Attachment 1

Locations of Berrima's Dust Deposition Gauges

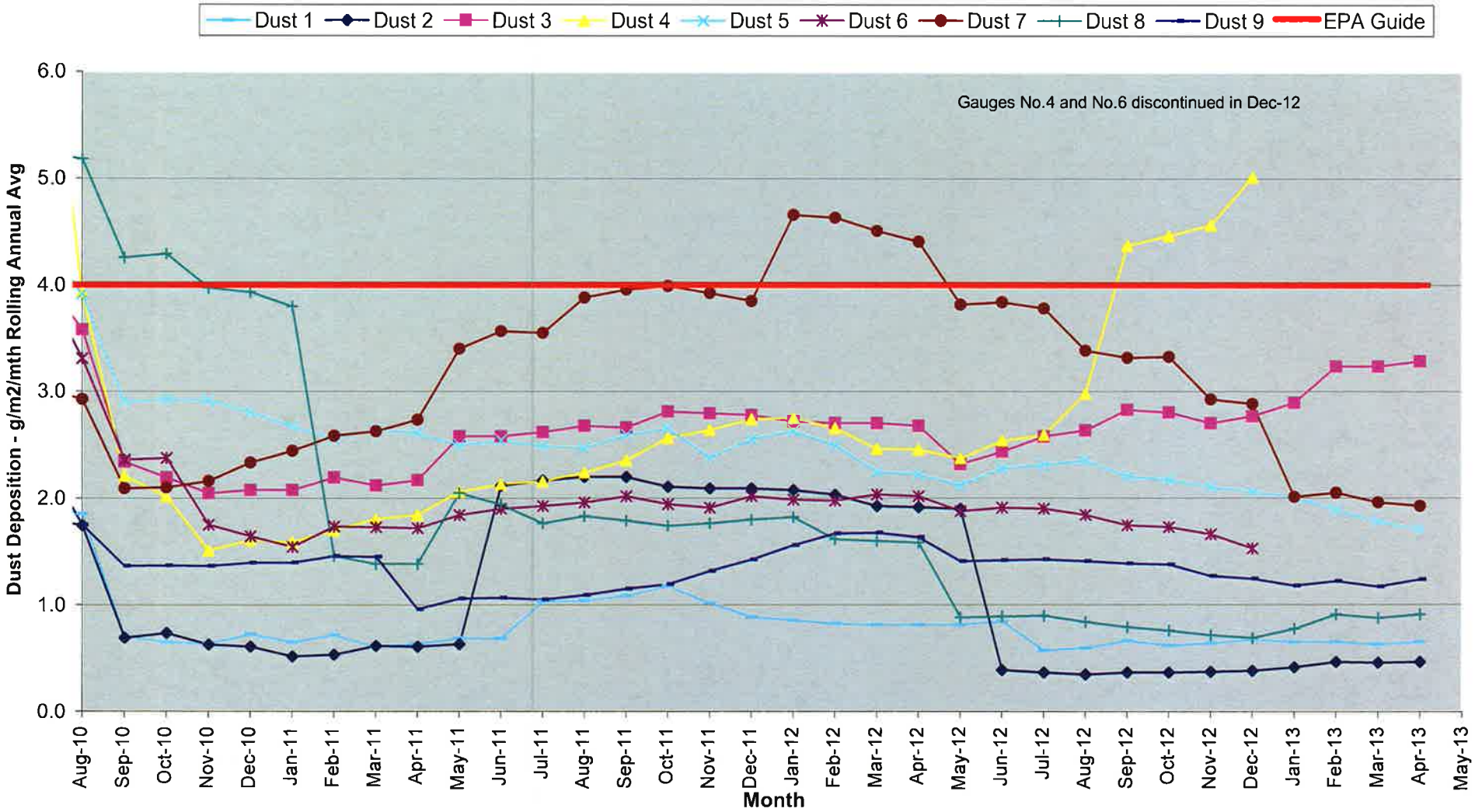
Location of Dust Gauges and HVAS station at Berrima from January 2013

Revision of Dust Gauge network - Berrima, November 2012

Attachment 2

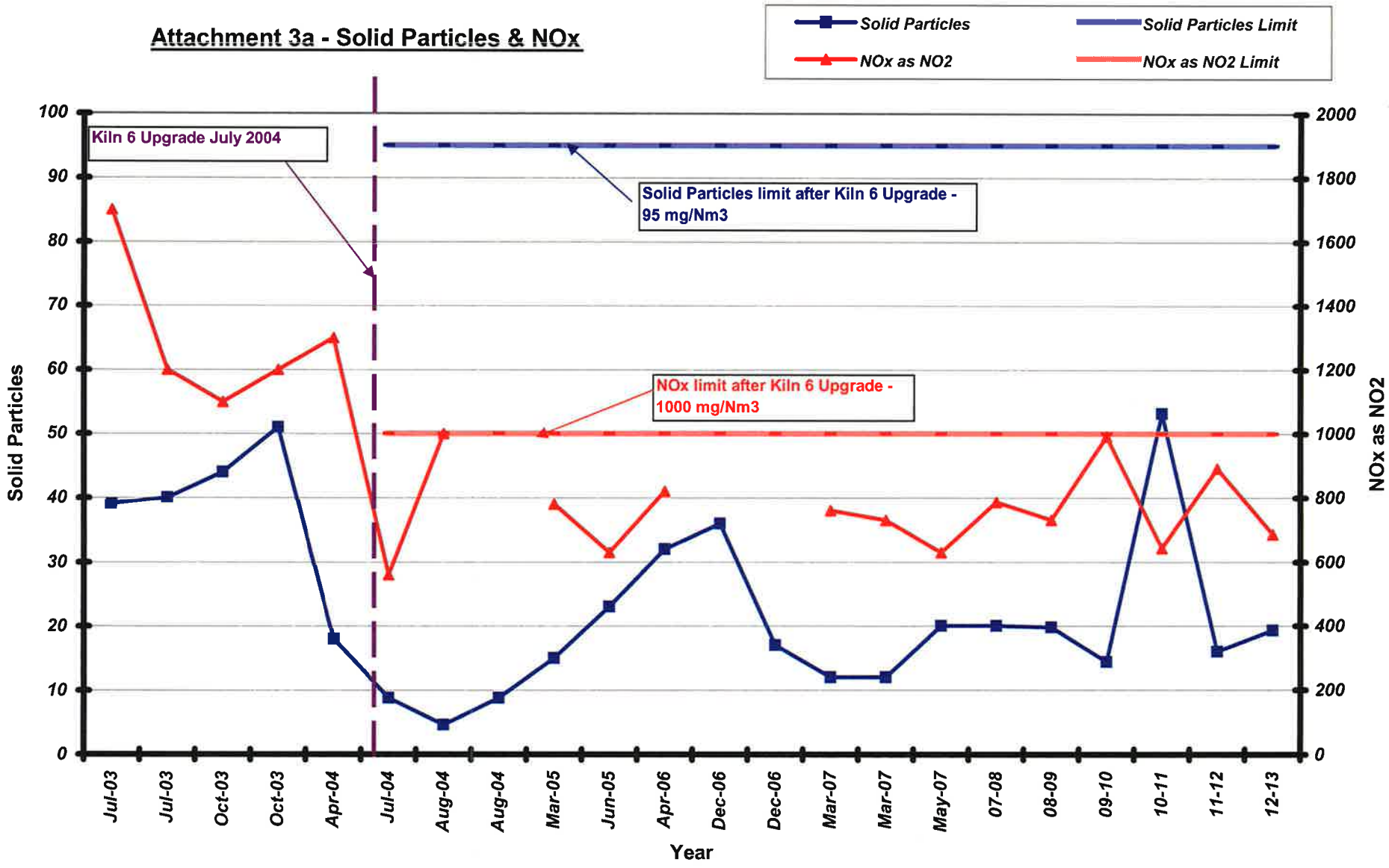
Dust Deposition Data

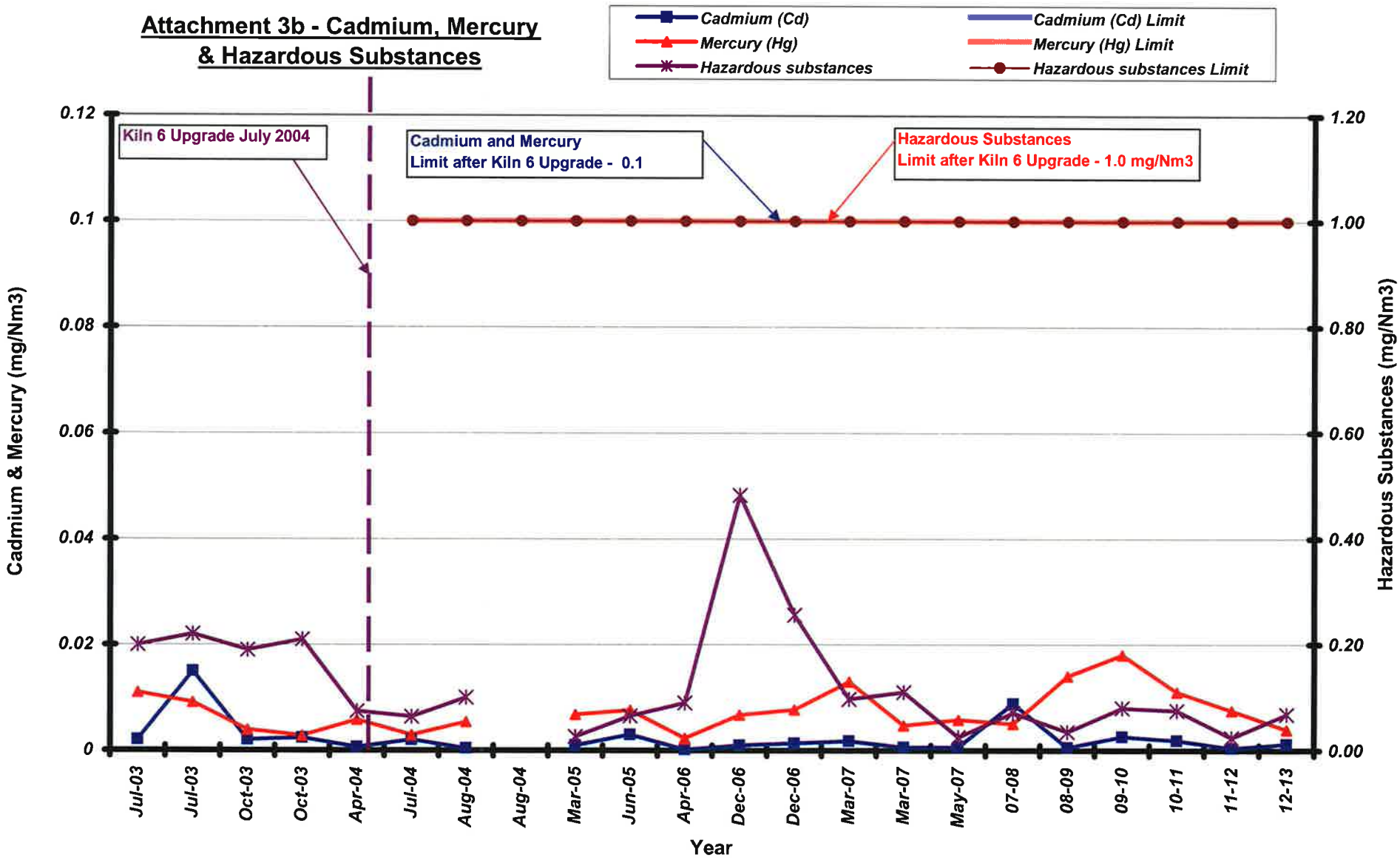
Total Deposited Dust (12-Month Rolling Average)
Berrima Cement Works - Aug 2010- May 2013



Attachment 3

Kiln 6 Stack Emissions


Attachment 3a - Solid Particles & NOx
Solid Particles
Solid Particles Limit
NOx as NO2
NOx as NO2 Limit
Kiln 6 Upgrade July 2004
Solid Particles limit after Kiln 6 Upgrade - 95 mg/Nm3
NOx limit after Kiln 6 Upgrade - 1000 mg/Nm3
Solid Particles
NOx as NO2
Year
0
10
20
30
40
50
60
70
80
90
100
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Jul-03
Jul-03
Oct-03
Oct-03
Apr-04
Jul-04
Aug-04
Aug-04
Mar-05
Jun-05
Apr-06
Dec-06
Dec-06
Mar-07
Mar-07
May-07
07-08
08-09
09-10
10-11
11-12
12-13


Attachment 3b - Cadmium, Mercury & Hazardous Substances
Cadmium (Cd)
Cadmium (Cd) Limit
Mercury (Hg)
Mercury (Hg) Limit
Hazardous substances
Hazardous substances Limit
Kiln 6 Upgrade July 2004
Cadmium and Mercury
Limit after Kiln 6 Upgrade - 0.1
Hazardous Substances
Limit after Kiln 6 Upgrade - 1.0 mg/Nm3
Cadmium & Mercury (mg/Nm3)
Hazardous Substances (mg/Nm3)
0.12
0.1
0.08
0.06
0.04
0.02
0
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Jul-03
Jul-03
Oct-03
Oct-03
Apr-04
Jul-04
Aug-04
Aug-04
Mar-05
Jun-05
Apr-06
Dec-06
Dec-06
Mar-07
Mar-07
May-07
07-08
08-09
09-10
10-11
11-12
12-13
Year

Attachment 4

Stack Testing Report
June 2012

BORAL CEMENT LTD

BERRIMA CEMENT WORKS

EMISSIONS COMPLIANCE MONITORING: STANDARD FUELS

JUNE – JULY 2012

TEST REPORT NUMBER: RSN12026B

REPORT REVISION HISTORY		
REVISION NUMBER	**DATE ISSUED**	**REVISION DETAILS**
Original	28th September 2012	Original Report
A	8th May 2013	Dry Gas Density and Stack Gas Molecular Weight included at Boral Cement's request. Corrected Barometric Pressure for 31/7/2012
B	22nd May 2013	Sulphur Dioxide results added at Boral Cements request
REPORT DISTRIBUTION		
REVISION NUMBER	**COPY NUMBER**	**LOCATION**
0	1	ECS Stack Pty Ltd: Project File
0	2	Boral Cement Ltd: Ms Aleksandra Wnorowski
0	3	Company Name: Ms Aleksandra Wnorowski (Electronic Copy)
A	1	ECS Stack Pty Ltd: Project File
A	2	Boral Cement Ltd: Ms Aleksandra Wnorowski
A	3	Company Name: Ms Aleksandra Wnorowski (Electronic Copy)
B	1	ECS Stack Pty Ltd: Project File
B	2	Boral Cement Ltd: Ms Aleksandra Wnorowski
B	3	Company Name: Ms Aleksandra Wnorowski (Electronic Copy)

DOCUMENT INFORMATION

REPORT NUMBER	RSN12026B
REPORT TITLE:	Source Emissions Compliance Monitoring Report (Standard Fuels)
DATE OF ISSUE:	22nd May 2013
ATTENTION:	Ms Aleksandra Wnorowski
ADDRESS:	Boral Cement Ltd - Berrima Cement Works Taylor Avenue New Berrima NSW Australia 2577

EMISSIONS TESTING INFORMATION

SAMPLING COMMENCED:	31st May 2012
SAMPLING COMPLETED:	2nd August 2012
TESTING LABORATORY:	ECS Stack Pty Ltd
LABORATORY PREMISES:	Unit 2, 27 Clark Court, Bibra Lake, Western Australia, 6163

REPORT AUTHORISATION

REPORT PREPARED BY:

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BEng (Environ), MBA,
MIEAust
ECS Regional Manager - Northern

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 ISO 9001:2008 Certified Quality Management System and must not be reproduced in any form except in full.

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Raw Data: RSN12026 Number 6 Kiln Stack USEPA Method 8
Raw Data: RSN12026 Number 6 Kiln Stack USEPA Method 29
Raw Data: RSN12026 Number 6 Cement Mill Stack AS4323.2 Duct A
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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 Ms Aleksandra Wnorowski of Boral Cement Ltd (New Berrima site), 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 New South Wales (NSW) Environmental Protection Agency (EPA) (previously Department of Environment & Climate Change (DECC) licence 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 L3 '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 (No 6 Kiln Stack)			
Parameter	Concentration	Criteria	Compliance	Criteria Reference
Units	mg/m^3	mg/m^3	Yes/No	
Nitrogen Oxides (as NO_2) Corrected to 10% O_2	687	1000	Yes	EPA
Particulates Corrected to 10% O_2	19.3	95	Yes	EPA
Mercury Corrected to 10% O_2	0.0039	0.1	Yes	EPA
Cadmium Corrected to 10% O_2	nd	0.1	Yes	EPA
Hazardous Substances Corrected to 10% O_2[3.]	nd	1.0	Yes	EPA
EPA Source Identification Number	4 (No 6 Cement Mill Stack)			
Particulates (Duct A)	4.15	100	Yes	EPA
Particulates (Duct B)	4.32	100	Yes	EPA
EPA Source Identification Number	5 (No 6 Kiln Cooler Stack)			
Particulates	3.88	100	Yes	EPA
EPA Source Identification Number	10 (No 7 Cement Mill Stack)			
Particulates	8.78	20	Yes	EPA

Notes:

1. nd = Not Detected
2. Results have been reported on a Dry Basis, corrected to 101.325kPa and 0°C.
3. Hazardous Substances are an aggregate of the following metals; Sb, AS, Be, Cd, Cr, Co, Pb, Mn, Hg, Ni, Se, Sn & V.
4. The Oxygen actual concentration on the 31/07/2012 (Nitrogen Oxides) is 9.1%
5. The Oxygen actual concentration on the 07/06/2012 (Sulphur Dioxide) is 9.1%
6. The Oxygen actual concentration on the 06/06/2012 (Particulates) is 9.1%
7. The Oxygen actual concentration on the 02/08/2012 (Metals) is 8.8%
8. Dry gas density and dry gas molecular weight data can be found in the summary reports.

2 INTRODUCTION

ECS Stack Pty Ltd was requested to conduct stack monitoring for Boral Cement Ltd at the New Berrima facility, New South Wales. Testing was conducted on the following sources according to the Emissions Compliance Monitoring (Standard Fuels) requirements detailed in the Scope of Work document (ECS Stack Pty Ltd quote QSN12007).

- 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)

The methodology to be employed for the Emissions Compliance Monitoring program is consistent with USEPA CFR 40 Part 60 Methods, and where applicable Australian Standards. The methodology to be employed is consistent with the requirements of the New South Wales Environmental Protection Agency (previously Department of Environment & Climate Change (DECC)).

Further to this, ECS Stack provides NATA accredited test results for the sampling carried out under this program, unless where otherwise specified. Limits of detection will be aimed to achieve the best available under normal sampling conditions. The following table outlines the variety of tests to be performed on the emission sources at the Boral Cement, New Berrima facility.

Table 2: Sampling Program – Source and Methods

Analyte	Method	NSW EPA Equivalent	ISO 17025 (NATA) Accreditation
EPA Source Identification Number 2 (Number 6 Kiln Stack)			
Sampling Plane and Traverse Point Selection	AS4323.1-1995	TM-1	Yes
Gas Flow Rates	USEPA Method 2	TM-2	Yes
Carbon Dioxide and Oxygen	USEPA Method 3A	TM-24	Yes
Moisture	USEPA Method 4	TM-22	Yes
Nitrogen Oxides (as NO_2)	USEPA Method 7E	TM-11	Yes
Sulphur Dioxide / Sulphur Trioxide / Acid Mist	USEPA Method 8	TM-4	Yes
Carbon Monoxide	USEPA Method 10	TM-32	Yes
Particulates/Total Solids	AS4323.2-1995	TM-15	Yes
Multiple Metals	USEPA Method 29	TM-12	Yes
EPA Source Identification Number 4 (Number 6 Cement Mill Stack)			
Sampling Plane and Traverse Point Selection	AS4323.1-1995	TM-1	Yes
Gas Flow Rates	USEPA Method 2	TM-2	Yes
Carbon Dioxide and Oxygen	USEPA Method 3A	TM-24	Yes
Moisture	USEPA Method 4	TM-22	Yes
Particulates/Total Solids	AS4323.2-1995	TM-15	Yes
EPA Source Identification Number 5 (Number 6 Kiln Cooler Stack)			
Sampling Plane and Traverse Point Selection	AS4323.1-1995	TM-1	Yes
Gas Flow Rates	USEPA Method 2	TM-2	Yes
Carbon Dioxide and Oxygen	USEPA Method 3A	TM-24	Yes
Moisture	USEPA Method 4	TM-22	Yes
Particulates/Total Solids	AS4323.2-1995	TM-15	Yes

Table 2: Sampling Program - Source and Methods (Continued)

EPA Source Identification Number 10 (Number 7 Cement Mill Stack)			
Sampling Plane and Traverse Point Selection	AS4323.1-1995	TM-1	Yes
Gas Flow Rates	USEPA Method 2	TM-2	Yes
Carbon Dioxide and Oxygen	USEPA Method 3A	TM-24	Yes
Moisture	USEPA Method 4	TM-22	Yes
Particulates/Total Solids	AS4323.2-1995	TM-15	Yes

Note:

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

The following report details the sampling results from work performed on the aforementioned emission sources at New Berrima site from the 31st May to the 2nd August 2012. The results presented relate only to the sources tested.

3 SAMPLING PLANE

3.1 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 3: 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	
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 point meet 'ideal' plane requirements?	Yes	-	

Note:

1. 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)

3.2 Non Ideal Sampling Plane

EPA ID 4 Number 6 Cement Mill Stack (Duct A): The sampling plane is considered to be Non Ideal for the determinations for flow rate and particulate test parameters as detailed in AS4323.1-1995 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 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. For Isokinetic testing the ratio of the highest to lowest gas velocities shall not exceeds 1.6:1

Table 4: 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	
Distance to Near Wall of Stack (L_{nw})	0.09	m	
Diameter of Stack (D)	1.16	m	
Area of Stack (A_s)	1.06	m^2	
Distance Upstream to Nearest Flow Disturbance (B)	0.50	m	
Distance Downstream to Nearest Flow Disturbance (A)	0.30	m	
Does this point meet 'ideal' plane requirements?	**No**	-	

Note:

1. The 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.

EPA ID 4 Number 6 Cement Mill Stack (Duct B): The sampling plane is considered to be Non Ideal for the determinations for flow rate and particulate test parameters as detailed in AS4323.1-1995 due to the following:

1. The upstream stack diameters to the nearest disturbance is 5.3 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 6 to 9.
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. For Isokinetic testing the ratio of the highest to lowest gas velocities shall not exceeds 1.6:1

Table 5: 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})	0.64	m	
Distance to Near Wall of Stack (L_{nw})	0.09	m	
Diameter of Stack (D)	0.55	m	
Area of Stack (A_s)	0.24	m^2	
Distance Upstream to Nearest Flow Disturbance (B)	0.07	m	
Distance Downstream to Nearest Flow Disturbance (A)	0.00	m	
Does this point meet 'ideal' plane requirements?	**No**	-	

Note:

1. The 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 5 Number 6 Kiln Cooler Stack: The sampling plane is considered to be Non Ideal for the determinations for flow rate and particulate test parameters as detailed in AS4323.1-1995 due to the following:

1. The stack gas flow is cyclonic or swirling;

Table 6: 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	
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 point meet 'ideal' plane requirements?	**No**	-	

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 AS4323.1-1995 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 sampling points is less than 3 metres per second;
4. For Isokinetic testing the ratio of the highest to lowest gas velocities shall not exceeds 1.6:1

Table 7: 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	
Distance to Near Wall of Stack (L_{nw})	0.34	m	
Diameter of Stack (D)	1.52	m	
Area of Stack (A_s)	1.81	m^2	
Distance Upstream to Nearest Flow Disturbance (B)	3.60	m	
Distance Downstream to Nearest Flow Disturbance (A)	2.00	m	
Does this point meet 'ideal' plane requirements?	**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.

4 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 the Raw Data Appendices.

4.1 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 was also required to be used in conjunction with this method. The velocity was then used to calculate the average stack gas 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 3 as being non-ideal sampling locations, additional sampling traverse points were used in accordance with AS4323.1-1995.

4.2 Determination of Combustion Gases Concentration

ECS Stack Pty. Ltd. used Horiba PG250 Portable Gas Analyser (PGA) for the measurement of gaseous parameters from the EPA Point2 Number 6 Kiln Stack emission source.

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.

Additionally, USEPA Method 7E and 10 were used for the determination of Nitrogen Oxides (reported as NO_2) and Carbon Monoxide, respectively.
Comprehensive instrumental analyser calibrations were 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 EPA Point 2 Number 6 Kiln Stack

4.3 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 and an impinger containing silica gel. The water component was removed by condensation and the amount collected was determined volumetrically. The amount of water absorbed in the silica gel was determined gravimetrically and the total volume of water measured was 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 AS4323.2-1995 and USEPA Method 29.

4.4 Determination of Particulate Concentration

AS4323.2-1995 was used for the sampling of particulate matter. A gas sample was collected isokinetically from the effluent stream and the particulate matter was collected either on the filter 'in-stack', at stack conditions or collected on an external quartz fibre filter maintained at a temperature in the range of 120 ± 14 °C. 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.

Duplicate samples were collected from the each of the sources. 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 the each emission point.

4.5 Determination of Sulphur Dioxide and Sulphuric Acid Mist Concentration

USEPA Method 8 was used for the sampling of Sulphuric Acid Mist / Sulphur Trioxide (reported as SO_3) and Sulphur Dioxide Emissions from EPA Point 2 Number 6 Kiln Stack emission source. A gas sample was extracted isokinetically from the effluent stream in accordance with USEPA Method 8. The Sulphuric Acid Mist and Sulphur Trioxide fraction was separated from the Sulphur Dioxide fraction and both were measured separately by the barium-thorin titration method.

Isokinetic rates for all samples, collected from the EPA Point 2 Number 6 Kiln Stack emission source, were within the required QA tolerances.

Duplicate samples were collected from the EPA Point 2 Number 6 Kiln Stack emission source One Blank sample was collected per source. At the completion of testing, samples were labelled with a unique sample identifier and transported to the ECS NATA certified laboratory, under chain of custody tracking, for analysis.

Refer to the Summary Report Section USEPA Method 8, for detailed sampling and analysis results for the EPA Point 2 Number 6 Kiln Stack emission source.

4.6 Determination of Metals Concentration

USEPA Method 29 was used for sampling of Metals from the EPA Point 2 Number 6 Kiln Stack. 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 a variety of Metals was 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 (ICP-AES) or atomic absorption spectroscopy (AAS).

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

Duplicate samples were collected from the Kiln Stack. One Blank sample was collected per source. At the completion of testing, samples were recovered and labelled with a unique sample identifier prior to transportation to the Chemistry Centre of Western Australia (CCWA) and SGS Leeder Consulting for analysis.

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

5 DEFINITIONS

5.1 List of Commonly Used Acronyms

AS	- Australian Standard
AQSM	- Air Quality Sampling Manual (Queensland)
CD	- Calibration Drift
CO	- Carbon Monoxide
CO_2	- Carbon Dioxide
CEM	- Continuous Emission Monitor
CEMS	- Continuous Emission Monitoring System
CFR	- Code of Federal Regulations (United States)
CGA	- Cylinder Gas Audit
CH_4	- Methane
DCM	- Dust Concentration Monitor
DCS	- Data Control System
DEC	- Department of Environment & Conservation (WA)
DECC	- Department of Environment & Climate Change (NSW)
dscm	- Dry Standard Cubic Metre
EPA	- Environmental Protection Agency
EPROM	- Erasable Programmable Read-Only Memory (microchip)
eV	- Electron Volts
FTIR	- Fourier Transform Infra Red
GHG	- Greenhouse gas
HCl	- Hydrogen Chloride
HF	- Hydrogen Fluoride
Hg	- Mercury
H_2S	- Hydrogen Sulfide
ISO	- International Standards Organisation
IR	-Infra Red
LED	- Light Emitting Diode
LEL	- Lower Explosive Limit
NATA	- National Association of Testing Authorities (Accreditation Body)
NCSI	- NCS International (Accreditation Body)
NDIR	- Non-Dispersive Infra Red
NO	- Nitric Oxide
NO_x	- Nitrogen Oxides
NO_2	- Nitrogen Dioxide
O_2	- Oxygen
O_3	- Ozone
PEMS	- Predictive Emission Monitoring System
PM	- Particulate matter
PM_{10}	- Particulate matter <10 microns
ppb	- Parts per billion by volume
ppm	- Parts per million by volume
PS	- Performance Specification
QA	- Quality Assurance
QC	- Quality Control
RA	- Relative Accuracy
RATA	- Relative Accuracy Test Audit
RCA	- Relative Correlation Audit
RM	- Reference Method
RRA	- Relative Response Audit
SD	- Span Drift
SO_x	- Sulfur Oxides
SO_2	- Sulfur Dioxide
SVA	- Sample Volume Audit
SVOC	- Semi-Volatile Organic Compounds

THC	- Total Hydrocarbons
TM	- Test Method
TRS	- Total Reduced Sulfur
TSP	- Total Suspended Particulates
UD	- Upscale Drift
USEPA	- United States Environmental Protection Agency
UV	- Ultra Violet
VOC	- Volatile Organic Compounds
ZD	- Zero Drift

5.2 Practical Quantitation Limit (PQL)

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

5.3 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.

5.4 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.

5.5 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'.

5.6 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.

5.7 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 - No 6 Kiln Stack

Client:	Boral Cement (New Berrima)
Job Number:	RSN12026

Sampling Date:	31/07/2012	dd/mm/yyyy
Sampling Start Time:	11:47	hh:mm
Sampling Finish Time:	12:51	hh:mm
Average Stack Temperature:	104	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	14	%
Average Dry Gas Density	0.94	kg/m^3
Average Dry Gas Molecular Weight	31	g/g-mole
Dry Standard Flow Rate:	7256	dscm/min

Analyte - USEPA Method 3A	Concentration		Method Detection Limit		Code	Emission Rate	
Carbon Dioxide	18.9	%	0.10	%	D	N/A	
Oxygen	9.1	%	0.10	%	D	N/A	

Analyte - USEPA Method 10	Concentration		Method Detection Limit		Code	Emission Rate	
Carbon Monoxide	562	mg/dscm	1.3	mg/dscm	D	245	kg/hr
Carbon Monoxide	450	ppm	1.00	ppm	D	68	g/sec

Analyte - USEPA Method 7E	Concentration		Method Detection Limit		Code	Emission Rate	
Nitric Oxide	-	mg/dscm	-	mg/dscm		-	kg/hr
Nitrogen Dioxide	-	mg/dscm	-	mg/dscm		-	kg/hr
Nitrogen Oxides (as NO2)	747	mg/dscm	2.1	mg/dscm	D	325	kg/hr
Nitric Oxide	-	ppm	-	ppm		-	g/sec
Nitrogen Dioxide	-	ppm	-	ppm		-	g/sec
Nitrogen Oxides (as NO2)	364	ppm	1.00	ppm	D	90	g/sec

Summary Report: Combustion Gases - No 6 Kiln Stack

Client:	Boral Cement (New Berrima)
Job Number:	RSN12026

Sampling Date:	31/07/2012	dd/mm/yyyy
Sampling Start Time:	11:47	hh:mm
Sampling Finish Time:	12:51	hh:mm
Average Stack Temperature:	104	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	14	%
Average Dry Gas Density	0.94	kg/m^3
Average Dry Gas Molecular Weight	31	g/g-mole
Dry Standard Flow Rate:	7256	dscm/min

Analyte - USEPA Method 3A	Concentration		Method Detection Limit		Code	Emission Rate	
Carbon Dioxide	18.9	%	0.10	%	D	N/A	
Oxygen	9.1	%	0.10	%	D	N/A	

Analyte - USEPA Method 10	Concentration		Method Detection Limit		Code	Emission Rate	
Carbon Monoxide - Corrected @10% O2)	518	mg/dscm	1.2	mg/dscm	D	N/A	kg/hr
Carbon Monoxide - Corrected @10% O2)	414	ppm	0.92	ppm	D	N/A	g/sec

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)	687	mg/dscm	1.9	mg/dscm	D	N/A	kg/hr
Nitric Oxide - Corrected @10% O2)	-	ppm	-	ppm		N/A	g/sec
Nitrogen Dioxide - Corrected @10% O2)	-	ppm	-	ppm		N/A	g/sec
Nitrogen Oxides (as NO2) - Corrected @10% O2)	335	ppm	0.92	ppm	D	N/A	g/sec

Summary Report: USEPA Method 5 - No 6 Kiln Stack Compliance

Client:	Boral Cement (New Berrima)
Job Number:	RSN12026

	Run 1	Run 2	
Sampling Date:	6/06/2012	6/06/2012	dd/mm/yyyy
Sampling Start Time:	9:20	12:20	hh:mm
Sampling Finish Time:	11:20	14:20	hh:mm
Average Stack Temperature:	114	110	C
Average Stack Gas Velocity:	30	34	m/sec
Average Gas Moisture Content:	13	13	%
Dry Standard Flow Rate:	7109	8021	dscm/min
Dry Gas Density	0.89	0.90	kg/m^3
Dry Gas Molecular Weight	31	31	g/g-mole
Percent of Isokinetic Rate:	100	100	%

Summary Results - Run 1

Analyte	Concentration		Code	Emission Rate	
Total Particulates	21.5	mg/dscm	D	9.17	kg/hr
				2.55	g/sec

Method Detection Limit	0.105	mg/dscm

Summary Results - Run 2

Analyte	Concentration		Code	Emission Rate	
Total Particulates	20.5	mg/dscm	D	9.85	kg/hr
				2.74	g/sec

Method Detection Limit	0.0925	mg/dscm

Summary Results - Averages

Analyte	Concentration		Emission Rate	
Total Particulates	21.0	mg/dscm	9.51	kg/hr
			2.64	g/sec

Summary Report: USEPA Method 5 - No 6 Kiln Stack Compliance

Client:	Boral Cement (New Berrima)
Job Number:	RSN12026

	Run 1	Run 2	
Sampling Date:	6/06/2012	6/06/2012	dd/mm/yyyy
Sampling Start Time:	9:20	12:20	hh:mm
Sampling Finish Time:	11:20	14:20	hh:mm
Average Stack Temperature:	114	110	C
Average Stack Gas Velocity:	30	34	m/sec
Average Gas Moisture Content:	13	13	%
Dry Standard Flow Rate:	7109	8021	dscm/min
Dry Gas Density	0.89	0.90	kg/m^3
Dry Gas Molecular Weight	31	31	g/g-mole
Percent of Isokinetic Rate:	100	100	%

Summary Results - Run 1

Analyte	Concentration		Code	Emission Rate	
Total Particulates - Corrected to 10% Oxygen	19.8	mg/dscm	D	N/A	kg/hr
				N/A	g/sec
Method Detection Limit	0.1	mg/dscm			

Summary Results - Run 2

Analyte	Concentration		Code	Emission Rate	
Total Particulates - Corrected to 10% Oxygen	18.8	mg/dscm	D	N/A	kg/hr
				N/A	g/sec
Method Detection Limit	0.09	mg/dscm			

Summary Results - Averages

Analyte	Concentration		Emission Rate	
Total Particulates - Corrected to 10% Oxygen	19.3	mg/dscm	N/A	kg/hr
			N/A	g/sec

Summary Report: USEPA Method 8 - No 6 Kiln Stack

Client: Boral Cement (New Berrima)

Job Number: RSN12026

Summary Results

	Run 1	Run 2	
Sampling Date:	7/06/2012	7/06/2012	dd/mm/yyyy
Sampling Start Time:	13:30	15:20	hh:mm
Sampling Finish Time:	14:42	16:32	hh:mm
Average Stack Temperature:	104	105	C
Average Stack Gas Velocity:	29	29	m/sec
Average Stack Moisture Content:	13	13	%
Dry Standard Flow Rate:	7049	6981	dscm/min
Dry Gas Density	0.91	0.91	kg/m^3
Dry Gas Molecular Weight	31	31	g/g-mole
Percent of Isokinetic Rate:	99	101	%

Summary Results - Run 1

Analyte	Concentration (mg/dscm)	Code	Emission Rate (g/sec)	MDL (mg/dscm)
Sulfur Dioxide (SO2)	nd	nd (D,B)	<0.14	1.2
Sulfur Trioxide & Sulfuric Acid Mist (as SO3)	nd	nd	nd	0.05

Summary Results - Run 2

Analyte	Concentration (mg/dscm)	Code	Emission Rate (g/sec)	MDL (mg/dscm)
Sulfur Dioxide (SO2)	nd	nd (D,B)	<0.14	1.2
Sulfur Trioxide & Sulfuric Acid Mist (as SO3)	nd	nd	nd	0.05

Summary Results - Averages

Analyte	Concentration (mg/dscm)	Emission Rate (g/sec)
Sulfur Dioxide (SO2)	nd	<0.14
Sulfur Trioxide & Sulfuric Acid Mist (as SO3)	nd	nd

Summary Report: USEPA Method 8 - No 6 Kiln Stack

Client: Boral Cement (New Berrima)

Job Number: RSN12026

Summary Results

	Run 1	Run 2	
Sampling Date:	7/06/2012	7/06/2012	dd/mm/yyyy
Sampling Start Time:	13:30	15:20	hh:mm
Sampling Finish Time:	14:42	16:32	hh:mm
Average Stack Temperature:	104	105	C
Average Stack Gas Velocity:	29	29	m/sec
Average Stack Moisture Content:	13	13	%
Dry Standard Flow Rate:	7049	6981	dscm/min
Dry Gas Density	0.91	0.91	kg/m^3
Dry Gas Molecular Weight	31	31	g/g-mole
Percent of Isokinetic Rate:	99	101	%

Summary Results - Run 1

Analyte	Concentration (mg/dscm)	Code	Emission Rate (g/sec)	MDL (mg/dscm)
Sulfur Dioxide (SO2) - Corrected to 10% Oxygen	nd	nd (D,B)	<0.14	1.1
Sulfur Trioxide & Sulfuric Acid Mist (as SO3) - Corrected to 10% Oxygen	nd	nd	N/A	0.05

Summary Results - Run 2

Analyte	Concentration (mg/dscm)	Code	Emission Rate (g/sec)	MDL (mg/dscm)
Sulfur Dioxide (SO2) - Corrected to 10% Oxygen	nd	nd (D,B)	<0.14	1.1
Sulfur Trioxide & Sulfuric Acid Mist (as SO3) - Corrected to 10% Oxygen	nd	nd	N/A	0.05

Summary Results - Averages

Analyte	Concentration (mg/dscm)	Emission Rate (g/sec)
Sulfur Dioxide (SO2) - Corrected to 10% Oxygen	nd	<0.14
Sulfur Trioxide & Sulfuric Acid Mist (as SO3) - Corrected to 10% Oxygen	nd	N/A

Summary Report: USEPA Method 29 - No 6 Kiln Stack

Client: Boral Cement (New Berrima)

Job Number: RSN12026

Summary Results - Run 1

No 6 Kiln Stack

Sampling Date:	2/08/2012	dd/mm/yyyy
Sampling Start Time:	8:36	hh:mm
Sampling Finish Time:	9:48	hh:mm
Average Stack Temperature:	109	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	15	%
Dry Standard Flow Rate:	7018	dscm/min
Dry Gas Density	0.92	kg/m3
Dry Gas Molecular Weight	31	g/g-mole
Percent of Isokinetic Rate:	92	%

Analyte	Concentration mg/dscm	Code	Emission Rate g/sec	MDL mg/dscm
Ag	nd	nd	nd	0.0034
As	nd	nd (D)	nd	0.00074
Ba	0.0075	**D (B)**	0.00088	0.0014
Be	nd	nd	nd	0.00074
Cd	nd	nd (D)	nd	0.0014
Co	nd	nd (D)	nd	0.0034
Cr	nd	nd (D,B)	nd	0.00074
Cu	0.024	**D (B)**	0.0028	0.0014
Hg	0.0056	**D (B)**	0.00066	0.0002
Mn	0.071	**D (B)**	0.0083	0.00074
Ni	nd	nd (D)	nd	0.0067
P	nd	nd (D,B)	nd	0.066
Pb	nd	nd (D)	nd	0.013
Sb	nd	nd	nd	0.033
Se	nd	nd (D,B)	nd	0.00074
Sn	nd	nd (D,B)	nd	0.013
Tl	0.062	**D**	0.0073	0.013
V	nd	nd (D)	nd	0.0037
Zn	0.032	**D (B)**	0.0037	0.0034
Hazardous Substances	nd	nd (D,B)	nd	0.078
Cadmium & Thallium	0.062	**D**	0.0073	0.015

Summary Report: USEPA Method 29 - No 6 Kiln Stack

Client: Boral Cement (New Berrima)

Job Number: RSN12026

Summary Results - Run 2

No 6 Kiln Stack

Sampling Date:	2/08/2012	dd/mm/yyyy
Sampling Start Time:	10:28	hh:mm
Sampling Finish Time:	11:40	hh:mm
Average Stack Temperature:	107	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	15	%
Dry Standard Flow Rate:	6994	dscm/min
Dry Gas Density	0.92	kg/m3
Dry Gas Molecular Weight	31	g/g-mole
Percent of Isokinetic Rate:	96	%

Analyte	Concentration mg/dscm	Code	Emission Rate g/sec	MDL mg/dscm
Ag	nd	nd	nd	0.0030
As	nd	nd (D)	nd	0.00068
Ba	0.0037	**D (B)**	0.00043	0.0013
Be	nd	nd	nd	0.00068
Cd	nd	nd (D)	nd	0.0013
Co	nd	nd (D)	nd	0.0030
Cr	nd	nd (D,B)	nd	0.00068
Cu	0.0045	**D (B)**	0.00052	0.0013
Hg	0.0029	**D (B)**	0.00	0.00021
Mn	0.020	**D (B)**	0.0023	0.00068
Ni	nd	nd (D)	nd	0.0060
P	nd	nd (D,B)	nd	0.060
Pb	nd	nd (D)	nd	0.012
Sb	nd	nd	nd	0.030
Se	0.0017	**D (B)**	0.00020	0.00068
Sn	nd	nd (D,B)	nd	0.012
Tl	nd	nd (D)	nd	0.012
V	nd	nd (D)	nd	0.0034
Zn	0.011	**D (B)**	0.0013	0.0030
Hazardous Substances	nd	nd (D,B)	nd	0.071
Cadmium & Thallium	nd	nd (D)	nd	0.013

Summary Report: USEPA Method 29 - No 6 Kiln Stack

Client:	Boral Cement (New Berrima)
Job Number:	RSN12026

Result Averages

No 6 Kiln Stack

Sampling Date:	2/08/2012	dd/mm/yyyy
Overall Sampling Start Time:	8:36	hh:mm
Overall Sampling Finish Time:	11:40	hh:mm
Average Stack Temperature:	108	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	15	%
Average Dry Gas Density	0.92	kg/m3
Avergae Dry Gas Molecular Weight	31	g/g-mole
Avg. Dry Standard Flow Rate:	7006	dscm/min

Analyte	Concentration mg/dscm	Emission Rate g/sec
Ag	nd	nd
As	nd	nd
Ba	0.0056	0.00066
Be	nd	nd
Cd	nd	nd
Co	nd	nd
Cr	nd	nd
Cu	0.014	0.0016
Hg	0.0043	0.00050
Mn	0.046	0.0053
Ni	nd	nd
P	nd	nd
Pb	nd	nd
Sb	nd	nd
Se	0.00100	0.00012
Sn	nd	nd
Tl	0.034	0.0040
V	nd	nd
Zn	0.021	0.0025
Hazardous Substances	nd	nd
Cadmium & Thallium	0.034	0.0040

Note:

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

Summary Report: USEPA Method 29 - No 6 Kiln Stack

Client: Boral Cement (New Berrima)

Job Number: RSN12026

Summary Results - Run 1

No 6 Kiln Stack

Sampling Date:	2/08/2012	dd/mm/yyyy
Sampling Start Time:	8:36	hh:mm
Sampling Finish Time:	9:48	hh:mm
Average Stack Temperature:	109	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	15	%
Dry Standard Flow Rate:	7018	dscm/min
Dry Gas Density	0.92	kg/m3
Dry Gas Molecular Weight	31	g/g-mole
Percent of Isokinetic Rate:	92	%

Analyte	Concentration mg/dscm	Code	Emission Rate g/sec	MDL mg/dscm
Ag - Corrected to 10% Oxygen	nd	nd	N/A	0.0030
As - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.00067
Ba - Corrected to 10% Oxygen	0.0068	**D (B)**	N/A	0.0013
Be - Corrected to 10% Oxygen	nd	nd	N/A	0.00067
Cd - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.0013
Co - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.0030
Cr - Corrected to 10% Oxygen	nd	nd (D,B)	N/A	0.00067
Cu - Corrected to 10% Oxygen	0.021	**D (B)**	N/A	0.0013
Hg - Corrected to 10% Oxygen	0.0051	**D (B)**	N/A	0.0002
Mn - Corrected to 10% Oxygen	0.064	**D (B)**	N/A	0.00067
Ni - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.0060
P - Corrected to 10% Oxygen	nd	nd (D,B)	N/A	0.060
Pb - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.012
Sb - Corrected to 10% Oxygen	nd	nd	N/A	0.030
Se - Corrected to 10% Oxygen	nd	nd (D,B)	N/A	0.00067
Sn - Corrected to 10% Oxygen	nd	nd (D,B)	N/A	0.012
Tl - Corrected to 10% Oxygen	0.056	**D**	N/A	0.012
V - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.0034
Zn - Corrected to 10% Oxygen	0.029	**D (B)**	N/A	0.0030
Hazardous Substances - Corrected to 10%	nd	nd (D,B)	N/A	0.071
Cadmium & Thallium - Corrected to 10%	0.056	**D**	N/A	0.013

Summary Report: USEPA Method 29 - No 6 Kiln Stack

Client: Boral Cement (New Berrima)

Job Number: RSN12026

Summary Results - Run 2

No 6 Kiln Stack

Sampling Date:	2/08/2012	dd/mm/yyyy
Sampling Start Time:	10:28	hh:mm
Sampling Finish Time:	11:40	hh:mm
Average Stack Temperature:	107	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	15	%
Dry Standard Flow Rate:	6994	dscm/min
Dry Gas Density	0.92	kg/m3
Dry Gas Molecular Weight	31	g/g-mole
Percent of Isokinetic Rate:	96	%

Analyte	Concentration mg/dscm	Code	Emission Rate g/sec	MDL mg/dscm
Ag - Corrected to 10% Oxygen	nd	nd	N/A	0.0028
As - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.00061
Ba - Corrected to 10% Oxygen	0.0034	**D (B)**	N/A	0.0011
Be - Corrected to 10% Oxygen	nd	nd	N/A	0.00061
Cd - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.0011
Co - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.0028
Cr - Corrected to 10% Oxygen	nd	nd (D,B)	N/A	0.00061
Cu - Corrected to 10% Oxygen	0.0041	**D (B)**	N/A	0.0011
Hg - Corrected to 10% Oxygen	0.0027	**D (B)**	N/A	0.00019
Mn - Corrected to 10% Oxygen	0.018	**D (B)**	N/A	0.00061
Ni - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.0054
P - Corrected to 10% Oxygen	nd	nd (D,B)	N/A	0.054
Pb - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.011
Sb - Corrected to 10% Oxygen	nd	nd	N/A	0.027
Se - Corrected to 10% Oxygen	0.0015	**D (B)**	N/A	0.00061
Sn - Corrected to 10% Oxygen	nd	nd (D,B)	N/A	0.011
Tl - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.011
V - Corrected to 10% Oxygen	nd	nd (D)	N/A	0.0031
Zn - Corrected to 10% Oxygen	0.010	**D (B)**	N/A	0.0028
Hazardous Substances - Corrected to 10%	nd	nd (D,B)	N/A	0.064
Cadmium & Thallium - Corrected to 10%	nd	nd (D)	N/A	0.012

Summary Report: USEPA Method 29 - No 6 Kiln Stack

Client:	Boral Cement (New Berrima)
Job Number:	RSN12026

Result Averages

No 6 Kiln Stack

Sampling Date:	2/08/2012	dd/mm/yyyy
Overall Sampling Start Time:	8:36	hh:mm
Overall Sampling Finish Time:	11:40	hh:mm
Average Stack Temperature:	108	C
Average Stack Gas Velocity:	30	m/sec
Average Stack Moisture Content:	15	%
Average Dry Gas Density	0.92	kg/m3
Avergae Dry Gas Molecular Weight	31	g/g-mole
Avg. Dry Standard Flow Rate:	7006	dscm/min

Analyte	Concentration mg/dscm	Emission Rate g/sec
Ag - Corrected to 10% Oxygen	nd	N/A
As - Corrected to 10% Oxygen	nd	N/A
Ba - Corrected to 10% Oxygen	0.0051	N/A
Be - Corrected to 10% Oxygen	nd	N/A
Cd - Corrected to 10% Oxygen	nd	N/A
Co - Corrected to 10% Oxygen	nd	N/A
Cr - Corrected to 10% Oxygen	nd	N/A
Cu - Corrected to 10% Oxygen	0.013	N/A
Hg - Corrected to 10% Oxygen	0.0039	N/A
Mn - Corrected to 10% Oxygen	0.041	N/A
Ni - Corrected to 10% Oxygen	nd	N/A
P - Corrected to 10% Oxygen	nd	N/A
Pb - Corrected to 10% Oxygen	nd	N/A
Sb - Corrected to 10% Oxygen	nd	N/A
Se - Corrected to 10% Oxygen	0.00093	N/A
Sn - Corrected to 10% Oxygen	nd	N/A
Tl - Corrected to 10% Oxygen	0.031	N/A
V - Corrected to 10% Oxygen	nd	N/A
Zn - Corrected to 10% Oxygen	0.019	N/A
Hazardous Substances - Corrected to 10% Oxygen	nd	N/A
Cadmium & Thallium - Corrected to 10% Oxygen	0.031	N/A

Note:

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

Summary Report: AS4323.2 - No 6 Cement Mill Stack Duct A

Client: Boral Cement (New Berrima)

Job Number: RSN12026

	Run 1	Run 2	
Sampling Date:	6/06/2012	6/06/2012	dd/mm/yyyy
Sampling Start Time:	9:53	11:25	hh:mm
Sampling Finish Time:	11:08	12:40	hh:mm
Average Stack Temperature:	86	87	C
Average Stack Gas Velocity:	16	15	m/sec
Average Gas Moisture Content:	2.3	3.7	%
Dry Standard Flow Rate:	935	884	dscm/min
Percent of Isokinetic Rate:	98	103	%

Summary Results - Run 1

Analyte	Concentration		Code	Emission Rate	
Total Particulates	4.85	mg/dscm	D	0.272	kg/hr

Method Detection Limit	0.26	mg/dscm

Summary Results - Run 2

Analyte	Concentration		Code	Emission Rate	
Total Particulates	3.45	mg/dscm	D	0.183	kg/hr

Method Detection Limit	0.26	mg/dscm

Summary Results - Averages

Analyte	Concentration		Emission Rate	
Total Particulates	4.15	mg/dscm	0.230	kg/hr

Summary Report: AS4323.2 - No 6 Cement Mill Stack Duct B

Client:	Boral Cement (New Berrima)
Job Number:	RSN12026

	Run 1	Run 2	
Sampling Date:	6/06/2012	6/06/2012	dd/mm/yyyy
Sampling Start Time:	13:31	14:52	hh:mm
Sampling Finish Time:	14:34	15:55	hh:mm
Average Stack Temperature:	82	81	C
Average Stack Gas Velocity:	14	13	m/sec
Average Gas Moisture Content:	2.7	6.2	%
Dry Standard Flow Rate:	403	347	dscm/min
Percent of Isokinetic Rate:	100	104	%

Summary Results - Run 1

Analyte	Concentration		Code	Emission Rate	
Total Particulates	3.14	mg/dscm	D	0.0760	kg/hr

Method Detection Limit	0.33	mg/dscm

Summary Results - Run 2

Analyte	Concentration		Code	Emission Rate	
Total Particulates	5.50	mg/dscm	D	0.115	kg/hr

Method Detection Limit	0.37	mg/dscm

Summary Results - Averages

Analyte	Concentration		Emission Rate	
Total Particulates	4.32	mg/dscm	0.0950	kg/hr

Summary Report: AS4323.2 - No 6 Kiln Cooler Stack

Client:	Boral Cement (New Berrima)
Job Number:	RSN12026

	Run 1	Run 2	
Sampling Date:	4/06/2012	4/06/2012	dd/mm/yyyy
Sampling Start Time:	16:10	17:55	hh:mm
Sampling Finish Time:	17:30	19:15	hh:mm
Average Stack Temperature:	59	55	C
Average Stack Gas Velocity:	7.9	7.8	m/sec
Average Gas Moisture Content:	0.82	1.0	%
Dry Standard Flow Rate:	1729	1716	dscm/min
Percent of Isokinetic Rate:	101	100	%

Summary Results - Run 1

Analyte	Concentration		Code	Emission Rate	
Total Particulates	3.22	mg/dscm	D	0.334	kg/hr
Method Detection Limit	0.21	mg/dscm			

Summary Results - Run 2

Analyte	Concentration		Code	Emission Rate	
Total Particulates	4.54	mg/dscm	D	0.467	kg/hr
Method Detection Limit	0.22	mg/dscm			

Summary Results - Averages

Analyte	Concentration		Emission Rate	
Total Particulates	3.88	mg/dscm	0.400	kg/hr

Summary Report: AS4323.2 - No 7 Cement Mill Stack

Client:	Boral Cement (New Berrima)
Job Number:	RSN12026

	Run 1	Run 2	
Sampling Date:	5/06/2012	5/06/2012	dd/mm/yyyy
Sampling Start Time:	10:52	12:20	hh:mm
Sampling Finish Time:	11:52	13:20	hh:mm
Average Stack Temperature:	104	103	C
Average Stack Gas Velocity:	8.4	8.8	m/sec
Average Gas Moisture Content:	4.5	8.3	%
Dry Standard Flow Rate:	939	946	dscm/min
Percent of Isokinetic Rate:	99	104	%

Summary Results - Run 1

Analyte	Concentration		Code	Emission Rate	
Total Particulates	10.3	mg/dscm	D	0.583	kg/hr

Method Detection Limit	0.21	mg/dscm

Summary Results - Run 2

Analyte	Concentration		Code	Emission Rate	
Total Particulates	7.21	mg/dscm	D	0.410	kg/hr

Method Detection Limit	0.20	mg/dscm

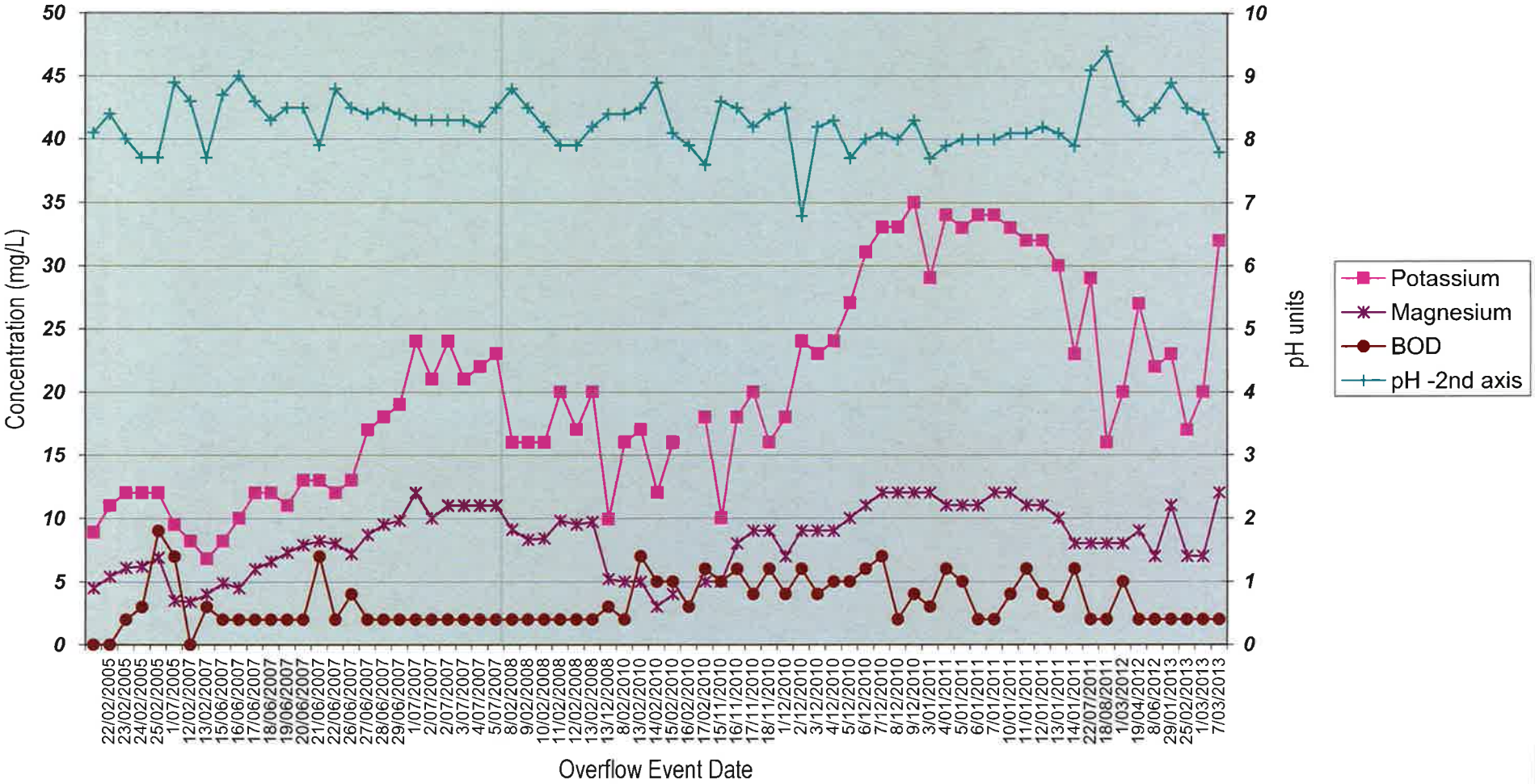
Summary Results - Averages

Analyte	Concentration		Emission Rate	
Total Particulates	8.78	mg/dscm	0.500	kg/hr

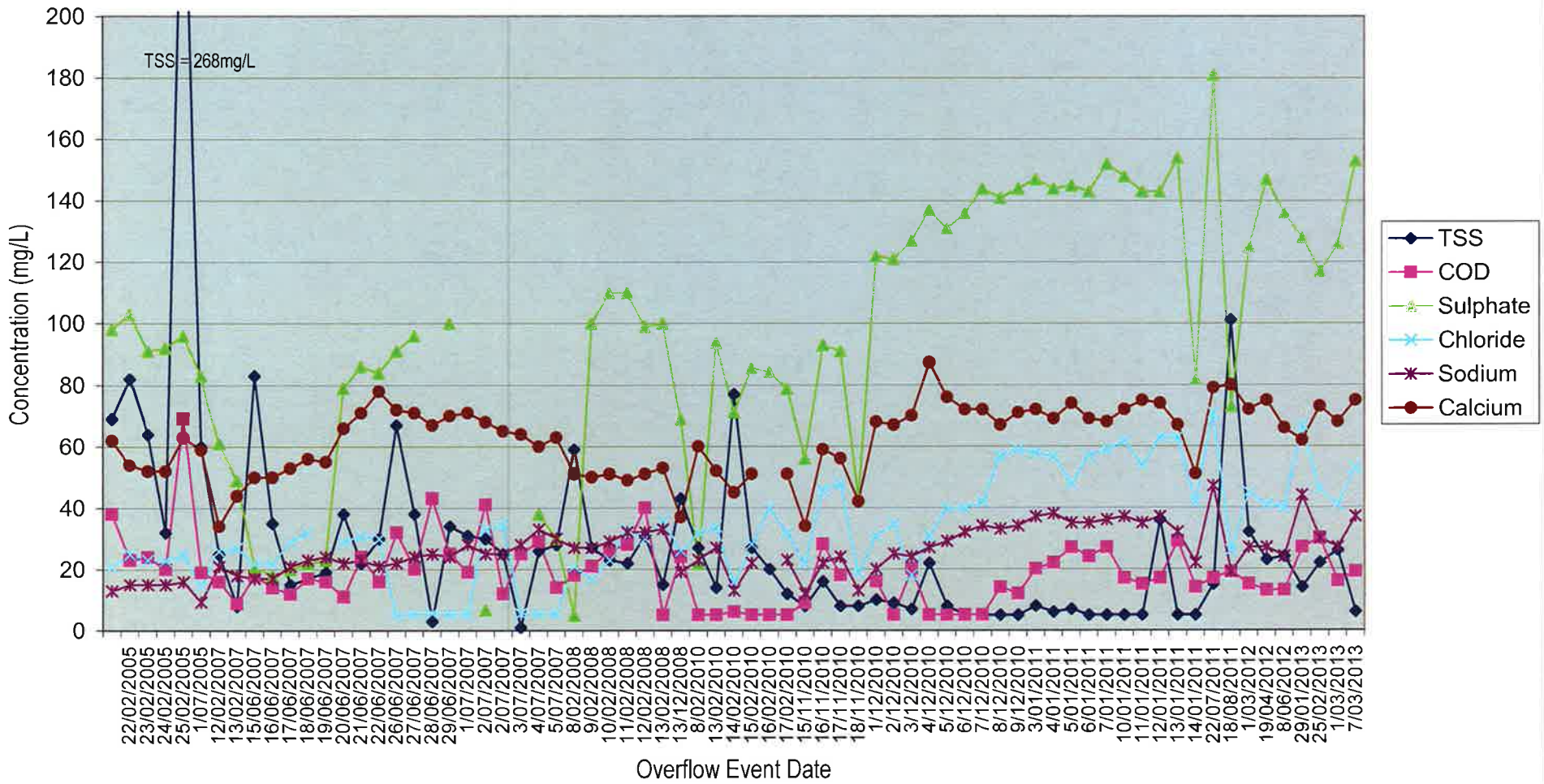
Attachment 5

Lake Quality Overflow Events

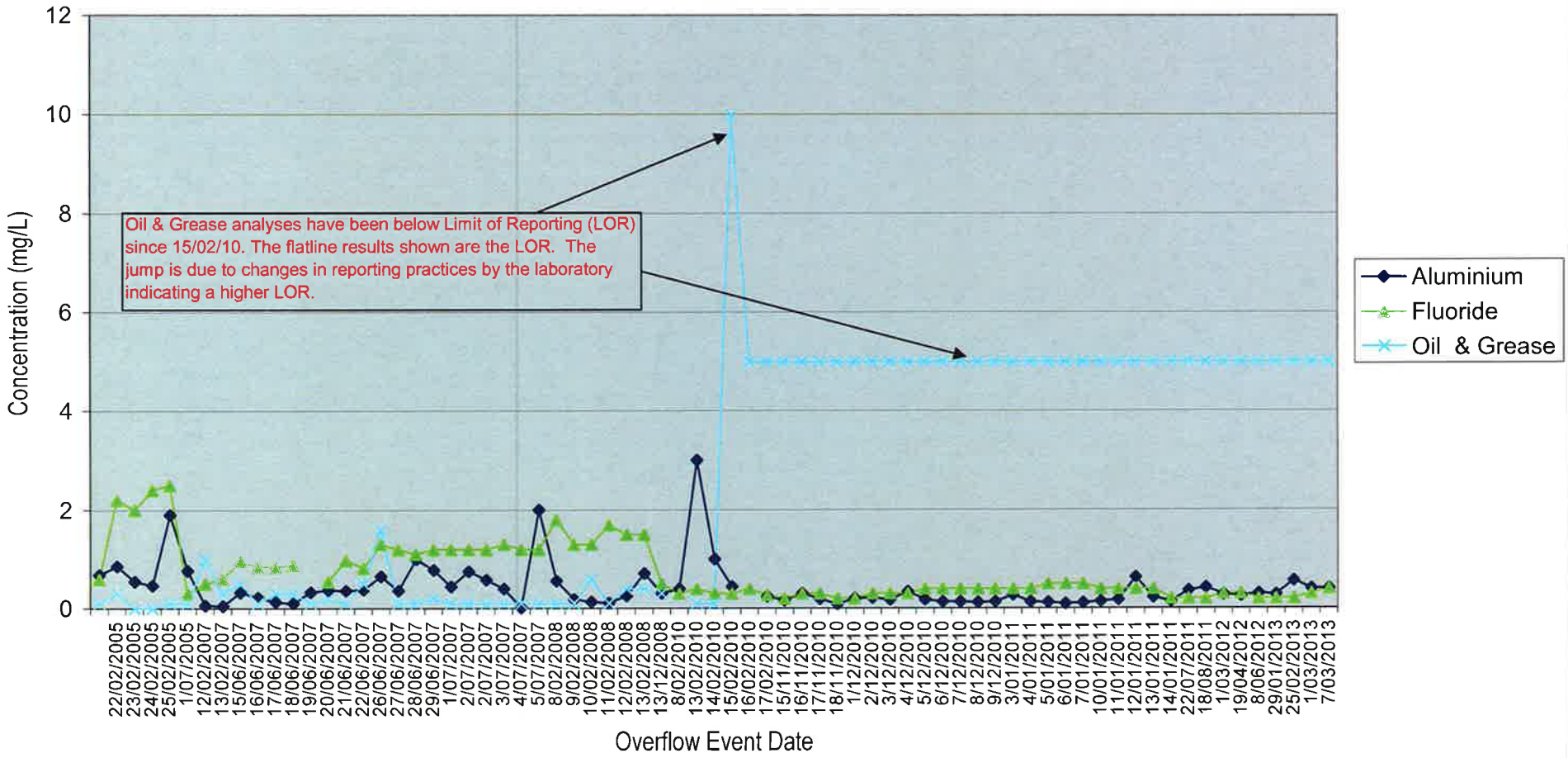
Attachment No 5 (a)
Lake Quality Overflow Events, 2005-2013



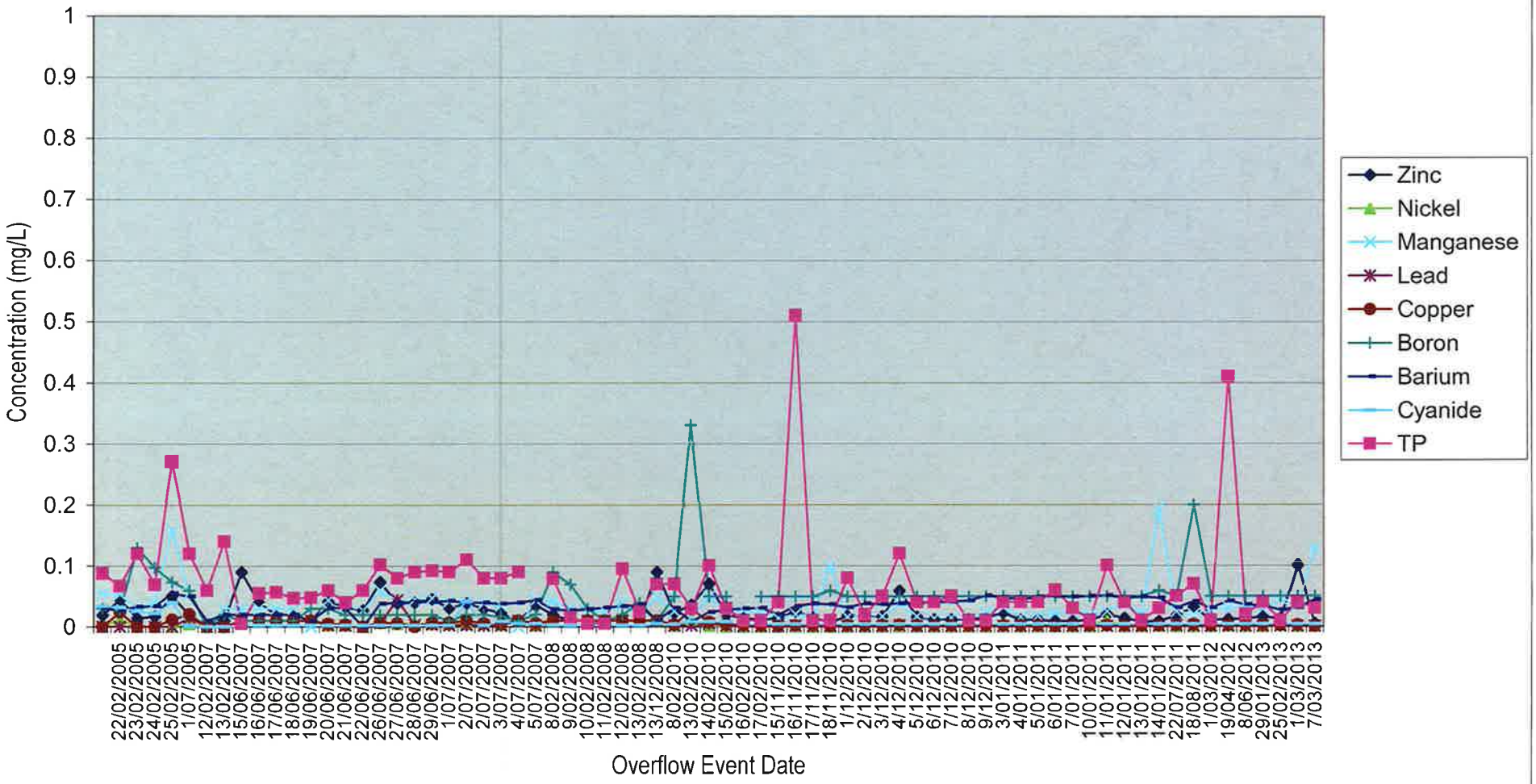
Attachment No 5 (b)
Lake Quality Overflow Events, 2005-2013



Attachment No 5 (c)
Lake Quality Overflow Events, 2005-2013



Attachment No 5 (d)
Lake Quality Overflow Events, 2005-2013



Attachment 6

Community Complaints
May 2012 – April 2013

Community Complaints LY 2012-13

	Date	Time / h	Complainant Name	Complainant Contact Details	Incident Details	Action Taken	Status	Area
1	5/06/2012	14:54	Mr Gordon John Byrne,	Stonington, Old Hume Hwy, Berrima	Neighbour sent an official complaint to the EPA (Ref No 137564) stating that '"wastewater" coming from Boral Cement works runs onto his property. Incident occured in heavy rain. There is no bunding around the area. KS received call from Craig Patterson from EPA at 4:30pm, when it was still raining.	KS went with Shift Fitter (BW) to the Black Dam and Dam was just starting to overflow into the neighboring paddock (Boral property). The pump was switched on immediately to lower dam level. BW explained that he had checked the water level 2 hours before, and it was still too low to start pump. It was agreed with EPA that we have to ensure that no runoff water from the stockpile area can enter surface waters uncontrolled. Suggestion: Raise dam wall and ensure that procedures are in place to check water level more frequently. Spoke to Craig Patterson of EPA (0407231675) on 5 June 5:30pm. Letter sent to EPA on 8 June. EPA followed up with a vist by Matthew Fuller on 26 June.	Closed	Water
2	14/06/2012	14:35	Tracey O'Neill	17 Sydney St, New Berrima, Tel 0409 771183	A new car got covered in sticky dust over the weekend while owners were away. Doesn't come off with wash. The car was parked in a carport protected to the south by a wall. Dust on car looked like cement dust.	Investigation into the cause indicated that the combination of atmospheric conditions (wind, morning mist) and current stockpile movements may have contributed to the increase in dust fallout. Resident was given car wash voucher and car detailing was organised.	Closed	Dust
3	23/07/2012	14:40			Residents noted constant noise since last Friday.	Since Friday wind direction shifted to south/southeasterly directions; it was also overcast. Plant was operating normally, both cement mills running. Monitoring was undertaken to determine if noise reduction is significant if kiln shell cooling fans are switched off under these conditions.	Closed	Noise
4	23/07/2012	14:40	Grace Lawrence	14 Brisbane St, New Berrima, Tel 4877 2441	Resident's car was covered in cement dust over the weekend. Car was parked outside.	Constant drizzle on Sunday combined with wind direction could have caused this condition. Stack emissions below 20mg/m3. Normal operation; some fugitive dust from cement silo and TS03 possible. Resident received car wash voucher.	Closed	Dust
5	25/07/2012	16:08	Grace Lawrence	14 Brisbane St, New Berrima, Tel 4877 2441	Resident's car was again covered in cement dust on Wednesday morning. Car was parked outside.	Damper test on preheater tower on Tuesday afternoon during SSW winds could have contributed to higher dust concentration in New Berrima. Additional clinker truck loading from loading shoot during this time, but no abnormal dust emission from this area observable.	Closed	Dust
6	1/08/2012	9:05	Steve and Kelly Frost	78 Taylor Av, New Berrima, Tel 0413328974	Resident's cars were parked outside for 5 weeks while owners were away. Cars are covered in cement dust which does not wash off easily. Resident asked for car wash voucher.	Weather conditions within the last weeks will have contributed to this incident. As resident is employed in the cement works, management has to decide if car wash coucher is appropriate in this case.	Closed	Dust

7	13/08/2012	18:00	Peter Moore	Adelaide St, New Berrima, Tel 0412036836	Residents cars were parked outside and covered with clinker dust on Fri and Sat evening.	Car hand wash and detailing was organised for two cars and caravan.	Closed	Dust
8	14/08/2012	9:30	Alex Makeham	Taylor Av (Garage), New Berrima, Tel 0407785473	Resident reported dust cloud coming from the cement works on the weekend starting Friday night. Stronger southerly winds carried dust into his shed and covered tools, benches, products etc. Car was covered in clinker dust.	Resident received car wash voucher. RCA on cooler stack incident.	Closed	Dust
9	14/08/2012	11:40	Grace Lawrence	14 Brisbane St, New Berrima, Tel 4877 2441	Residents car was parked outside and covered with clinker dust on Fri and Sat evening.	Car wash voucher was given to resident.	Closed	Dust
10	14/08/2012		Peter Moore	Adelaide St, New Berrima, Tel 0412036836	On Friday night/Sat his cars were covered with dust which he cant clean off his windscreen.	Requested Sam book in the cars and caravan to the local detailer, Daley Detailing in Moss Vale. Sam Donaldson contacted Daley detailsing advising of Peter's impending booking and organise for invoice to be sent to us.	Closed	Dust
11	15/08/2012	15:30	David Catton	4 Sydney St, Tel. 48771670; 4878 9567	Windows, Veranda and house covered in clinker dust	The cleaning of house and veranda was offered, but resident preferred to do it himself.	Closed	Dust
12	15/08/2012	15:50	Timothy Lancaster	22 Melbourne St, Tel.: 4877 1437	Residents cars were parked outside and covered with clinker dust on Fri and Sat evening. Resident mentioned that it was an unusual dust event and wondered how this happened.	Car hand wash and detailing was organised for three cars.	Closed	Dust
13	27/08/2012	9:30	Luke Hannan	53 Brisbane St; Tel: 0414 830 172	Resident complained because dust from last month would not come off car with normal hand wash. Cars were covered with gritty clinker dust.	Special hand wash and detailing was organised.	Closed	Dust
14	17/09/2012	9:30	Kristy Lee	38 Brisbane St; Tel.: 0487 349 797	Resident complained because dust from last month would not come off car with normal wash. Car was covered with clinker dust when inspected.	Special hand wash and detailing was organised.	Closed	Dust
15	3/10/2012	14:00	Tracey O'Neill	17 Sydney St; 0409771183	Resident saw dust cloud from stack from Hume Highway	Kiln stop caused by power dip resulting in ESP trip.	Closed	Dust
16	25/10/2012		Grace Lawrence; Sue Wallace	12 and 14 Brisbane St, New Berrima, Tel 4877 2441	Excess dust on cars on Monday and Tuesday	No action taken, no car wash wouchers issued, just noted the complaint as requested.	Closed	Dust
17	25/10/2012		Grace Lawrence; Sue Wallace	12 and 14 Brisbane St, New Berrima, Tel 4877 2441	Quite a lot more noise than normal on Monday night.	Grace asked if we had a shut going and I explained yes and that the kiln had gone back on around about the same time as when she had noticed the noise increase.	Closed	Noise
18	19/11/2012	9:00	Janice Gill	30 Sydney St; 4877 1094	Resident reported excessive noise at night that it is keeping her awake until at least 3am this morning. Noise source: refractory work on the preheater tower including banging, drilling and brick disposal on shoot.	Resident was contacted	Closed	Noise

19	11/12/2012	19:00	Neil Middleton	5 Sydney St; 0488767409	Resident reported dust fallout over the past two nights.	Resident was contacted; dust sample taken. Car voucher was issued.	Closed	Dust
20	15/12/2012	20:00	Sue Wallace	12 Brisbane St, New Berrima, Tel 0438 218 217	Resident reported drowning noise in the evening. Southerly winds and overcast conditions.	Doors of Cement Mill 6 and Raw Mill 7 were open at the time of the complaint. Plant controller closed both doors. Resident was contacted.	Closed	Noise
21	28/12/2012	19:00	Sue Wallace	12 Brisbane St, New Berrima, Tel 0438 218 217	Resident reported higher noise levels in the evening. Southerly winds; 14km/h. Normal plant conditions.	Doors were checked; doors of Raw Mill 6 were closed; no apparent difference noticed.	Closed	Noise
22	2/01/2013	17:30	Sue Wallace	dto	Resident reported loud droning noise coming from plant. The two cement mills have been off for the last two days.	Doors checked, but all doors were shut.	Closed	Noise
23	5/01/2013	22:50	Sue Wallace	dto	Resident reported loud droning noise coming from plant. All mills running. Wind changed shortly before to southerly.	Doors checked, but all doors were shut.	Closed	Noise
24	13/01/2013	20:00	Sue Wallace	dto	Resident reported loud droning noise coming from plant. Normal operating conditions. Southerly winds.	Doors checked; open raw mills doors were closed.	Closed	Noise
25	14/01/2013	15:00	Sue Wallace	dto	Resident reported loud droning noise coming from plant. All mills running. Southerly winds; 13.5 km/h.	Doors checked, but all doors were shut.	Closed	Noise
26	18/01/2013	22:00	Sue Wallace	dto	Resident reported noise coming from the plant. Shortly before the call a southerly moved in and changed the direction of the wind. Wind was then blowing across the plant toward the village possibly explaining why the noise level may have been higher than usual. Plant was running as normal with no abnormalities in regards to production or equipment.	Plant operatives were asked to check running plant for any adverse sound coming from equipment and reported nothing unusual.	Closed	Noise
27	6/02/2013	10:00	Grace Lawrence	14 Brisbane St, New Berrima, Tel 4877 2441	Resident reported more dust than usually on cars and windows, and therefore requested car wash vouchers.	Residents received car wash vouchers.	Closed	Dust
28	6/02/2013	10:00	Grace Lawrence	14 Brisbane St, New Berrima, Tel 4877 2441	Resident reported that noise levels seemed higher recently.	Plant is operating normally, but some nights with overcast conditions and southerly winds might have contributed to higher noise levels.	Closed	Noise
29	13/03/2013	17:00	Neil Middleton	5 Sydney St; 0488767409	Resident reported lime dust on car and house	Resident contacted and he was sure was limestone but we could not find any issues with limestone. Still there were issues with cement silos and wind was blowing E-SE at 20 km/h.	Closed	Dust
30	17/04/2013	14:30	Grace Lawrence	14 Brisbane St, New Berrima, Tel 4877 2441	Complaint about a heavy film of cement dust on the car	Car wash woucher offered.	Closed	Dust
31	17/04/2013	14:30	Grace Lawrence	14 Brisbane St, New Berrima, Tel 4877 2441	Complaint about the plant being a bit more noisy than normal	Plant checked - operation at normal levels.	Closed	Noise

Attachment 7

Statement of Environmental Effects

for the period of
May 2012 – April 2013

Attachment No 7

Kiln 6 Upgrade Project – Statement of Environmental Effects Comparison of Predicted Impacts Vs Actual Impact

An assessment of predicted environmental impacts versus actual environmental impacts for the Kiln 6 Upgrade Project is provided below.

Predicted Impact	Actual Impact
There will be no significant effect on the frequency of overflows to Stony Creek and hence the Wingecarribee River from Lake Quality - *overflows are expected to occur no more than three times per year on average.*	2005 / 2006 - 1 overflow event (1 day) 2006 / 2007 - 1 overflow event (2 days) 2007 / 2008 - 4 overflow events (8 days; 4 days; 4 days; 5 days) 2008 / 2009 - 1 overflow event (1 day) 2009 / 2010 - 2 overflow events (1 day; 5 days) 2010/2011- 4 overflow events (3 days; 10 days; 3 days; 13 days) 2011/2012 - 4 overflow events (1 day; 4 days; 28 days; 4 days) 2012/2013 - 5 overflow events (18 days, 1 day and 11 days with two short overflow stops which turned it into 3 events) *Average – 2.75 events per year (5.8 days per event)* The actual impact reflects the predicted impact, given that the weather cycle has changed to wet in the recent years.
Based on extant data, overflows do not have the capacity to significantly affect water quality in the River	Water quality monitoring data post-upgrade is consistent with the data detailed in the SEE, upon which this prediction was based. It is therefore considered likely that this prediction is being achieved.
The visual impact of the tower will be minimised by the selection of building materials and colours to ensure that the new tower looks similar to the existing one.	The tower was constructed with an appearance similar to the existing tower.
The new baghouse will reduce dust emissions below 30 mg/m3.	Continuous monitoring data confirms that dust emissions (24-hour average) are generally less than 30mg/m^3.
The coal required to produce 1kg of clinker will fall from 0.16kg pre-upgrade to 0.147kg post-upgrade (an 8% reduction).	In 2003 (pre-upgrade) 206,138 tonnes of coal and coal fines was used to produce 1,147,988 tonnes of clinker– equating to 0.18kg of coal per kg of clinker produced. In 2012/2013 licence year 224,587 tonnes of coal was used to produce 1,290,449 tonnes of clinker – equating to 0.174 kg of coal per kg of clinker produced. This is a 3.3% reduction of specific coal consumption rather than the 8% reduction predicted in the SEE. The reason for this situation may relate to coal of lower quality (lower calorific value) being mined in the recent years.

The upgrade will result in a reduction of coal use by 61,134 tonnes per year.	The basis for the 61,134 TPA reduction expected in the SEE is unclear because the expected 8% reduction in specific coal consumption from 2003 rate should only equate to about a reduction of 16,490 tonnes per year, for coal of same quality. Based on 2003 production figures, the 2012/2013 coal use data are 9 % higher than the pre-upgrade consumption. The reason for this situation may relate to coal of lower quality being mined in recent years.
The upgrade will result in a reduction of approximately 18 million kWh of electricity per year.	Pre-upgrade, Kiln 5 electrical efficiency was 81.64 kWh/tonne of clinker and Kiln 6 electrical efficiency was 61.47 kWh/tonne of clinker. Based on production of 980,000 tonnes for Kiln 6 and 395,000 tonnes for Kiln 5, the total electrical consumption was approximately 92.5 million kWh (the base case). In 2012/2013 licence year, Kiln-related electricity consumption was 84.5 M kWh and electrical efficiency was 65.5 kWh/tonne of clinker. Based on a production of 1.375 Mt of clinker (as for the base case), Kiln 6 would have consumed approximately 90 million kWh. The upgrade therefore resulted in a reduction of approximately 2.5 million kWh of electricity per year for the base case, which is lower than predicted.
The upgrade will result in a reduction in CO_2 emission of 139,875 tonnes per annum (123,736 tonnes from reduced coal usage, 16,139 tonnes from reduced electricity consumption).	The avg. CO_2-e emission value per tonne of clinker produced was 0.891 in the financial year 2012/2013 to end April (it was 1.057 t/t and 0.987 t/t in 2010-11 and 2011-12, respectively).
Coal deliveries will result in approximately 28 truck movements per day (for a total annual tonnage of 198,000 tonnes).	The annual coal usage in 2012/2013 licence year was 224,587 tonnes. Based on a truck capacity of 30 tonnes, this is equivalent to ~7,500 truck loads per year. Based on a 6-day working week this equates to 24 truck loads per day. The results are better than predicted.
Up to two train movements per day will be required to out load 0.2Mtpa of clinker and 0.55Mtpa of cement.	A total of 129,581 tonnes of clinker, and 470,088 tonnes of cement were moved by rail in the licence year 2012/13. Based on a capacity of 1,800 tonnes per train this equates to about 333 trains per year. This is less than the 2 per day estimated in the SEE, based on a 6-day week. Rail movements were predicted to account for the out loading of 0.75Mtpa of product per year. In the licence year 2012/13 rail movements accounted for 0.60 Mtpa of product out loaded from the site. This reflects current market conditions and customer requirements, which vary from year to year.

Approximately 50 truck movements per day (from Monday to Saturday) will transport 0.55Mtpa of cement from the site.	In the licence year 2012/13 a total of 640,497 tonnes of cement were despatched from site by truck. Based on a capacity of 30 tonnes per truck this equates to 21,350 truck loads. The site therefore had approximately 68 truck movements per day (Monday to Saturday), which is over 30% higher than the 50 truck movements predicted. Additionally the site transported 216,553 tonnes of clinker from site by truck adding another 23 truck loads per day. This reflects current market conditions and customer requirements, which vary from year to year.