



**Boral Construction Materials  
Materials Technical Services**

Unit 4, 3-5 Gibbon Road  
Baulkham Hills NSW 2153 Australia  
PO Box 400, Winston Hills NSW 2153

T: +61 (02) 9624 9900  
F: +61 (02) 9624 9999

www.boral.com.au

**TEST REPORT**

**CLIENT:** XYPEX AUSTRALIA  
**Address:** 190 Toongabbie Road, Girraween, NSW 2145

**FILE NO:** 256/20

**LAB SAMPLE NO:** 242846

**DATE RECEIVED:** 30/07/2020

**REQUEST No:** 90588

**SAMPLE IDENTIFICATION:** Ecotec Silica Fume – 2020 – SA – 0205A

**IDENTIFICATION OF CEMENT USED:** Boral Cement SL Berrima Ref. No. 211-903-368-Mar 2019

**TEST METHOD:** AS3583: Methods of test for supplementary cementitious materials for use with Portland Cement

PROPERTY	DATE TESTED	RESULT	TEST METHOD
Relative density	05/08/2020	2.33	AS 3583.5
Relative water requirement	27/08/2020	112%	AS 3583.6
Relative strength 7days (accelerated)	03/09/2020	116%	AS 3583.6
Relative strength 28days (standard)	24/09/2020	104%	AS 3583.6

**Note:**

- Sample supplied by the client and tested as received.

Shaun Guthridge, Mat. File, File



Approved Signatory Julius C. Alvaro Julius Alvaro  
Date 25/09/2020 Serial No. CEM90588.JA.7

Accredited for compliance with ISO/IEC 17025 - Testing  
This report shall not be reproduced except in full without the approval of the Boral MTS Laboratory  
Test results in this Test Report relate only to the samples tested

NATA Accredited Laboratory

Number: 547



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**TEST REPORT**

**CLIENT:** XYPEX AUSTRALIA

**FILE NO:** 256/20

**ADDRESS:** 190 Toongabbie Road, Girraween, NSW 2145

**REQUEST NO:** 90588

**LAB SAMPLE NO:** 242846

**SOURCE OF SAMPLE:** Unknown

**DATE RECEIVED:** 30/07/2020

**SAMPLE IDENTIFICATION:** Ecotec Silica Fume – 2020 – SA – 0205A

**IDENTIFICATION OF CEMENT USED:** Boral Cement SL Berrima – Ref. 2019

**TEST METHOD:** ASTM C-1240 Use of Silica Fume as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar & Grout

**Accelerated Pozzolanic Strength Activity Index With Portland Cement - ASTM C1240**

**Date Cast:** 11/08/2020

**Date Crushed:** 18/08/2020 @ 7 Days

**Results:** Accelerated Pozzolanic Strength Activity Index:  
Control Mix Strength:  
Test Mix Strength:

108% @ 7 Days  
37.0 MPa  
39.9 MPa

**Note:**

Test mix used 242 mls of water and 1.8 grams of Dry Water Reducer (1000 NT from BASF) to obtain a flow of 106%.

**Note:**

- Sample supplied by the client and tested as received.

Shaun Guthridge, Mat. File, File



Approved Signatory

*Julius C. Alvaro*

Julius Alvaro

Date 25/09/2020

Serial No. CEM90588.JA.8

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**TEST REPORT**

**CLIENT:** XYPEX AUSTRALIA

Address: 190 Toongabbie Road, Girraween, NSW 2145

**FILE NO:** 256/20

**REQUEST NO:** 90588

**LAB. SAMPLE NO:** 242846

**SOURCE OF SAMPLE:** Unknown

**DATE RECEIVED:** 30/07/2020

**SAMPLE IDENTIFICATION:** Ecotec Silica Fume – 2020 – SA – 0205A

**TEST METHOD:** AS3583: Methods of test for supplementary cementitious materials for use with Portland Cement

PROPERTY	DATE TESTED	RESULT	TEST METHOD	AS3582 SPEC.
Moisture content	03/09/2020	0.4%	AS 3583.2	Max. 3.0%
Loss on ignition	03/09/2020	1.8%	AS 3583.3	Max. 6.0%
Relative Density	05/08/2020	2.33	AS 3583.5	

**Note:**

- Sample supplied by the client and tested as received.

Shaun Guthridge, Mat. File, File



Approved Signatory Julius C. Alvaro Julius Alvaro  
 Date 25/09/2020 Serial No. CEM90588.JA.9

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Number: 547



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**TEST REPORT**

**CLIENT:** XYPEX AUSTRALIA

**FILE NO:** 256/20

**ADDRESS:** 190 Toongabbie Road, Girraween, NSW 2145

**REQUEST NO:** 90588

**LAB. SAMPLE NO:** 242846

**SOURCE OF SAMPLE:** Unknown

**DATE RECEIVED:** 30/07/2020

**SAMPLE IDENTIFICATION:** Ecotec Silica Fume – 2020 – SA – 0205A

PROPERTY	DATE TESTED	RESULT	TEST METHOD
Bulk Density	18/08/2020	658 Kg/m <sup>3</sup>	AS3582.3 – Clause 7.1.7

**Notes:**

- Sample supplied by the client and tested as received.
- Test results in this Test Report relate only to samples tested.

Shaun Guthridge, Mat. File, File

*Julius C. Alvaro*

Julius Alvaro

25/09/2020



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**TEST REPORT**

CLIENT: XYPEX AUSTRALIA  
190, Toongabbie Road Girraween NSW 2145.

FILE No.: 256/20

PROJECT: Testing of Silica fume samples.

REQUEST No.: 90588

**TEST PROCEDURE:** Boral In House Method 7 – Based on AS2350.2 using XRF.

Laboratory Sample No.:	242846
Date Sampled:	Unknown
Date Received:	30/07/20
Sample Description:	Ecotec Silica Fume – 2020 SA – 0205A.
Field No.:	3

**TEST RESULTS**

Silicon as SiO <sub>2</sub> (%)	88.2
Sodium as Na <sub>2</sub> O (%)	1.20
Potassium as K <sub>2</sub> O (%)	2.34
Total Alkali content as Na <sub>2</sub> O equiv. (%)	2.7

Sample submitted by the Client.

A handwritten signature in black ink, appearing to read "Nanthini S".

Nanthini S  
Analytical Chemist  
03<sup>rd</sup> September 2020.  
S.Guthridge, Mat. File, File.



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**TEST REPORT**

CLIENT: XYPES AUSTRALIA  
190 Toongabbie Road, Girraween NSW 2145.

FILE No.:256/20

PROJECT: Testing of Silica Fume Sample.

REQUEST No.: 90588

**TEST PROCEDURE:**

**AS 3583.12 – 1991 – Determination of Available Alkali**

Laboratory Sample No.:	242846
Date Sampled:	Unknown
Date Received:	30/07/20
Date Tested:	02/09/20
Sample Description:	Ecotec Silica Fume 2020 SA – 0205A.
Field No.:	3

**TEST RESULTS:**

Sodium as Na <sub>2</sub> O (%)	0.18
Potassium as K <sub>2</sub> O (%)	0.20
Available Alkali (%)	0.3

Available Alkali (%) = Na<sub>2</sub>O (%) + (0.658 x K<sub>2</sub>O %)

**Note:**

- Samples submitted by the Client.
- Test results in this Test Report relate only to the samples tested
- This report shall not be reproduced except in full without the approval of the Boral MTS Laboratory.

S.Guthridge, Mat. File, File



Approved Signatory

Nanthini Selvadurai

CHEM90588.NS.7

Date 03-09-20

Serial No.

NATA Accredited Laboratory



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**TEST REPORT**

CLIENT: XYPES AUSTRALIA  
190 Toongabbie Road, Girraween NSW 2145.

FILE No.:256/20

PROJECT: Testing of Silica Fume samples

REQUEST No.: 90588

**TEST PROCEDURE:** AS 3583.13 – Determination of Chloride Ion content  
AS 3583.8 – Determination of Sulfuric Anhydride content

Laboratory Sample No.: 242846  
Date Sampled: Unknown  
Date Received: 30/07/20  
Date Tested: 07/08/20  
Sample Description: Ecotec Silica Fume 2020-  
SA -0205A  
Field No.: 3

**TEST RESULTS:**

Chloride as Cl<sup>-</sup> (%) 0.107  
Sulphate as SO<sub>3</sub> (%) 0.4

**Notes:**

- Samples submitted by the Client.
- Test results relate only to the samples tested
- This report shall not be reproduced except in full without the approval of the Boral MTS Laboratory.

S.Guthridge, Mat. File, File



Approved Signatory Nan Nanthini Selvadurai  
Date 03-09-20 Serial No. CHEM90588.NS.3

Accredited for compliance with ISO/IEC 17025

NATA Accredited Laboratory

Number: 9968



TriStar 3000 V6.08 A

Unit 1 Port 3

Serial #: 1586

Page 1

Sample: LSN 242846
Operator: MG
Submitter: Boral
File: Y:\...\TRISTAR\000-164.SMP

Started: 4/09/2020 11:13:50AM
Completed: 4/09/2020 4:22:26PM
Report Time: 4/09/2020 4:40:08PM
Warm Free Space: 17.5471 cm³ Measured
Equilibration Interval: 15 s
Sample Density: 1.000 g/cm³
Analysis Adsorptive: N2
Analysis Bath Temp.: 77.300 K
Sample Mass: 0.6320 g
Cold Free Space: 48.9697 cm³ Measured
Low Pressure Dose: None
Automatic Degas: No

Isotherm Tabular Report

Table with 5 columns: Relative Pressure (P/Po), Absolute Pressure (mmHg), Quantity Adsorbed (cm³/g STP), Elapsed Time (h:min), Saturation Pressure (mmHg). It contains 10 rows of data points.



TriStar 3000 V6.08 A

Unit 1 Port 3

Serial #: 1586

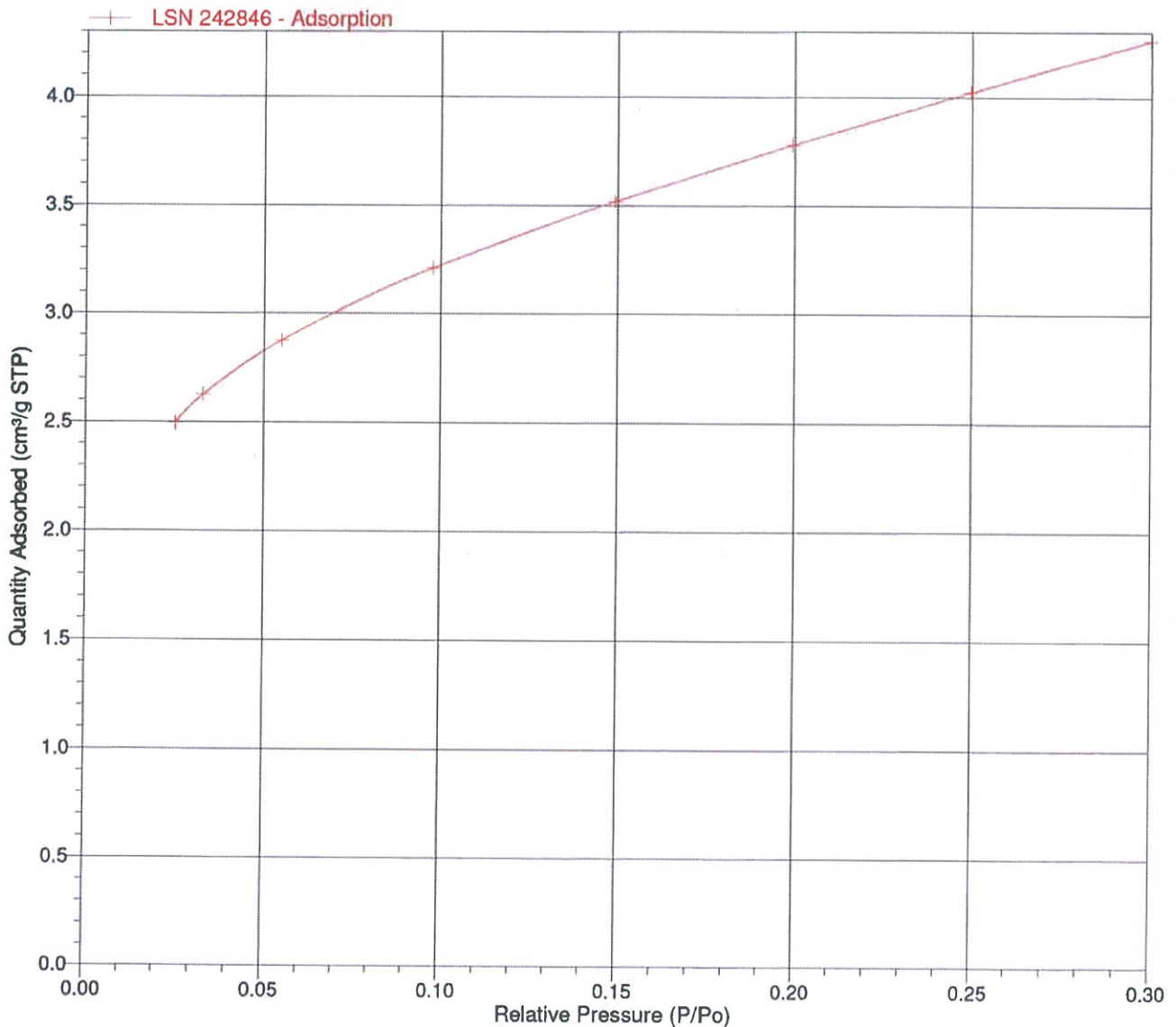
Page 2

Sample: LSN 242846  
Operator: MG  
Submitter: Boral  
File: Y:\...\TRISTAR\000-164.SMP

Started: 4/09/2020 11:13:50AM  
Completed: 4/09/2020 4:22:26PM  
Report Time: 4/09/2020 4:40:08PM  
Warm Free Space: 17.5471 cm<sup>3</sup> Measured  
Equilibration Interval: 15 s  
Sample Density: 1.000 g/cm<sup>3</sup>

Analysis Adsorptive: N<sub>2</sub>  
Analysis Bath Temp.: 77.300 K  
Sample Mass: 0.6320 g  
Cold Free Space: 48.9697 cm<sup>3</sup> Measured  
Low Pressure Dose: None  
Automatic Degas: No

### Isotherm Linear Plot





TriStar 3000 V6.08 A

Unit 1 Port 3

Serial #: 1586

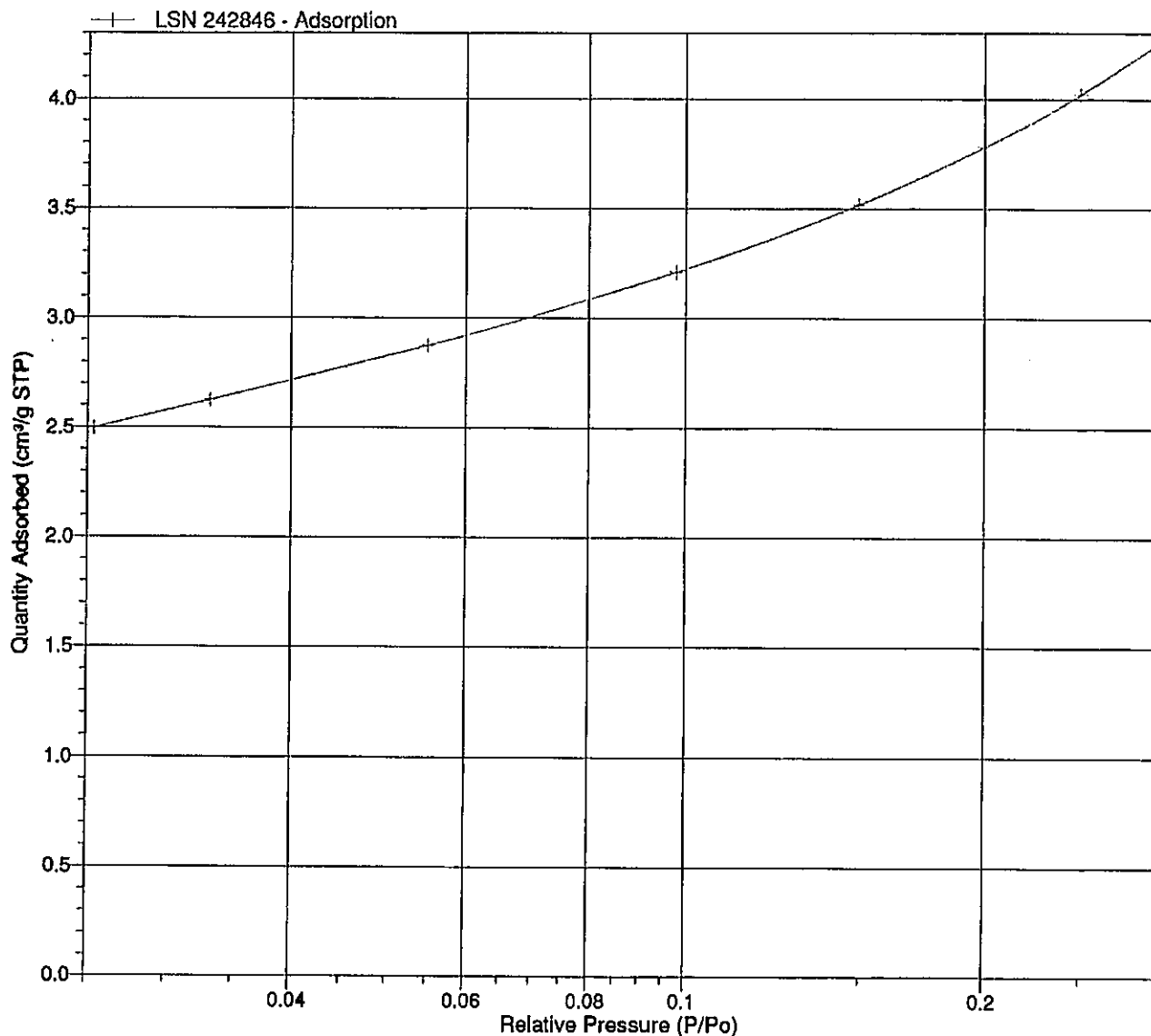
Page 3

Sample: LSN 242846  
Operator: MG  
Submitter: Boral  
File: Y:\...\TRISTAR\000-164.SMP

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Equilibration Interval: 15 s  
Sample Density: 1.000 g/cm<sup>3</sup>

Analysis Adsorptive: N<sub>2</sub>  
Analysis Bath Temp.: 77.300 K  
Sample Mass: 0.6320 g  
Cold Free Space: 48.9697 cm<sup>3</sup> Measured  
Low Pressure Dose: None  
Automatic Degas: No

### Isotherm Log Plot





TriStar 3000 V6.08 A

Unit 1 Port 3

Serial #: 1586

Page 4

Sample: LSN 242846
Operator: MG
Submitter: Boral
File: YA...\TRISTAR\000-164.SMP

Started: 4/09/2020 11:13:50AM
Completed: 4/09/2020 4:22:26PM
Report Time: 4/09/2020 4:40:08PM
Warm Free Space: 17.5471 cm³ Measured
Equilibration Interval: 15 s
Sample Density: 1.000 g/cm³

Analysis Adsorptive: N2
Analysis Bath Temp.: 77.300 K
Sample Mass: 0.6320 g
Cold Free Space: 48.9697 cm³ Measured
Low Pressure Dose: None
Automatic Degas: No

BET Surface Area Report

BET Surface Area: 13.4959 ± 0.1031 m²/g
Slope: 0.320147 ± 0.002432 g/cm³ STP
Y-Intercept: 0.002411 ± 0.000403 g/cm³ STP
C: 133.804331
Qm: 3.1002 cm³/g STP
Correlation Coefficient: 0.9999135
Molecular Cross-Sectional Area: 0.1620 nm²

Table with 3 columns: Relative Pressure (P/Po), Quantity Adsorbed (cm³/g STP), and 1/[Q(Po/P - 1)]



TriStar 3000 V6.08 A

Unit 1 Port 3

Serial #: 1586

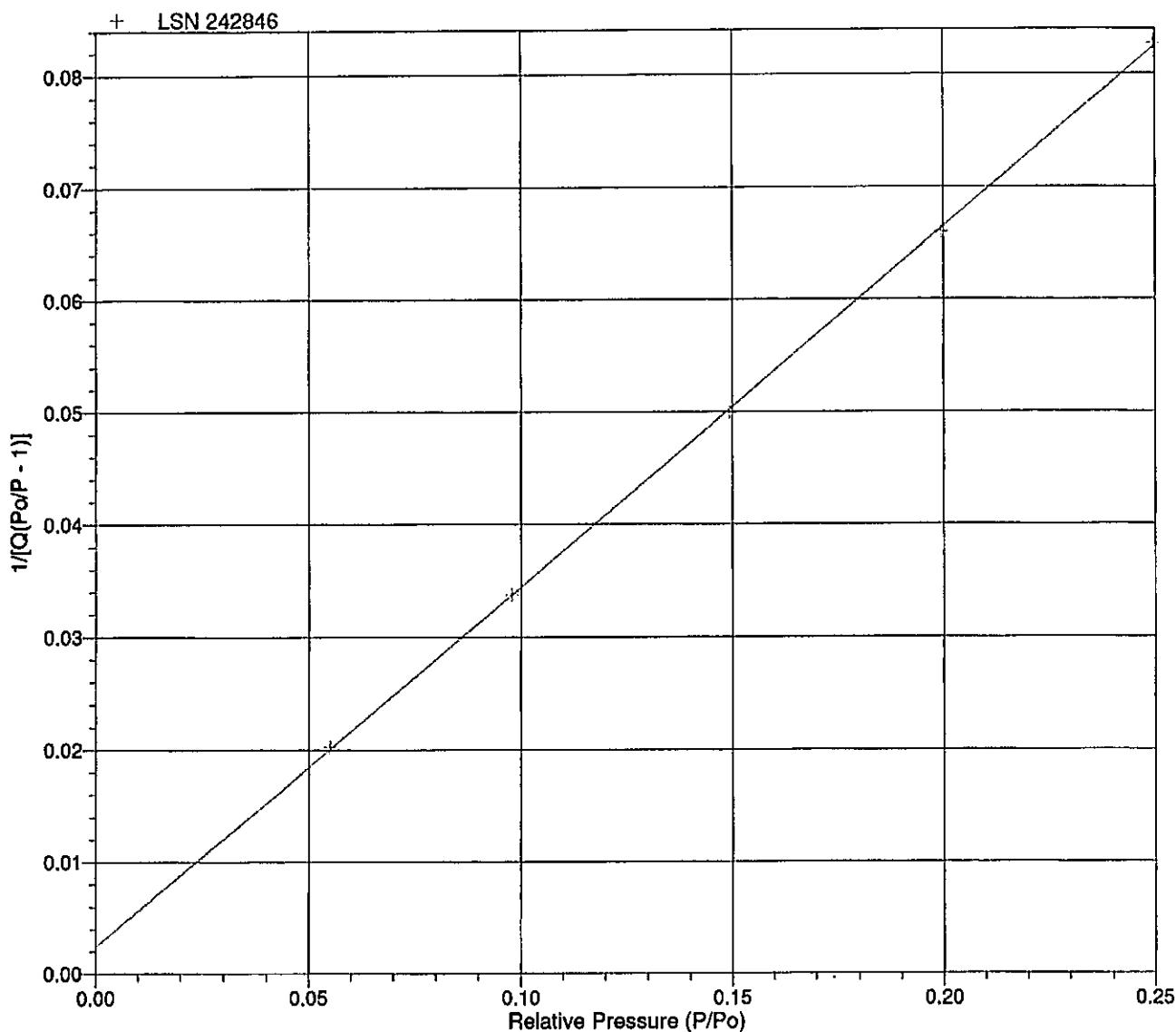
Page 5

Sample: LSN 242846  
Operator: MG  
Submitter: Boral  
File: Y:\...\TRISTAR\000-164.SMP

Started: 4/09/2020 11:13:50AM  
Completed: 4/09/2020 4:22:26PM  
Report Time: 4/09/2020 4:40:08PM  
Warm Free Space: 17.5471 cm<sup>3</sup> Measured  
Equilibration Interval: 15 s  
Sample Density: 1.000 g/cm<sup>3</sup>

Analysis Adsorptive: N<sub>2</sub>  
Analysis Bath Temp.: 77.300 K  
Sample Mass: 0.6320 g  
Cold Free Space: 48.9697 cm<sup>3</sup> Measured  
Low Pressure Dose: None  
Automatic Degas: No

BET Surface Area Plot





TriStar 3000 V6.08 A

Unit 1 Port 3

Serial #: 1586

Page 6

Sample: LSN 242846
Operator: MG
Submitter: Boral
File: Y:\...\TRISTAR\000-164.SMP

Started: 4/09/2020 11:13:50AM
Completed: 4/09/2020 4:22:26PM
Report Time: 4/09/2020 4:40:08PM
Warm Free Space: 17.5471 cm³ Measured
Equilibration Interval: 15 s
Sample Density: 1.000 g/cm³

Analysis Adsorptive: N2
Analysis Bath Temp.: 77.300 K
Sample Mass: 0.6320 g
Cold Free Space: 48.9697 cm³ Measured
Low Pressure Dose: None
Automatic Degas: No

Langmuir Surface Area Report

Langmuir Surface Area: 17.7219 ± 0.5635 m²/g
Slope: 0.245640 ± 0.007810 g/cm³ STP
Y-Intercept: 3.869435 ± 0.681698 mmHg·g/cm³ STP
b: 0.063482 1/mmHg
Qm: 4.0710 cm³/g STP
Correlation Coefficient: 0.997984
Molecular Cross-Sectional Area: 0.1620 nm²

Table with 3 columns: Pressure (mmHg), Quantity Adsorbed (cm³/g STP), and P/Q (mmHg·g/cm³ STP). It contains 6 rows of data points.



TriStar 3000 V6.08 A

Unit 1 Port 3

Serial #: 1586

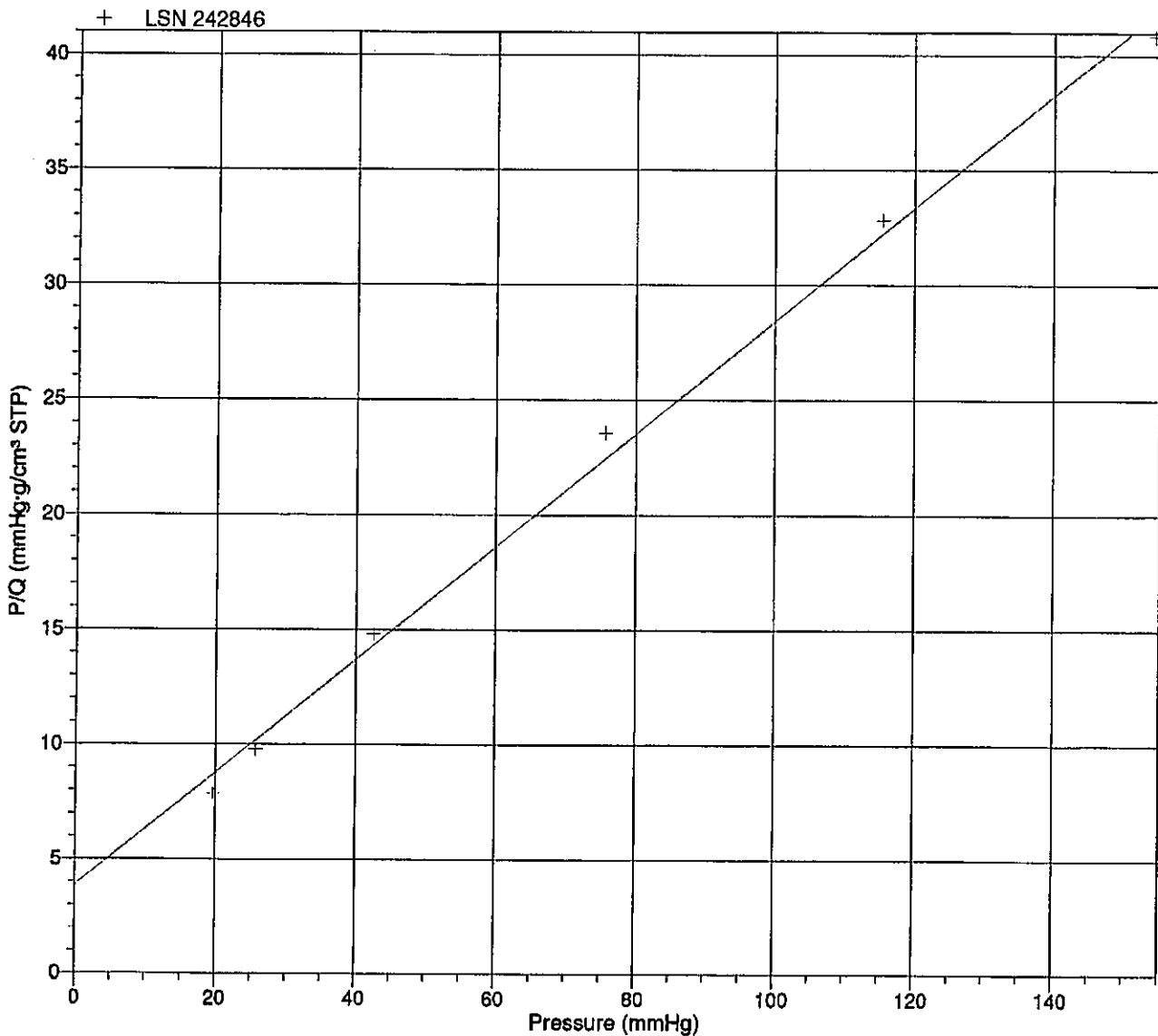
Page 7

Sample: LSN 242846  
Operator: MG  
Submitter: Boral  
File: Y:\...TRISTAR\000-164.SMP

Started: 4/09/2020 11:13:50AM  
Completed: 4/09/2020 4:22:26PM  
Report Time: 4/09/2020 4:40:08PM  
Warm Free Space: 17.5471 cm<sup>3</sup> Measured  
Equilibration Interval: 15 s  
Sample Density: 1.000 g/cm<sup>3</sup>

Analysis Adsorptive: N2  
Analysis Bath Temp.: 77.300 K  
Sample Mass: 0.6320 g  
Cold Free Space: 48.9697 cm<sup>3</sup> Measured  
Low Pressure Dose: None  
Automatic Degas: No

Langmuir Surface Area Plot





TriStar 3000 V6.08 A

Unit 1 Port 3

Serial #: 1586

Page 8

Sample: LSN 242846  
Operator: MG  
Submitter: Boral  
File: Y:\...\TRISTAR\000-164.SMP

Started: 4/09/2020 11:13:50AM  
Completed: 4/09/2020 4:22:26PM  
Report Time: 4/09/2020 4:40:08PM  
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Equilibration Interval: 15 s  
Sample Density: 1.000 g/cm<sup>3</sup>

Analysis Adsorptive: N2  
Analysis Bath Temp.: 77.300 K  
Sample Mass: 0.6320 g  
Cold Free Space: 48.9697 cm<sup>3</sup> Measured  
Low Pressure Dose: None  
Automatic Degas: No

### Summary Report

#### Surface Area

Single point surface area at P/Po = 0.249600026: 13.1358 m<sup>2</sup>/g

BET Surface Area: 13.4959 m<sup>2</sup>/g

Langmuir Surface Area: 17.7219 m<sup>2</sup>/g



A M U E L

BUREAU VERITAS MINERALS LABORATORIES

NATA Accreditation No. 626

ABN 30 008 127 802

Correspondence to:

PO Box 331

HUNTER REGION MC 2310

99 Mitchell Road

CARDIFF NSW 2285

Telephone: (02) 4902 4800

Facsimile: (02) 4902 4899

**CERTIFICATE OF ANALYSIS**

Contents :

1. Cover Page (1)
2. Authorisation Page (1)
3. Analysis Report Pages
4. Additional Reports - External (if applicable)

**Report No.** : L137993  
**Attention** : Cindy Liu  
**Client** : Bureau Veritas Asset Integ. & Reliability  
: Box 96  
: Hunter Region M C  
: NSW 2310  
**Samples** : 3  
**Reference/Order** : 2920308  
**Project** : SILICA FUME  
**Received Samples** : 04/09/20  
**Date Reported** : 24/09/20

**RESULTS**

This report relates specifically to the samples as received. Results relate to the source material only to the extent that the samples as supplied are truly representative of the sample source.

This report replaces any preliminary results issued. This report has been auto-authorised for PDF format.

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PLEASE SEE ATTACHED PAGES FOR RESULTS



BUREAU VERITAS MINERALS LABORATORIES

NATA Accreditation No. 626

ABN 30 008 127 802

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Correspondence to:

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PO Box 331

Telephone: (02) 4902 4800

HUNTER REGION MC 2310

Facsimile: (02) 4902 4899

This report has been authorised by –

**Robert Morris**  
Principal Chemist

**Phil Everson**  
Leading Technical Officer

**Scott Bradley**  
Senior Chemist – ICP

**Annette Poulton**  
Senior Chemist - XRF



A M U F I

Job Number : L137993

Client : Bureau Veritas Asset Integ.& Reliability

Reference/Order : 2920308

Project : SILICA FUME

Page 1 of 1

Analysis Report Pages

		Lab No	001	002	003
Analyte	Sample ID	DL	1	2	3
NQ519 - Determination of C & S-Leco IR Method					
Carbon	%	0.01	0.96	0.78	0.80

DL = Detection Limit

LNR = Samples Listed not Received

-- = Not Applicable

nd = <DL

db = Dry basis

\* = NATA accreditation does not cover the performance of this service.

**Sample Description Key (if req'd)**

001 ECOTEC SF2020-SA-0205A LSN242846

002 ECOTEC SF2020-SA-0205A LSN242847

003 ECOTEC SF2020-SA-0206 LSN243988

# Sietronics Pty Ltd

ANALYTICAL SPECIALISTS

40 Hoskins St Mitchell ACT 2911 | PO Box 695 Mitchell ACT 2911  
☎ (02) 6246 9299 • 📠 (02) 6241 5771 • 📧 [lab@sietronics.com.au](mailto:lab@sietronics.com.au)  
🌐 [www.sietronicslabservices.com.au](http://www.sietronicslabservices.com.au)

**Boral Material Technical Services**  
Unit 4, 3-5 Gibbon Rd,  
Baulkham Hills NSW 2153  
Attention: Muans Abdulnebe

Friday, 11 September 2020

Report Number: LS2216A

## Quantitative Analysis of Silica Material

### Introduction:

One sample of silica material was submitted for quantitative phase analysis using X-ray diffraction (XRD).

### Sampling & Preparation:

The sample supplied was said to be a grab sample from the bulk material. The sample was supplied in a powder form and analysed without further preparation. A spike of ZnO material was added to the sample to check for amorphous content.

### Analytical Method:

The XRD pattern was produced using a Bruker-AXS D2 XRD with copper radiation at 30 kV and 10 mA, over a range of 3 to 70°2θ, with a 0.02 degree step and 2 second per step count time. A 20% ZnO spike was added to the sample to calculate the amorphous content.

Identification of phases present was carried out using Bruker DIFFRAC.EVA Search/Match software and the ICDD PDF-2 database. The quantitative phase analysis was performed using SIROQUANT™ version 5 software.

### Results:

The XRD scan is attached. Note that the intensity of the peaks in an XRD pattern depend upon the crystallinity as well as the concentration of the phase. The Siroquant quantitative phase analysis are given in the following table(s):

	SPL ID:	LS2216-01
	Customer ID:	Ecotec SF-2020-SA-0205A LSN 242846
Phase Name/Formula	ICDD Ref	Weight %
Quartz; SiO <sub>2</sub>	46-1045	Trace
Hematite; Fe <sub>2</sub> O <sub>3</sub>	33-0664	≈ 2
Amorphous material	N/A	≈ 98

### Discussion:

The results of the analysis are summarised in the tables and scans attached. Results are given as % of the total.

The low level of the impurity compounds leads to some uncertainty in the quantitative results reported above – from the XRD pattern, there certainly appears to be a trace of these compounds present.

Quantification of the crystalline mineral phases was performed with the SIROQUANT™ software package. This software uses the full-profile Rietveld method of refining the profile of the calculated XRD pattern against the profile of the measured XRD pattern. The total calculated pattern is the sum of the calculated patterns of the individual phases. Results are given as weight % of the total.

Corrections are incorporated in the process that allows for a more accurate description of the mineral's contribution to the measured pattern and to allow for variation due to atomic substitution, layer disordering, preferred orientation, and other factors that affect the acquisition of the XRD scan.

The limitations of qualitative XRD analysis are as follows:

1. There is a limit of detection of 1-2% on most crystalline phases.
2. Where there exist multiple phases, overlap of diffracted reflections can occur, thus rendering some ambiguity into the interpretation.
3. Some phases cannot be unambiguously identified as they are present in minor or trace amounts.

The limitations of quantitative XRD analysis by a full-profile Rietveld method are as follows:

1. The limitations for qualitative XRD analysis all apply
2. The method as described is standardless as it relies solely on the published crystallographic data available for each phase. Some crystallographic data may not exactly describe the phases present.
3. Results are normalized to 100% and do not include estimates of unidentified or amorphous materials unless otherwise stated.

Potential limitations on the quantitative analysis can also include effects from varying crystallinity of each mineral, their preferred orientation in the sample preparation and their differing absorption of the X-rays.

**Sietronics Pty Limited - Canberra Office**

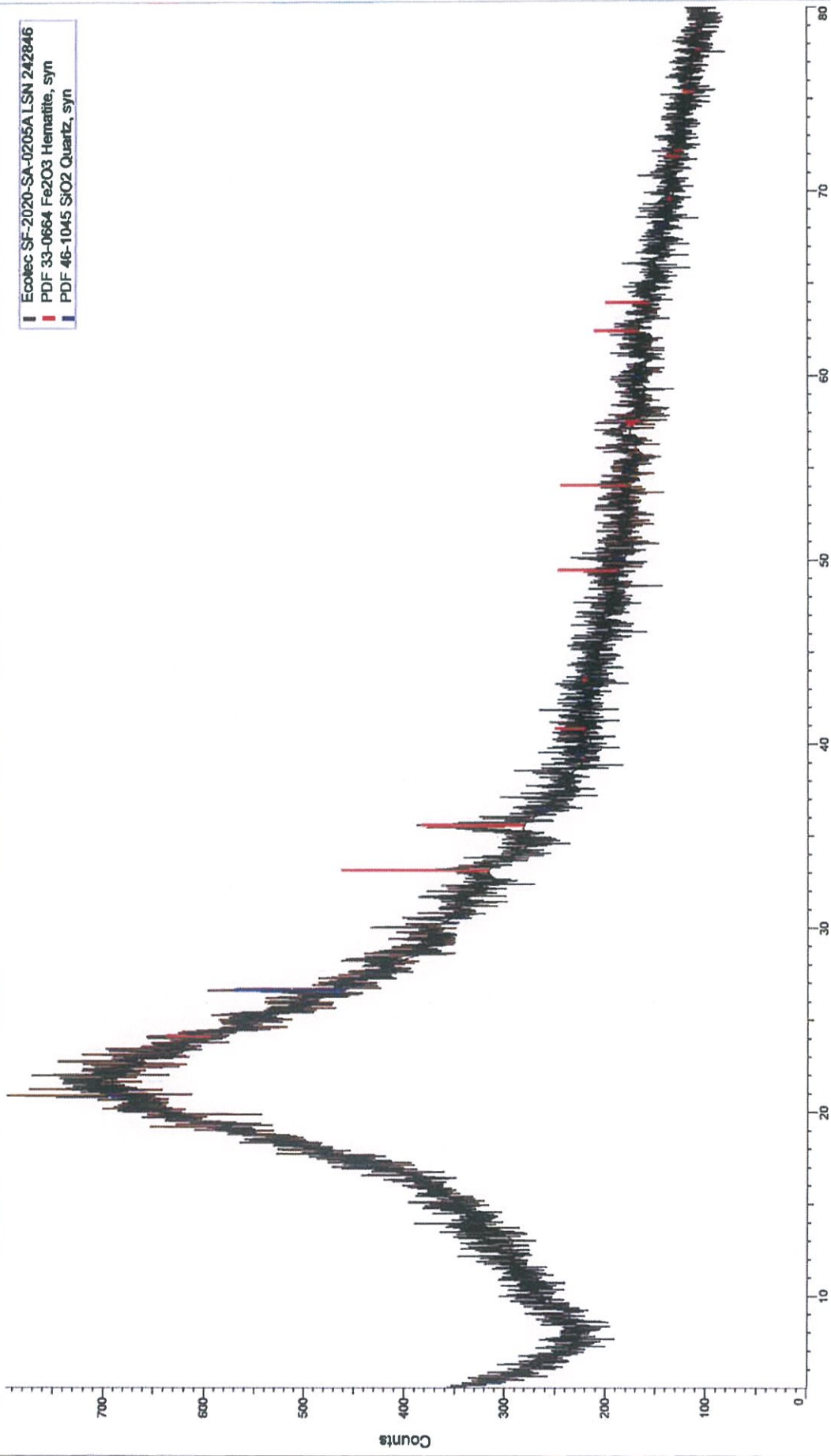
E: [lab@sietronics.com.au](mailto:lab@sietronics.com.au)

P: (02) 6246 9299

W: [www.sietronicslabservices.com.au](http://www.sietronicslabservices.com.au)

**Please note:** All samples are discarded one (1) month after report is issued. If samples are required to be returned or held for a long period of time please contact Sietronics Pty Ltd as soon as possible.

LS2216-01



2Theta (Coupled TwoTheta/Theta) WL=1.54060