

CLIENT DETAILS

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Project **Calcium Silica**  
 Order Number **10510**  
 Samples **1**

LABORATORY DETAILS

Manager **Jon Dicker**  
 Laboratory **SGS Cairns Environmental**  
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SGS Reference **CE138013 R0**  
 Date Received **11 Feb 2019**  
 Date Reported **25 Feb 2019**

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(3146).

SiO2 subcontracted to SGS Townsville, 50-52 Leyland St Garbutt QLD 4814, Not Accredited, TV098038.

SIGNATORIES



**Anthony Nilsson**  
 Operations Manager



**Jon Dicker**  
 Manager Northern QLD

Sample Number CE138013.001  
 Sample Matrix Other  
 Sample Date 05 Feb 2019  
 Sample Name Calcium Silica

Parameter Units LOR

**Moisture Content Method: AN002 Tested: 11/2/2019**

% Moisture	%w/w	0.5	<0.5
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**Particle sizing of soils by sieving Method: AN005 Tested: 25/2/2019**

Passing 710µm	%w/w	1	<b>97</b>
Retained 710µm	%w/w	1	<b>3</b>
Passing 500µm	%w/w	1	<b>88</b>
Retained 500µm	%w/w	1	<b>9</b>
Passing 250µm	%w/w	1	<b>71</b>
Retained 250µm	%w/w	1	<b>18</b>

**Acid Neutralising Capacity (ANC) Method: AN214 Tested: 12/2/2019**

Lime Equivalence	% CaCO <sub>3</sub>	0.1	<b>71</b>
ANC as % CaCO <sub>3</sub>	% CaCO <sub>3</sub>	0.1	<b>71</b>
Neutralising Value*	% CaCO <sub>3</sub>	0.1	<b>71</b>

**Chloride (water extractable) Method: AN274 Tested: 13/2/2019**

Chloride (water extractable 1:5)	mg/kg	5	<b>12</b>
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**Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES Method: AN040/AN320 Tested: 18/2/2019**

Calcium, Ca	%w/w	0.05	<b>34</b>
Magnesium, Mg	%w/w	0.05	<0.05
Arsenic, As	mg/kg	1	<b>3</b>
Boron, B	mg/kg	5	<b>50</b>
Cadmium, Cd	mg/kg	0.3	<b>0.5</b>
Cobalt, Co	mg/kg	0.5	<b>1.2</b>
Copper, Cu	mg/kg	0.5	<b>6.0</b>
Iron, Fe	mg/kg	50	<b>1700</b>
Manganese, Mn	mg/kg	1	<b>310</b>
Molybdenum, Mo	mg/kg	1	<1
Sodium, Na	mg/kg	10	<b>190</b>
Nickel, Ni	mg/kg	0.5	<b>2.7</b>
Lead, Pb	mg/kg	1	<b>5</b>
Sulphur, S	mg/kg	10	<b>82</b>
Zinc, Zn	mg/kg	2	<b>19</b>

Sample Number CE138013.001  
 Sample Matrix Other  
 Sample Date 05 Feb 2019  
 Sample Name Calcium Silica

Parameter	Units	LOR
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**Mercury in Soil Method: AN312 Tested: 18/2/2019**

Mercury	mg/kg	0.05	<0.05
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**Metals in Soils from Alkali Fusion ICP AES Method: ICP90Q Tested: 20/2/2019**

Silicon, Si*	%	0.42	<b>12.8</b>
Silica, SiO <sub>2</sub> *	%	0.42	<b>27.3</b>

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

**Acid Neutralising Capacity (ANC) Method: ME-(AU)-[ENV]AN214**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Lime Equivalence	LB064360	% CaCO3	0.1	<0.1		
ANC as % CaCO <sub>3</sub>	LB064360	% CaCO3	0.1	<0.1	1%	NA
Neutralising Value*	LB064360	% CaCO3	0.1	<0.1		

**Chloride (water extractable) Method: ME-(AU)-[ENV]AN274**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chloride (water extractable 1:5)	LB064411	mg/kg	5	<5	2 - 3%	109%

**Mercury in Soil Method: ME-(AU)-[ENV]AN312**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Mercury	LB064598	mg/kg	0.05	<0.05	0 - 2%	102%	101%

**Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES Method: ME-(AU)-[ENV]AN040/AN320**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD
Calcium, Ca	LB064595	%w/w	0.05	<0.05	0%
Magnesium, Mg	LB064595	%w/w	0.05	<0.05	1%
Arsenic, As	LB064595	mg/kg	1	<1	23%
Boron, B	LB064595	mg/kg	5	<5	57%
Cadmium, Cd	LB064595	mg/kg	0.3	<0.3	25%
Cobalt, Co	LB064595	mg/kg	0.5	<0.5	1%
Copper, Cu	LB064595	mg/kg	0.5	<0.5	7%
Iron, Fe	LB064595	mg/kg	50	<50	2%
Manganese, Mn	LB064595	mg/kg	1	<1	9%
Molybdenum, Mo	LB064595	mg/kg	1	<1	14%
Sodium, Na	LB064595	mg/kg	10	<10	1%
Nickel, Ni	LB064595	mg/kg	0.5	<0.5	3%
Lead, Pb	LB064595	mg/kg	1	<1	7%
Sulphur, S	LB064595	mg/kg	10	32	17%
Zinc, Zn	LB064595	mg/kg	2	<2	2%

METHOD

METHODOLOGY SUMMARY

AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN005	The particle size distribution of a soil is determined by wet sieving, using a maximum of 900 mL of deionised water to sieve all fractions down to 75 µm. Referenced to AS1289.3.6.1 and AS1141.11.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN214	Acid Neutralising Capacity (ANC) or Neutralising Value (NV): The crushed or as received sample is reacted with excess normal acid (HCl) and then back titrated with standard sodium hydroxide to determine the acid consumed. The result is expressed as kg H <sub>2</sub> SO <sub>4</sub> /tonne or %CaCO <sub>3</sub> . Based on AS4969-13.
AN274	Chloride by Aquakem DA following 1:5 or 1:2 DI water extraction: Chloride reacts with mercuric thiocyanate forming a mercuric chloride complex. In the presence of ferric iron, highly coloured ferric thiocyanate is formed which is proportional to the chloride concentration. Results reported on dry sample basis. Reference APHA 4500Cl-
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
ICP90Q	Sample solutions (from Alkali Fusion) are analysed by Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES) against matched standards.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
**	Indicative data, theoretical holding time exceeded.	QFL	QC result is below the lower tolerance
		-	The sample was not analysed for this analyte
		NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.  
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- a. 1 Bq is equivalent to 27 pCi
- b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : <http://www.sgs.com.au/~media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf>

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