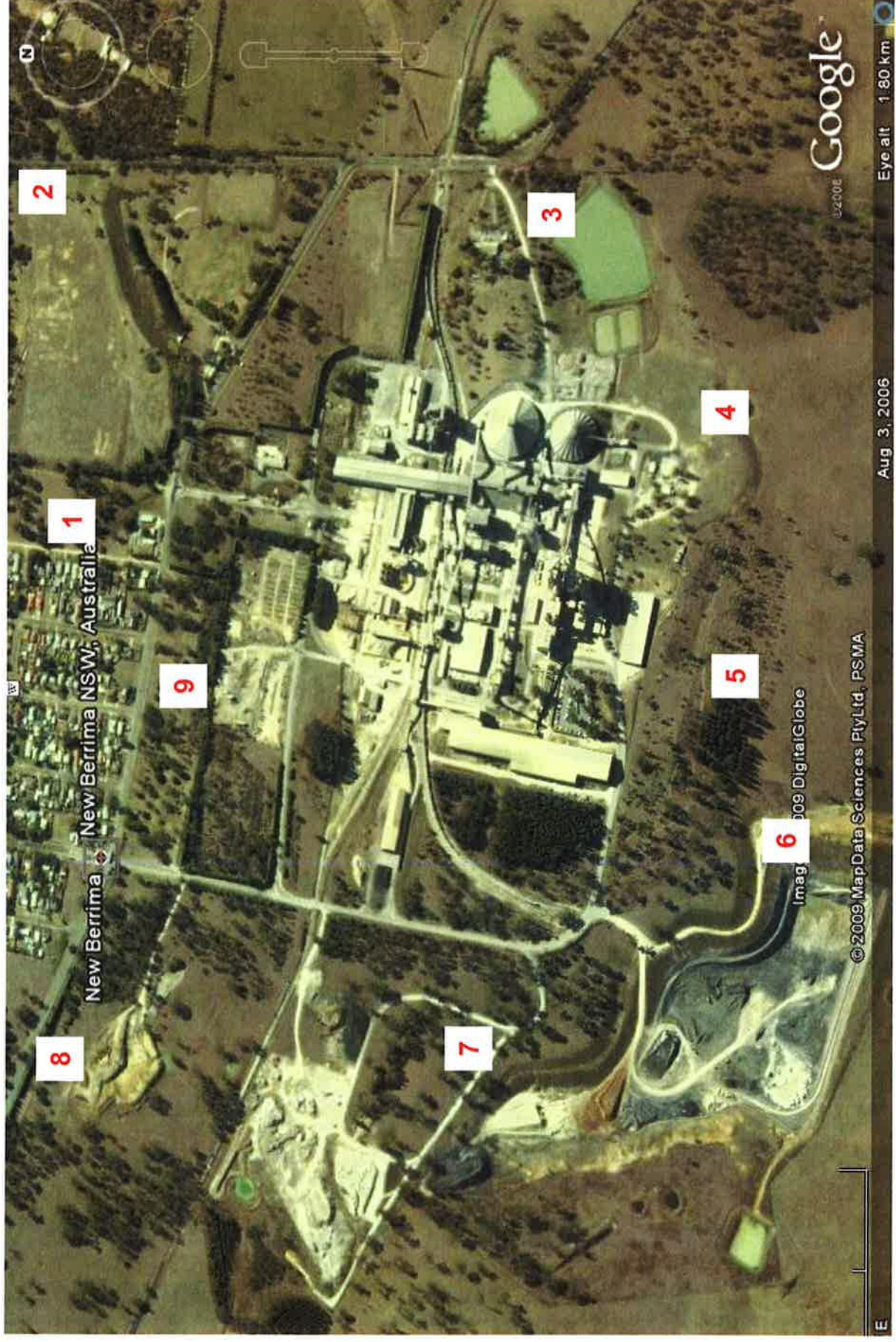


Attachment 1

Berrima Works **Dust Deposition** **Gauges**

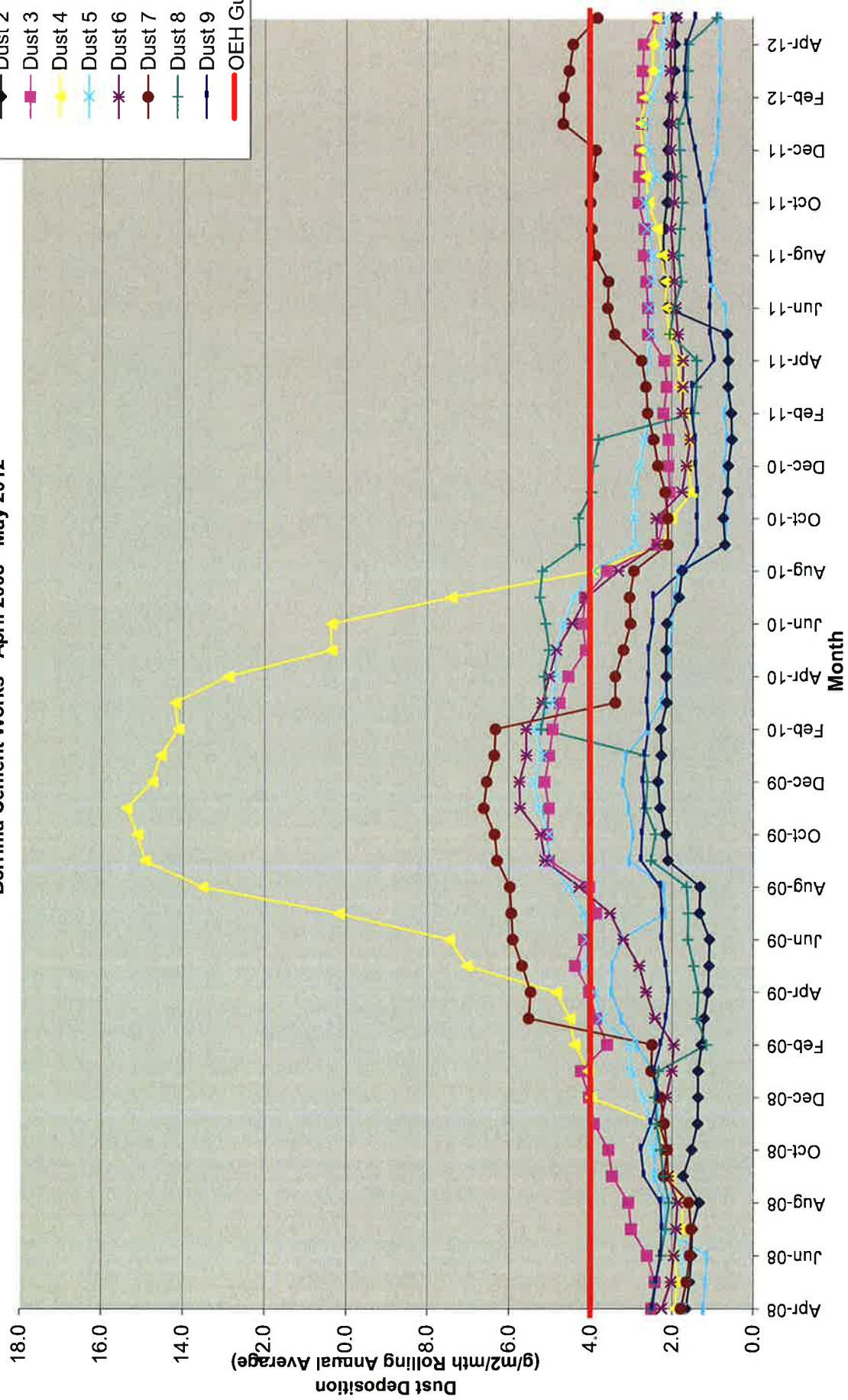
Berrima Works Dust Deposition Gauges



Attachment 2

Dust Deposition Data

Dust 1
Dust 2
Dust 3
Dust 4
Dust 5
Dust 6
Dust 7
Dust 8
Dust 9
OEH Guide



Attachment 3

Kiln 6 Stack Emissions

Attachment 4

Stack Testing Report **June 2011**

BORAL CEMENT

BERRIMA

EMISSIONS COMPLIANCE MONITORING (STANDARD FUELS)

JUNE 2011

REPORT NUMBER: RS11180A



REPORT REVISION HISTORY		
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ADDRESS: Boral Cement
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New Berrima
NSW Australia 2577

EMISSIONS TESTING INFORMATION

SAMPLING COMMENCED: 31st May 2011
SAMPLING COMPLETED: 3rd June 2011
TESTING LABORATORY: ECS Stack Pty Ltd
LABORATORY PREMISES: 2/27, Clark Court, Bibra Lake, 6163, Western Australia

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NATA Accredited Laboratory
Number: 14778

This document is issued in accordance with NATA's accreditation requirements and is accredited for compliance with ISO/IEC 17025. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

This report is a product of ECS Corporate Pty Ltd Certified Quality Management System.

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Summary Report: Number 6 Kiln Stack USEPA Method 29 (Multiple Metals)
Summary Report: Number 6 Cement Mill Stack AS4323.2 (Particulates) Duct A
Summary Report: Number 6 Cement Mill Stack AS4323.2 (Particulates) Duct B
Summary Report: Number 6 Kiln Cooler Stack AS4323.2 (Particulates)
Summary Report: Number 7 Cement Mill Stack AS4323.2 (Particulates)

RAW DATA

Raw Data: RS11180 Number 6 Kiln Stack USEPA Method 3a, 6c, 7e & 10
Raw Data: RS11180 Number 6 Kiln Stack AS4323.2
Raw Data: RS11180 Number 6 Kiln Stack USEPA Method 29
Raw Data: RS11180 Number 6 Cement Mill Stack AS4323.2 Duct A
Raw Data: RS11180 Number 6 Cement Mill Stack AS4323.2 Duct B
Raw Data: RS11180 Number 6 Kiln Cooler Stack AS4323.2
Raw Data: RS11180 Number 7 Cement Mill Stack AS4323.2
Raw Data: RS11180 ECS Raw Laboratory Analytical Data
Raw Data: RS11180 Leeder Consulting Raw Laboratory Analytical Data
Raw Data: RS11180 Sample Log

Note: Raw Data of worksheets are available electronically on CD provided with report. The worksheets provide raw data collected during sampling for the purposes of traceability of results.

1 EXECUTIVE SUMMARY

At the request of Boral Cement (BC) Berrima, each emission source was tested for a variety of parameters. The following data is presented to determine the clients compliance for each source with the site licence conditions as stipulated in the Department of Environment & Climate Change NSW (DECC) license document number 1698. The concentration for each parameter measured from sources detailed in section P1 'Location of Monitoring / Discharge Points and Areas' as compared to the site environmental licence criteria (Section L4 'Concentration Limits') is shown in the summary data below. A brief summary of the compliance status of the site release points is presented below.

Table 1: Summary of Source Emissions Criteria and Compliance Achievement.

EPA Source Identification Number	2 (Number 6 Kiln Stack)			
Parameter	Concentration	Criteria	Compliance	DECC / Internal Criteria
Units	mg/m ³	mg/m ³	Yes/No	
Cadmium	nd	0.1	Yes	DECC
Mercury	0.0094	0.1	Yes	DECC
Nitrogen Oxides (as NO ₂)	994	1000	Yes	DECC
Particulates	17.8	95	Yes	DECC
Hazardous Substances ²	0.028	1.0	Yes	DECC
EPA Source Identification Number	4 (Number 6 Cement Mill Stack)			
'Duct A' Particulates	2.5	250	Yes	DECC
'Duct B' Particulates	10	250	Yes	DECC
EPA Source Identification Number	5 (Number 6 Kiln Cooler Stack)			
Particulates	1.2	175	Yes	DECC
EPA Source Identification Number	10 (Number 7 Cement Mill Stack)			
Particulates	3.9	20	Yes	DECC

Notes:

1. nd = Not Detected
2. Hazardous Substances = Aggregate of Metals (Sb, As, Be, Cd, Cr, Co, Pb, Mn, Hg, Ni, Se, Sn, and V).
3. These license limits are taken from the EPA license current at the time testing.

Table 2: Summary of Source Emissions Criteria corrected to 10% Oxygen and Compliance Achievement.

EPA Source Identification Number	2 (Number 6 Kiln Stack)			
Parameter	Concentration	Criteria	Compliance	DECC / Internal Criteria
Units	mg/m ³	mg/m ³	Yes/No	
Cadmium	nd	0.1	Yes	NSWEPA
Mercury	0.0075	0.1	Yes	NSWEPA
Nitrogen Oxides (as NO ₂)	891	1000	Yes	NSWEPA
Particulates	16.0	95	Yes	NSWEPA
Hazardous Substances ²	0.024	1.0	Yes	NSWEPA

Notes:

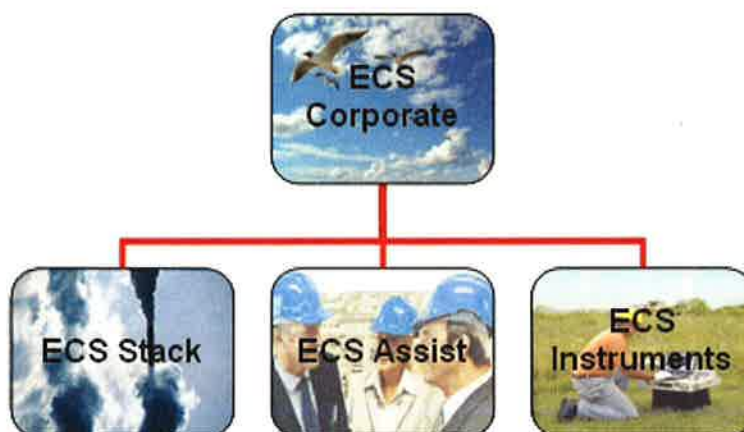
1. nd = Not Detected
2. Hazardous Substances = Aggregate of Metals (Sb, As, Be, Cd, Cr, Co, Pb, Mn, Hg, Ni, Se, Sn, and V).
3. The license limits used in Table 2 are taken from the current license conditions.
4. Oxygen Reference Value on 01/06/2011 = 8.7% vol/vol
5. Oxygen Reference Value on 31/05/2011 = 7.5% vol/vol

2 ECS PTY LTD OVERVIEW

Environmental Consultancy Services Pty Ltd (ECS) has rapidly developed a reputation as one of Australia's foremost independent environmental consultancies, offering business and industry an extensive range of emission management services.



Since commencing operations in 1997, ECS has grown substantially to become Australia's largest consultancy in environmental monitoring and sampling. Our expertise in Air Emission Sampling, the traditional focus of ECS, is recognised nationwide and the high degree of repeat business awarded to ECS from Australia's largest industries is recognition of the quality and technical rigour of our environmental services.



Under the ECS Corporate banner, ECS expanded and diversified in the early 2000s into three definitive client service groups that are fully integrated to provide an incorporated array of environmental monitoring, consultation and instrumentation services.

ECS Stack Pty Ltd – Provides extensive stationary source and ambient emissions monitoring expertise for regulatory or research and development purposes. All sampling and analysis is covered by NATA accreditation.

ECS Assist Pty Ltd - ECS Assist provides consulting, planning and project management services to our clients that enable them to confidently make decisions and direct their environmental requirements. ECS Assist services include; Environmental Project Management, Predictive Emission Modelling, Risk Assessments, Air Quality Assessments, EPA Regulatory Reporting and Environment Audits among others.

ECS Instruments Pty Ltd – ECS offers the best comprehensive range of instrumentation, analysers and monitors for continuous emissions monitoring (CEM) from individual analysers through to entire systems, with fully integrated online monitoring and management systems. ECS performs all the installation, calibration and servicing, and also provides on-going quality assurance programs that assist in the measurement and collection of high quality data.

3 INTRODUCTION

ECS Stack Pty Ltd was requested to conduct stack monitoring for Boral Cement at the Berrima facility in New South Wales. Testing comprised of monitoring a number of emission sources detailed in Department of Environment and Climate Change (DECC) NSW, Environment Protection Licence document number 1698 as part of the Emissions Compliance Monitoring (Standard Fuels), 2011.

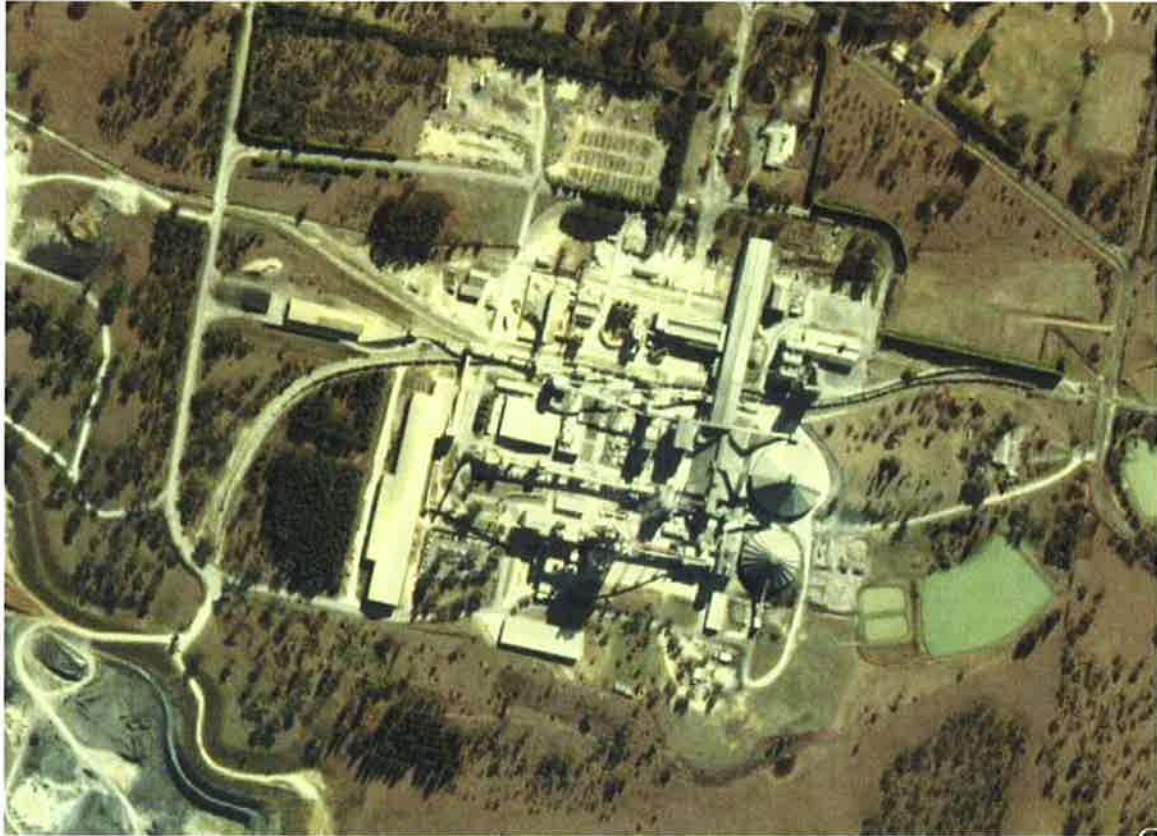


Figure 1: Boral Cement site, Berrima, New South Wales

Testing was conducted on the following sources according to the Emissions Compliance Monitoring (Standard Fuels) requirements stipulated in the 'Boral Cement Emission Testing Protocol: Berrima Works';

- EPA Source Identification Number 2 (Number 6 Kiln Stack)
- EPA Source Identification Number 4 (Number 6 Cement Mill Stack)
- EPA Source Identification Number 5 (Number 6 Kiln Cooler Stack)
- EPA Source Identification Number 10 (Number 7 Cement Mill Stack)

Testing was conducted as described below in Table 3.

Table 3: Sampling Program - Source and Methods

Source	Method	Analyte
EPA ID: 2 (Number 6 Kiln Stack)	AS4323.1 AS4323.2 USEPA Methods 2 USEPA Method 3a USEPA Method 4 USEPA Method 6c USEPA Method 7e USEPA Method 10 USEPA Method 29	Sampling Plane and Traverse Point Selection Particulates/Total Solids Gas Flow Rates Carbon Dioxide and Oxygen Moisture Sulphur Dioxide Nitrogen Oxides (as NO ₂) Carbon Monoxide Multiple Metals
EPA ID: 4 (Number 6 Cement Mill Stack) Duct A and Duct B	AS4323.1 AS4323.2 USEPA Methods 2 USEPA Method 3a USEPA Method 4	Sampling Plane and Traverse Point Selection Particulates/Total Solids Gas Flow Rates Carbon Dioxide and Oxygen Moisture
EPA ID: 5 (Number 6 Kiln Cooler Stack)	AS4323.1 AS4323.2 USEPA Methods 2 USEPA Method 3a USEPA Method 4	Sampling Plane and Traverse Point Selection Particulates/Total Solids Gas Flow Rates Carbon Dioxide and Oxygen Moisture
EPA ID: 10 (Number 7 Cement Mill Stack)	AS4323.1 AS4323.2 USEPA Methods 2 USEPA Method 3a USEPA Method 4	Sampling Plane and Traverse Point Selection Particulates/Total Solids Gas Flow Rates Carbon Dioxide and Oxygen Moisture

The Department of Environment and Climate Change (DECC) Environmental Protection Licence document number 1698 and the Boral Cement Emission Testing Protocol: Berrima Works document stipulate that the following sources are also to be tested for compliance purposes;

- EPA Source Identification Number 1 (Number 5 Kiln Stack)
- EPA Source Identification Number 6 (Number 5 Kiln Cooler Stack)
- EPA Source Identification Number 7 (Number 5 Cement Mill Stack)
- EPA Source Identification Number 8 (New baghouse Outlet)

Sampling was not completed on any of Unit 5 sources as the unit is not operating and emission testing is therefore not required.

The DECC Environmental Protection Licence document number 1698 also identifies EPA Source Number 8 (New Baghouse Outlet) as a source requiring testing, however this has not been requested by Boral Cement and is not detailed in the Boral Cement Emission Testing Protocol: Berrima Works document.

Due to an unscheduled shutdown of Kiln 6 USEPA Method 29 sampling run 2 was abbreviated. Due to a blockage in the crusher, the raw feed mills ran out of product with 15 minutes remaining of AS4323.2 sampling run 2.

The following report details the sampling results from work performed on the aforementioned emission sources at the Boral Cement facility, Berrima from the 31st May to the 3rd of June 2011.

The following report was reissued at Boral Cement – New Berrima’s request to include the following parameters on the Kiln 6 exhaust stack corrected to 10% Oxygen:

- Total Solid Particles
- Hazardous Substances
- Mercury
- Cadmium
- Nitrogen Oxides

The following tables are an excerpt from the Boral Cement Emission Testing Protocol: Berrima Works. The tables detail the reportable parameters for each emission source as part of the Emissions Compliance Report (Standard Fuels)

Table 4: Standard Fuels Emission Monitoring Program – EPA Point 2

Emission Test	EPA ID Number	Units of Measure	Frequency	DECC Test Method
	2 (Number 6 Kiln Stack)			
Carbon Dioxide	2 hours	%	Yearly	TM-24
Solid Particulate Matter	Replicate	mg/m ³	Yearly	TM-15
Metals	Replicate	mg/m ³	Yearly	TM-12, 13 & 14
Nitrogen Oxides	2 hours	mg/m ³	Yearly	TM-11
Oxygen	2 hours	%	Yearly	TM-25
Opacity	Continuous	% opacity	Continuous	CEM-1
Dry Gas Density	✓	kg/m ³	Yearly	TM-23
Molecular Weight of stack gases	✓	g/g mole	Yearly	TM-23
Moisture Content	✓	%	Yearly	TM-22
Temperature	✓	°C	Yearly	TM-2
Velocity	✓	m/s	Yearly	TM-2
Volumetric Flowrate	✓	mg/m ³	Yearly	TM-2

Table 5: Standard Fuels Emission Monitoring Program – EPA Point 4 & 5

Emission Test	EPA ID Number		Units of Measure	Frequency	DECC Test Method
	4 (Number 6 Cement Stack)	5 (Number 6 Cooler Stack)			
Dry Gas Density	✓	✓	kg/m ³	Yearly	TM-23
Moisture Content	✓	✓	%	Yearly	TM-22
Opacity	Not required	Not required	% opacity	Continuous	CEM-1
Solid Particulate Matter	Replicate	Replicate	mg/m ³	Yearly	TM-15
Molecular Weight of stack gases	✓	✓	g/g mole	Yearly	TM-23
Temperature	✓	✓	°C	Yearly	TM-2
Velocity	✓	✓	m/s	Yearly	TM-2
Volumetric Flowrate	✓	✓	mg/m ³	Yearly	TM-2

Table 6: Standard Fuels Emission Monitoring Program – EPA Point 10

Emission Test	EPA ID Number	Units of Measure	Frequency	DECC Test Method
	10 (Number 6 Cement Mill Stack)			
Dry Gas Density	✓	kg/m ³	Yearly	TM-23
Moisture Content	✓	%	Yearly	TM-22
Solid Particulate Matter	Replicate	mg/m ³	Yearly	TM-15
Molecular Weight of stack gases	✓	g/g mole	Yearly	TM-23
Temperature	✓	°C	Yearly	TM-2
Velocity	✓	m/s	Yearly	TM-2
Volumetric Flowrate	✓	mg/m ³	Yearly	TM-2

4 **METHODOLOGY**

Table 7 details the sampling methodology used to conduct the program.

Table 7: Sampling Methodology

Method Title		NSW DECC Equivalent	NATA Accreditation
Stationary Source Emissions, Selection of Sampling Positions:	AS 4323.1-1995	TM-1	Yes
Stationary Source Emissions - Determination of Total Particulate Matter - Isokinetic Manual Sampling - Gravimetric Method:	AS 4323.2-1995	TM-15	Yes
Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot tube):	USEPA Method 2	TM-2	Yes
Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyser Procedure):	USEPA Method 3A	TM-24	Yes
Determination of Moisture Content in Stack Gases:	USEPA Method 4	TM-22	Yes
Determination of Sulphur Dioxide Emissions from Stationary Sources (Instrumental Analyser Procedure):	USEPA Method 6C	TM-4	Yes
Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyser Procedure):	USEPA Method 7E	TM-11	Yes
Determination of Carbon monoxide Emissions from Stationary Sources:	USEPA Method 10	TM-32	Yes
Determination of Metals Emissions from Stationary Sources:	USEPA Method 29	TM-12	Yes

Note:

1. The first four items are required determinants for the calculation of Emission Rates.

5 SAMPLING PLANE

5.1 *Ideal Sampling Plane*

EPA ID 2 (Number 6 Kiln Stack): The sampling plane meets the requirements for the provision of stack sampling determinations for flow rate and particulate test parameters as detailed within Australian Standard AS4323.1-1995.

Table 8: EPA ID 2 (Number 6 Kiln Stack) Sampling Plane Characteristics

Parameter	Measurement	Units	Image
Distance to Far Wall of Stack (L_{fw})	3.26	m	No Image Available
Distance to Near Wall of Stack (L_{nw})	0.26	m	
Diameter of Stack (D)	3.00	m	
Area of Stack (A_s)	7.07	m ²	
Distance Upstream to Nearest Flow Disturbance (B)	25.00	m	
Distance Downstream to Nearest Flow Disturbance (A)	25.00	m	
Does this sampling plane conform with AS 4323.1?	Yes	-	

EPA ID 5 (Number 6 Kiln Cooler Stack): The sampling plane meets the requirements for the provision of stack sampling determinations for flow rate and particulate test parameters as detailed within Australian Standard AS4323.1-1995.

Table 9: EPA ID 5 (Number 6 Kiln Cooler Stack) Sampling Plane Characteristics

Parameter	Measurement	Units	Image
Distance to Far Wall of Stack (L_{fw})	2.49	m	No Image Available
Distance to Near Wall of Stack (L_{nw})	0.09	m	
Diameter of Stack (D)	2.40	m	
Area of Stack (A_s)	4.52	m ²	
Distance Upstream to Nearest Flow Disturbance (B)	20.00	m	
Distance Downstream to Nearest Flow Disturbance (A)	10.00	m	
Does this sampling plane conform with AS 4323.1?	Yes	-	

Note:

- The Number 6 Kiln Cooler Stack conforms with AS4323.1 in respect to the sampling plane location, however depending on process conditions at the time of testing, the ratio of the highest to lowest velocity may exceed 1.6:1 ratio (for Isokinetic testing)

5.2 Non Ideal Sampling Plane

EPA ID 4 (Number 6 Cement Mill Stack): The sampling plane for 'Duct A' is considered to be Non Ideal for the determinations for flow rate and particulate test parameters as detailed in AS4323.1 due to the following:

1. The upstream stack diameters to the nearest disturbance is 5.6 stack diameters less than the requirement and the downstream stack diameters to the nearest disturbance is 1.7 stack diameters less than the requirement. Due to the sampling plane not being the required distance(s) from a flow disturbance, the number of traverse points sampled across the sampling plane was increased from 6 to 15.
2. The stack gas flow is cyclonic or swirling;
3. The minimum number of 5 ports are not available, the source was tested using 3 ports.
4. The ratio of the highest to lower pitot pressure difference exceeds 9:1;
5. The ratio of the highest to lowest gas velocities exceeds 3:1;
6. For Isokinetic testing the ratio of the highest to lowest gas velocities shall not exceeds 1.6:1

Table 10: EPA ID 4 (Number 6 Cement Mill Stack) 'Duct A' Sampling Plane Characteristics

Parameter	Measurement	Units	Image
Distance to Far Wall of Stack (L_{fw})	1.25	m	No Image Available
Distance to Near Wall of Stack (L_{nw})	0.09	m	
Diameter of Stack (D)	1.18 ¹	m	
Area of Stack (A_s)	1.39	m ²	
Distance Upstream to Nearest Flow Disturbance (B)	0.46	m	
Distance Downstream to Nearest Flow Disturbance (A)	0.30	m	
Does this sampling plane conform with AS 4323.1?	No	-	

Note:

1. The Number 6 Cement Mill Stack 'Duct A' is a rectangular source, therefore the reported stack diameter is an 'equivalent stack diameter' to a circular duct. Please refer to AS4323.1 for further details.

The sampling plane for 'Duct B' is considered to be Non Ideal for the determinations for flow rate and particulate test parameters as detailed in AS4323.1 due to the following:

1. The upstream stack diameters to the nearest disturbance is 5.9 stack diameters less than the requirement and the downstream stack diameters to the nearest disturbance is 2.0 stack diameters less than the requirement. Due to the sampling plane not being the required distance(s) from a flow disturbance, the number of traverse points sampled across the sampling plane was increased from 9 to 15.
2. The stack gas flow is cyclonic or swirling;
3. The minimum number of 5 ports are not available, the source was tested using 3 ports.
4. The gas velocity at all sampling points is less than 3 metres per second;
5. For Isokinetic testing the ratio of the highest to lowest gas velocities shall not exceeds 1.6:1

Table 11: EPA ID 4 (Number 6 Cement Mill Stack) 'Duct B' Sampling Plane Characteristics

Parameter	Measurement	Units	Image
Distance to Far Wall of Stack (L_{fw})	1.25	m	No Image Available
Distance to Near Wall of Stack (L_{nw})	0.09	m	
Diameter of Stack (D)	1.18 ¹	m	
Area of Stack (A_s)	1.39	m ²	
Distance Upstream to Nearest Flow Disturbance (B)	0.07	m	
Distance Downstream to Nearest Flow Disturbance (A)	0.0	m	
Does this sampling plane conform with AS 4323.1?	No	-	

Note:

1. The Number 6 Cement Mill Stack 'Duct B' is a rectangular source, therefore the reported stack diameter is an 'equivalent stack diameter' to a circular duct. Please refer to AS4323.1 for further details.

EPA ID 10 (Number 7 Cement Mill Stack): The sampling plane is considered to be Non Ideal for the determinations for flow rate and particulate test parameters as detailed in AS4323.1 due to the following:

1. The upstream stack diameters to the nearest disturbance is 3.8 stack diameters less than the requirement and the downstream stack diameters to the nearest disturbance is 0.8 stack diameters less than the requirement. Due to the sampling plane not being the required distance(s) from a flow disturbance, the number of traverse points sampled across the sampling plane was increased from 12 to 20.
2. The stack gas flow is cyclonic or swirling;
3. The gas velocity at all points was not greater than 3 m/s;
4. The minimum number of 6 ports are not available, the source was tested using 5 ports;
5. The gas velocity at all sampling points is less than 3 metres per second;
6. The ratio of the highest to lower pitot pressure difference exceeds 9:1;
7. The ratio of the highest to lowest gas velocities exceeds 3:1;
8. For Isokinetic testing the ratio of the highest to lowest gas velocities shall not exceeds 1.6:1.

Table 12: EPA ID 10 (Number 7 Cement Mill Stack) Sampling Plane Characteristics

Parameter	Measurement	Units	Image
Distance to Far Wall of Stack (L_{fw})	1.86	m	No Image Available
Distance to Near Wall of Stack (L_{nw})	0.34	m	
Diameter of Stack (D)	1.65 ^{1.}	m	
Area of Stack (A_s)	2.74	m ²	
Distance Upstream to Nearest Flow Disturbance (B)	3.60	m	
Distance Downstream to Nearest Flow Disturbance (A)	2.00	m	
Does this sampling plane conform with AS 4323.1?	No	-	

Note:

1. The Number 7 Cement Mill Stack is a rectangular source, therefore the reported stack diameter is an 'equivalent stack diameter' to a circular duct. Please refer to AS4323.1 for further details.

6 RESULTS

ECS Stack Pty. Ltd. uses instrumentation that meets the United States (US) Code of Federal Regulations 40 Part 60 & 63 Appendix A & I. Results are representative of process conditions during the sampling periods. Full detailed descriptions can be found in the Summary Reports Section at the end of the document. For further information please refer to Raw Data Appendices.

6.1 Volumetric Flowrates and Gas Velocities

USEPA Method 2 was used for the measurement of gas flow rate. The velocity and gas flow rate was determined using a Pitot tube, manometer and thermocouple. Differential pressures and temperatures were measured from the predetermined traverse points from AS4323.1-1995. Data from USEPA Methods 3A and 4 were also required to be used in conjunction with this method. The velocity was then used to calculate average flow rate so that the total emission mass rate on a volume per unit time basis could be determined.

For the determination of flowrate from sources noted in Section 5 as being non-ideal sampling locations, additional sampling traverse points were used in accordance with AS4323.1-1995.

6.2 Determination of Combustion Gases Concentration

USEPA Method 3a was used for the determination of combustion gas concentration. A gas sample was continuously extracted from the effluent stream; a portion of the sample stream was conveyed to an instrumental analyser for the determination of Oxygen and Carbon Dioxide.

ECS Stack Pty. Ltd. used a Horiba PG250 Portable Gas Analyser (PGA) for the measurement of gaseous parameters from the EPA ID 2 (Number 6 Kiln Stack) emission source.

Additionally, USEPA Method 6c, 7e and 10 were used for the determination of Sulphur Dioxide, Nitrogen Oxides (reported as NO₂) and Carbon Monoxide, respectively.

Performance specifications and test procedures have been provided to ensure reliable data. Comprehensive instrumental analyser calibrations are carried out prior to, and post emission source testing.

Refer to the Summary Report Section Combustion Gases, for detailed sampling and analysis results for the Number 6 Kiln Stack.

6.3 Determination of Gas Moisture Concentration

USEPA Method 4 was used for the determination of gas moisture concentration. A sample was continuously extracted from the effluent stream using a heated probe and passed through chilled impingers containing water. The water component was removed by condensation and the amount collected was determined volumetrically and used to calculate moisture concentration.

USEPA Method 4 was performed as part of the methodology of completing isokinetic tests from each of the sources. Methods incorporating USEPA Method 4 include the following; AS4323.2 and USEPA Method 29.

6.4 Determination of Particulate Concentration

Method AS4323.2 was used for the sampling of particulate matter from EPA Source ID 2 (Number 6 Kiln Stack), Source ID 4 (Number 6 Cement Mill Stack), Source ID 5 (Number 6 Kiln Cooler Stack) and Source ID 10 (Number 7 Cement Mill Stack). A gas sample was collected isokinetically from the effluent stream and collected on a glass fibre filter maintained at a temperature in the range of 120 ± 14 °C or such other temperature as specified by an applicable subpart of the standards or approved by the administrator, for a particular operation. The particulate mass, which includes any material that condenses at or above the filtration temperature, was then determined gravimetrically after removal of uncombined water.

Isokinetic rates for all samples, collected from each of the sources, were within the required QA tolerances.

Due to a blockage in the crusher, the raw feed mills ran out of product with 15 minutes remaining on the second sampling run.

Duplicate samples were collected at each source. At the completion of testing, sample filters and nozzle washes were recovered in the ECS NATA accredited laboratory and labelled with a unique sample identifier under chain of custody tracking, prior to gravimetric analysis.

Refer to the Summary Report Section AS4323.2 for detailed sampling and analysis results for each emission point.

6.5 Determination of Metals Concentration

USEPA Method 29 was used for sampling of Metals. A gas sample was withdrawn isokinetically from the effluent stream. Particulate phase metals were collected on quartz fibre filter, whilst gaseous phase metals were absorbed in a series of glass impingers. The recovered samples were then digested and variety of Metals can be analysed for in accordance with USEPA Method 29.

Appropriate fractions are analysed for Hg by Cold Vapour Atomic Absorption Spectroscopy (CVAAS) and Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Ni, P, Se, Ag, Tl and Zn by inductively coupled argon plasma emission spectroscopy (ISCAP) or atomic absorption spectroscopy (AAS).

Graphite furnace atomic absorption spectroscopy (GFAAS) is used for the analysis of Sb, As, Cd, Co, Pb, Se, and Tl if these elements require greater analytical sensitivity than can be obtained by ICAP. If one so chooses, AAS may be used for analysis of all listed metals if the resulting in-stack method detection limits meet the goal of the testing program.

Similarly, inductively coupled plasma-mass spectroscopy (ICP-MS) may be used for the analysis of Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Ni, Ag, Tl and Zn.

Isokinetic rates for all samples, collected from the EPA ID 2 (Number 6 Kiln Stack) were within the required QA tolerances.

USEPA Method 29 sampling run 2 was abbreviated due to an unscheduled shutdown of Kiln 6.

Duplicate samples were collected from the EPA ID 2 (Number 6 Kiln Stack). One Blank sample was collected per sampling program. At the completion of testing, samples were recovered and labelled with a unique sample identifier prior to transportation to Leeder Consulting for analysis.

Refer to the Summary Report Section USEPA Method 29, for detailed sampling and analysis results for EPA ID 2 (Number 6 Kiln Stack).

7 **DEFINITIONS**

7.1 **Practical Quantitation Limit (PQL)**

Practical Quantitation Limits (PQLs) stated in the following report have been derived from the associated analytical laboratory reports.

7.2 **Method Detection Limits (MDL)**

Method detection limits (MDLs) stated in the following report are derived using the analytical practical quantitation limits (PQLs) and field test dry gas volumes. This is the minimum detectable limit for each run based solely on the PQL divided by the Dry Standard Cubic Metre (dscm) for each run. This value incorporates analytical instrumental uncertainty only and does not include uncertainties due to manual sampling.

7.3 **Result Codes**

Result codes are assigned to each result to illustrate the level of detection that each specific analyte has achieved. The two main codes that are assigned are "D" and "nd" which represent the result being equal or above and below the MDL respectively. All subsequent codes (Noted in brackets) indicate where laboratories have found analyte present in one or more of the samples (Test or Blank). All combinations of codes are listed and explained below:

- nd Final result is below the MDL, has no detects in any of the Blanks or any of the Test samples.
- nd (D) Final result is below the MDL, has no detects in any of the Blanks but at least one detect in one of the Test samples.
- nd (B) Final result is below the MDL, has no detects in any of the Test samples but at least one detect in one of the Blank samples.
- nd (D,B) Final result is below the MDL, has at least one detect in one of the Blank samples and at least one detect in one of the Test samples.
- D Final result is above the MDL, has no detects in any of the Blank samples and at least one detect in one of the Test samples.
- D(B) Final result is above the MDL, has at least one detect in one of the Blank samples and at least one detect in one of the Test samples.

7.4 **Average Calculation Methodology**

The Average Calculation (for a sample within a duplicate, triplicate or quadruplicate test) is calculated depending on one of the following:

- If all runs are detected, then the average is calculated based on the results of the detected compound and then divided by the number of runs;
- If a run (or more) in a sample set is non-detected then half of the respective MDL is used in the average calculation
- If all runs are non-detected, then the average is reported as 'nd'.

7.5 **Significant Figures**

All data generated from external laboratories is presented to two significant figures as laboratory results are typically supplied in this format. ECS results are consequently bound by this accuracy.

All calculations are performed on unrounded data. All physical parameters displayed in the report are unrounded.

All particulate data is presented to three significant figures.

All combustion gas data is accurate to two significant figures. Oxygen (%vol/vol) and Carbon Dioxide (%vol/vol) is reported to one decimal place accuracy.

7.6 Units of Measure

All data generated from external laboratories is presented to two significant figures as laboratory results are typically supplied in this format. ECS results are consequently bound by this accuracy.

The following units of measure are referred to within this report;

- dscm Dry Standard Cubic Metre/s - All concentrations and emission rates are based on the gas being dry and at Standard conditions (101.325kPa and 0°C).
- g/dscm grams per Dry Standard Cubic Metre/s.
- mg/dscm milligrams per Dry Standard Cubic Metre/s.
- µg/dscm micrograms per Dry Standard Cubic Metre/s
- pg/dscm picograms per Dry Standard Cubic Metre/s
- dscm/min Dry Standard Cubic Metre/s per Minute.
- dscm/hr Dry Standard Cubic Metre/s per Hour.
- wscm/min Wet Standard Cubic Metre/s - All concentrations and emission rates are based on the gas being wet and at Standard conditions (101.325kPa and 0°C).
- acm/min Actual Cubic Metres per Minute flow rate at sampling conditions.
- m/sec Metres per Second – Velocity of the stack or duct gas at sampling conditions.
- % Compositions (%) Percentage constitution of an analyte measured on a volume basis.
- ppm Parts per Million – Volume based measurement.

Summary Reports



Summary Report: Combustion Gases - Kiln 6

Client:
Job Number:

Boral Cement New Berrima
RS11180

Sampling Date:	1/06/2011	dd/mm/yyyy
Sampling Start Time:	12:39	hh:mm
Sampling Finish Time:	16:27	hh:mm
Average Stack Temperature:	106	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	16	%
Dry Standard Flow Rate:	7073	dscm/min

Analyte - USEPA Method 3A	Concentration	Method Detection Limit	Code	Emission Rate
Carbon Dioxide	20.1 %	0.1 %	D	N/A
Oxygen	8.7 %	0.1 %	D	N/A

Analyte - USEPA Method 10	Concentration	Method Detection Limit	Code	Emission Rate
Carbon Monoxide	317 mg/dscm	1.3 mg/dscm	D	134 kg/hr
Carbon Monoxide				134000 g/hr

Analyte - USEPA Method 7E	Concentration	Method Detection Limit	Code	Emission Rate
Nitric Oxide	- mg/dscm	- mg/dscm	D	- kg/hr
Nitrogen Dioxide	- mg/dscm	- mg/dscm		- kg/hr
Nitrogen Oxides (as NO2)	994 mg/dscm	2.1 mg/dscm		422 kg/hr
Corrected Nitrogen Oxides (as NO2 @10% O2)	891 mg/dscm			
Nitric Oxide				- g/hr
Nitrogen Dioxide				- g/hr
Nitrogen Oxides (as NO2)				422000 g/hr

Analyte - USEPA Method 6C	Concentration	Method Detection Limit	Code	Emission Rate
Sulphur Dioxide	nd mg/dscm	2.9 mg/dscm	nd	nd kg/hr
Sulphur Dioxide			D	nd g/hr

Summary Report: Combustion Gases - Kiln 6

Client:
Job Number:

Boral Cement New Berrima
RS11180

Sampling Date:	1/06/2011	dd/mm/yyyy
Sampling Start Time:	12:39	hh:mm
Sampling Finish Time:	16:27	hh:mm
Average Stack Temperature:	106	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	16	%
Dry Standard Flow Rate:	7073	dscm/min

Analyte - USEPA Method 3A	Concentration	Method Detection Limit	Code	Emission Rate
Carbon Dioxide	20.1 %	0.1 %	D	N/A
Oxygen	8.7 %	0.1 %	D	N/A

Analyte - USEPA Method 10	Concentration	Method Detection Limit	Code	Emission Rate
Carbon Monoxide - Corrected @10% O2)	284 mg/dscm	1.1 mg/dscm	D	N/A kg/hr

Analyte - USEPA Method 7E	Concentration	Method Detection Limit	Code	Emission Rate
Nitric Oxide - Corrected @10% O2)	- mg/dscm	- mg/dscm		N/A kg/hr
Nitrogen Dioxide - Corrected @10% O2)	- mg/dscm	- mg/dscm		N/A kg/hr
Nitrogen Oxides (as NO2) - Corrected @10% O2)	891 mg/dscm	1.8 mg/dscm	D	N/A kg/hr

Analyte - USEPA Method 6C	Concentration	Method Detection Limit	Code	Emission Rate
Sulphur Dioxide - Corrected @10% O2)	nd mg/dscm	2.6 mg/dscm	nd	N/A kg/hr

Summary Report: AS4323.2 - Kiln 6

Client: Boral Cement New Berrima
Job Number: RS11180

	Run 1	Run 2	
Sampling Date:	1/06/2011	1/06/2011	dd/mm/yyyy
Sampling Start Time:	12:35	15:21	hh:mm
Sampling Finish Time:	14:35	17:21	hh:mm
Average Stack Temperature:	106	108	C
Average Stack Gas Velocity:	34	35	m/sec
Average Gas Moisture Content:	17	15	%
Dry Standard Flow Rate:	7985	8445	dscm/min
Percent of Isokinetic Rate:	102	97	%
Dry Gas Molecular Weight	29	30	g/g-mol
Dry Gas Density	0.94	0.93	kg/dscm

Summary Results - Run 1

Analyte	Concentration	Code	Emission Rate
Total Particulates	17.1 mg/dscm	D	8.19 kg/hr
Method Detection Limit	0.088 mg/dscm		

Summary Results - Run 2

Analyte	Concentration	Code	Emission Rate
Total Particulates	18.5 mg/dscm	D	9.38 kg/hr
Method Detection Limit	0.087 mg/dscm		

Summary Results - Averages

Analyte	Concentration	Emission Rate
Total Particulates	17.8 mg/dscm	8.79 kg/hr

Summary Report: AS4323.2 - Kiln 6

Client: Boral Cement New Berrima
Job Number: RS11180

	Run 1	Run 2	
Sampling Date:	1/06/2011	1/06/2011	dd/mm/yyyy
Sampling Start Time:	12:35	15:21	hh:mm
Sampling Finish Time:	14:35	17:21	hh:mm
Average Stack Temperature:	106	108	C
Average Stack Gas Velocity:	34	35	m/sec
Average Gas Moisture Content:	17	15	%
Dry Standard Flow Rate:	7985	8445	dscm/min
Percent of Isokinetic Rate:	102	97	%
Dry Gas Molecular Weight	29	30	g/g-mol
Dry Gas Density	0.94	0.93	kg/dscm

Summary Results - Run 1

Analyte	Concentration	Code	Emission Rate
Total Particulates - Corrected to 10% Oxygen	15.3 mg/dscm	D	N/A kg/hr
Method Detection Limit	0.000 mg/dscm		

Summary Results - Run 2

Analyte	Concentration	Code	Emission Rate
Total Particulates - Corrected to 10% Oxygen	16.6 mg/dscm	D	N/A kg/hr
Method Detection Limit	0.000 mg/dscm		

Summary Results - Averages

Analyte	Concentration	Emission Rate
Total Particulates - Corrected to 10% Oxygen	16.0 mg/dscm	N/A kg/hr

Summary Report: USEPA Method 29 - Kiln 6

Client: Boral Cement New Berrima
Job Number: RS11180

Summary Results - Run 1

Kiln 6

Sampling Date:	31/05/2011	dd/mm/yyyy
Sampling Start Time:	8:14	hh:mm
Sampling Finish Time:	9:26	hh:mm
Average Stack Temperature:	113	C
Average Stack Gas Velocity:	31	m/sec
Average Stack Moisture Content:	13	%
Dry Standard Flow Rate:	7401	dscm/min
Percent of Isokinetic Rate:	98	%

Analyte	Concentration	Code	Emission Rate	MDL
	mg/dscm		g/hr	mg/dscm
Arsenic	nd	nd (D,B)	nd	0.00054
Beryllium	nd	nd	nd	0.00054
Cadmium	nd	nd (D,B)	nd	0.00054
Cobalt	nd	nd (D)	nd	0.00054
Chromium	0.0020	D (B)	0.88	0.00054
Copper	0.0021	D (B)	0.93	0.00054
Mercury	0.0092	D (B)	4.1	0.0028
Manganese	0.027	D (B)	12	0.00054
Nickel	0.0012	D (B)	0.51	0.00054
Lead	0.0047	D	2.1	0.00054
Antimony	nd	nd	nd	0.00054
Selenium	nd	nd	nd	0.00054
Thallium	0.0044	D	2.0	0.00054
Vanadium	nd	nd (D)	nd	0.00083
Tin	nd	nd (D,B)	nd	0.00054
Cadmium and Thallium	0.0034	D	1.5	0.0011
Hazardous Substances (Sb,As,Be,Cd,Cr,Co,Pb,Mn,Hg,Ni,Se,Sn,V)	0.029	D (B)	13	0.0095

Summary Report: USEPA Method 29 - Kiln 6

Client: Boral Cement New Berrima
Job Number: RS11180

Summary Results - Run 2

Kiln 6

Sampling Date:	31/05/2011	dd/mm/yyyy
Sampling Start Time:	12:12	hh:mm
Sampling Finish Time:	13:12	hh:mm
Average Stack Temperature:	106	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	14	%
Dry Standard Flow Rate:	7195	dscm/min
Percent of Isokinetic Rate:	98	%

Analyte	Concentration	Code	Emission Rate	MDL
	mg/dscm		g/hr	mg/dscm
Arsenic	nd	nd (D,B)	nd	0.00073
Beryllium	nd	nd	nd	0.00073
Cadmium	nd	nd (D,B)	nd	0.00073
Cobalt	nd	nd (D)	nd	0.00073
Chromium	0.0032	D (B)	1.4	0.00073
Copper	0.0021	D (B)	0.90	0.00073
Mercury	0.0096	D (B)	4.1	0.0039
Manganese	0.011	D (B)	4.7	0.00073
Nickel	0.0049	D (B)	2.1	0.00073
Lead	0.0023	D	0.99	0.00073
Antimony	nd	nd	nd	0.00073
Selenium	nd	nd	nd	0.00073
Thallium	0.0036	D	1.5	0.00073
Vanadium	nd	nd (D)	nd	0.0011
Tin	nd	nd (D,B)	nd	0.00073
Cadmium and Thallium	0.0027	D	1.2	0.0015
Hazardous Substances (Sb,As,Be,Cd,Cr,Co,Pb,Mn,Hg,Ni,Se,Sn,V)	0.026	D (B)	11	0.013

Summary Report: USEPA Method 29 - Kiln 6

Client:
Job Number:

Boral Cement New Berrima
RS11180

Result Averages

Kiln 6

Sampling Date:	31/05/2011	dd/mm/yyyy
Overall Sampling Start Time:	8:14	hh:mm
Overall Sampling Finish Time:	13:12	hh:mm
Average Stack Temperature:	109	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	14	%
Avg. Dry Standard Flow Rate:	7298	dscm/min
Avg. Percent of Isokinetic Rate:	98	%

Analyte	Concentration mg/dscm	Emission Rate g/hr
Arsenic	nd	nd
Beryllium	nd	nd
Cadmium	nd	nd
Cobalt	nd	nd
Chromium	0.0026	1.1
Copper	0.0021	0.91
Mercury	0.0094	4.1
Manganese	0.019	8.4
Nickel	0.0030	1.3
Lead	0.0035	1.5
Antimony	nd	nd
Selenium	nd	nd
Thallium	0.0040	1.7
Vanadium	nd	nd
Tin	nd	nd
Cadmium and Thallium	0.0030	1.3
Hazardous Substances (Sb,As,Be,Cd,Cr,Co,Pb,Mn,Hg,Ni,Se,Sn,V)	0.028	12

Note:

- Concentrations below MDL are averaged using 0.5 x MDL.
- Averages below the Average MDL for all runs are reported as nd.

Summary Report: USEPA Method 29 - Kiln 6

Client:
Job Number:

Boral Cement New Berrima
RS11180

Summary Results

- Run 1

Kiln 6

Sampling Date:	31/05/2011	dd/mm/yyyy
Sampling Start Time:	8:14	hh:mm
Sampling Finish Time:	9:26	hh:mm
Average Stack Temperature:	113	C
Average Stack Gas Velocity:	31	m/sec
Average Stack Moisture Content:	13	%
Dry Standard Flow Rate:	7401	dscm/min
Percent of Isokinetic Rate:	98	%

Analyte	Concentration	Code	Emission Rate	MDL
	mg/dscm		g/hr	mg/dscm
Arsenic - Corrected to 10% Oxygen	nd	nd (D,B)	N/A	0.00044
Beryllium - Corrected to 10% Oxygen	nd	nd	N/A	0.00044
Cadmium - Corrected to 10% Oxygen	nd	nd (D,B)	N/A	0.00044
Cobalt - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.00044
Chromium - Corrected to 10% Oxygen	0.0016	D (B)	N/A	0.00044
Copper - Corrected to 10% Oxygen	0.0017	D (B)	N/A	0.00044
Mercury - Corrected to 10% Oxygen	0.0075	D (B)	N/A	0.0023
Manganese - Corrected to 10% Oxygen	0.022	D (B)	N/A	0.00044
Nickel - Corrected to 10% Oxygen	0.00094	D (B)	N/A	0.00044
Lead - Corrected to 10% Oxygen	0.0038	D	N/A	0.00044
Antimony - Corrected to 10% Oxygen	nd	nd	N/A	0.00044
Selenium - Corrected to 10% Oxygen	nd	nd	N/A	0.00044
Thallium - Corrected to 10% Oxygen	0.0036	D	N/A	0.00044
Vanadium - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.00067
Tin - Corrected to 10% Oxygen	nd	nd (D,B)	N/A	0.00044
Cadmium and Thallium - Corrected to 10% Oxygen	0.0028	D	N/A	0.00088
Hazardous Substances (Sb,As,Be,Cd,Cr,Co,Pb,Mn,Hg,Ni,Se,Sn,V) - Corrected to 10% Oxygen	0.024	D (B)	N/A	0.0078

Summary Report: USEPA Method 29 - Kiln 6

Client: Boral Cement New Berrima
Job Number: RS11180

Summary Results - Run 2

Kiln 6

Sampling Date:	31/05/2011	dd/mm/yyyy
Sampling Start Time:	12:12	hh:mm
Sampling Finish Time:	13:12	hh:mm
Average Stack Temperature:	106	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	14	%
Dry Standard Flow Rate:	7195	dscm/min
Percent of Isokinetic Rate:	98	%

Analyte	Concentration	Code	Emission Rate	MDL
	mg/dscm		g/hr	mg/dscm
Arsenic - Corrected to 10% Oxygen	nd	nd (D,B)	N/A	0.00060
Beryllium - Corrected to 10% Oxygen	nd	nd	N/A	0.00060
Cadmium - Corrected to 10% Oxygen	nd	nd (D,B)	N/A	0.00060
Cobalt - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.00060
Chromium - Corrected to 10% Oxygen	0.0026	D (B)	N/A	0.00060
Copper - Corrected to 10% Oxygen	0.0017	D (B)	N/A	0.00060
Mercury - Corrected to 10% Oxygen	0.0078	D (B)	N/A	0.0032
Manganese - Corrected to 10% Oxygen	0.0089	D (B)	N/A	0.00060
Nickel - Corrected to 10% Oxygen	0.0040	D (B)	N/A	0.00060
Lead - Corrected to 10% Oxygen	0.0019	D	N/A	0.00060
Antimony - Corrected to 10% Oxygen	nd	nd	N/A	0.00060
Selenium - Corrected to 10% Oxygen	nd	nd	N/A	0.00060
Thallium - Corrected to 10% Oxygen	0.0029	D	N/A	0.00060
Vanadium - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.00093
Tin - Corrected to 10% Oxygen	nd	nd (D,B)	N/A	0.00060
Cadmium and Thallium - Corrected to 10% Oxygen	0.0022	D	N/A	0.0012
Hazardous Substances (Sb,As,Be,Cd,Cr,Co,Pb,Mn,Hg,Ni,Se,Sn,V) - Corrected to 10% Oxygen	0.021	D (B)	N/A	0.011

Summary Report: USEPA Method 29 - Kiln 6

Client:
Job Number:

Boral Cement New Berrima
RS11180

Result Averages

Kiln 6

Sampling Date:	31/05/2011	dd/mm/yyyy
Overall Sampling Start Time:	8:14	hh:mm
Overall Sampling Finish Time:	13:12	hh:mm
Average Stack Temperature:	109	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	14	%
Avg. Dry Standard Flow Rate:	7298	dscm/min
Avg. Percent of Isokinetic Rate:	98	%

Analyte	Concentration mg/dscm	Emission Rate g/hr
Arsenic - Corrected to 10% Oxygen	nd	N/A
Beryllium - Corrected to 10% Oxygen	nd	N/A
Cadmium - Corrected to 10% Oxygen	nd	N/A
Cobalt - Corrected to 10% Oxygen	nd	N/A
Chromium - Corrected to 10% Oxygen	0.0021	N/A
Copper - Corrected to 10% Oxygen	0.0017	N/A
Mercury - Corrected to 10% Oxygen	0.0076	N/A
Manganese - Corrected to 10% Oxygen	0.016	N/A
Nickel - Corrected to 10% Oxygen	0.0025	N/A
Lead - Corrected to 10% Oxygen	0.0028	N/A
Antimony - Corrected to 10% Oxygen	nd	N/A
Selenium - Corrected to 10% Oxygen	nd	N/A
Thallium - Corrected to 10% Oxygen	0.0032	N/A
Vanadium - Corrected to 10% Oxygen	nd	N/A
Tin - Corrected to 10% Oxygen	nd	N/A
Cadmium and Thallium - Corrected to 10% Oxygen	0.0025	N/A
Hazardous Substances (Sb,As,Be,Cd,Cr,Co,Pb,Mn,Hg,Ni,Se,Sn,V) - Corrected to 10% Oxygen	0.023	N/A

Note:

- Concentrations below MDL are averaged using 0.5 x MDL.
- Averages below the Average MDL for all runs are reported as nd.

Summary Report: AS4323.2 - Number 6 Cement Mill 'Duct A'

Client: Boral Cement Berrima
Job Number: RS11180

	Run 1	Run 2	
Sampling Date:	31/05/2011	31/05/2011	dd/mm/yyyy
Sampling Start Time:	9:00	10:40	hh:mm
Sampling Finish Time:	10:15	11:55	hh:mm
Average Stack Temperature:	75	80	C
Average Stack Gas Velocity:	17	18	m/sec
Average Gas Moisture Content:	3.5	3.7	%
Dry Standard Flow Rate:	964	989	dscm/min
Percent of Isokinetic Rate:	97	100	%
Dry Gas Molecular Weight	28	28	g/g-mol
Dry Gas Density	0.24	0.24	kg/dscm

Summary Results - Run 1

Analyte	Concentration	Code	Emission Rate
Total Particulates	2.70 mg/dscm	D	0.156 kg/hr
Method Detection Limit	0.24 mg/dscm		

Summary Results - Run 2

Analyte	Concentration	Code	Emission Rate
Total Particulates	2.36 mg/dscm	D	0.140 kg/hr
Method Detection Limit	0.23 mg/dscm		

Summary Results - Averages

Analyte	Concentration	Emission Rate
Total Particulates	2.53 mg/dscm	0.150 kg/hr

Summary Report: AS4323.2 - Number 6 Cement Mill Stack 'Duct B'

Client: Boral Cement Berrima
Job Number: RS11180

	Run 1	Run 2	
Sampling Date:	31/05/2011	31/05/2011	dd/mm/yyyy
Sampling Start Time:	15:10	15:50	hh:mm
Sampling Finish Time:	15:55	16:35	hh:mm
Average Stack Temperature:	80	81	C
Average Stack Gas Velocity:	17	17	m/sec
Average Gas Moisture Content:	3.6	3.5	%
Dry Standard Flow Rate:	1004	977	dscm/min
Percent of Isokinetic Rate:	102	102	%
Dry Gas Molecular Weight	29	29	g/g-mol
Dry Gas Density	0.23	0.23	kg/dscm

Summary Results - Run 1

Analyte	Concentration	Code	Emission Rate
Total Particulates	16.7 mg/dscm	D	1.00 kg/hr
Method Detection Limit	0.37 mg/dscm		

Summary Results - Run 2

Analyte	Concentration	Code	Emission Rate
Total Particulates	3.36 mg/dscm	D	0.197 kg/hr
Method Detection Limit	0.38 mg/dscm		

Summary Results - Averages

Analyte	Concentration	Emission Rate
Total Particulates	10.0 mg/dscm	0.600 kg/hr

Summary Report: USEPA Method 17 - Number 6 Kiln Cooler Stack

Client: Boral Cement Berrima
Job Number: RS11180

	Run 1	Run 2	
Sampling Date:	1/06/2011	1/06/2011	dd/mm/yyyy
Sampling Start Time:	15:55	17:41	hh:mm
Sampling Finish Time:	17:15	19:01	hh:mm
Average Stack Temperature:	91	94	C
Average Stack Gas Velocity:	13	14	m/sec
Average Gas Moisture Content:	1.6	1.4	%
Dry Standard Flow Rate:	2380	2619	dscm/min
Percent of Isokinetic Rate:	101	102	%
Dry Gas Molecular Weight	29	29	g/g-mol
Dry Gas Density	0.23	0.24	kg/dscm

Summary Results - Run 1

Analyte	Concentration	Code	Emission Rate
Total Particulates	1.21 mg/dscm	D	0.173 kg/hr
Method Detection Limit	0.15 mg/dscm		

Summary Results - Run 2

Analyte	Concentration	Code	Emission Rate
Total Particulates	1.26 mg/dscm	D	0.197 kg/hr
Method Detection Limit	0.14 mg/dscm		

Summary Results - Averages

Analyte	Concentration	Emission Rate
Total Particulates	1.23 mg/dscm	0.190 kg/hr

Summary Report: AS4323.2 - Number 7 Cement Mill Stack

Client: Boral Cement Berrima
Job Number: RS11180

	Run 1	Run 2	
Sampling Date:	1/06/2011	1/06/2011	dd/mm/yyyy
Sampling Start Time:	8:50	10:40	hh:mm
Sampling Finish Time:	10:10	12:00	hh:mm
Average Stack Temperature:	104	104	C
Average Stack Gas Velocity:	7.6	7.6	m/sec
Average Gas Moisture Content:	5.1	5.3	%
Dry Standard Flow Rate:	805	810	dscm/min
Percent of Isokinetic Rate:	96	99	%
Dry Gas Molecular Weight	28	28	g/g-mol
Dry Gas Density	0.24	0.24	kg/dscm

Summary Results - Run 1

Analyte	Concentration	Code	Emission Rate
Total Particulates	5.02 mg/dscm	D	0.243 kg/hr
Method Detection Limit	0.19 mg/dscm		

Summary Results - Run 2

Analyte	Concentration	Code	Emission Rate
Total Particulates	2.78 mg/dscm	D	0.135 kg/hr
Method Detection Limit	0.18 mg/dscm		

Summary Results - Averages

Analyte	Concentration	Emission Rate
Total Particulates	3.90 mg/dscm	0.190 kg/hr