

CLIENT DETAILS

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Project **10638 Composite**
Order Number **2858**
Samples **1**

LABORATORY DETAILS

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SGS Reference **PE053398 R0**
Report Number **0000009205**
Date Reported **04 Nov 2010**

COMMENTS

The document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(898).

Total Sulphur was subcontracted to SGS Perth Minerals, 10 Reid Rd Newburn WA, NATA Accreditation Number 1936, report # WM 127567.

SIGNATORIES



Kurt Blackman
Inorganic Team Leader - Soils



Said Hirad
Laboratory Manager

		Sample Number	PE053398.001
		Sample Matrix	Composite
		Sample Name	78911
Parameter	Units	LOR	

Moisture Content Method: AN234

% Moisture	%	0.5	-
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pH in soil Method: AN101

pH	No unit	-	6.4
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Conductivity and TDS by Calculation - Soil Method: AN106

Conductivity	µS/cm	1	110
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TCLP (Toxicity Characteristic Leaching Procedure) Method: AN006

pH 1:20	pH Units	-	5.7
pH 1:20 plus HCL	pH Units	-	1.6
pH TCLP after 18 hours	pH Units	-	5.1
Solution Used	No unit	-	1

Mercury in Soil by TCLP Extract Method: AN311

Mercury	mg/L	0.0005	<0.0005
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Metals in Soil (TCLP) by ICPOES Method: AN321

Arsenic, As	mg/L	0.02	<0.020
Cadmium, Cd	mg/L	0.001	0.001
Chromium, Cr	mg/L	0.005	<0.005
Copper, Cu	mg/L	0.005	0.15
Lead, Pb	mg/L	0.005	0.088
Nickel, Ni	mg/L	0.005	0.065
Zinc, Zn	mg/L	0.01	0.06

Net Acid Generation Potential (NAGP) Method: AN215

Total Oxidisable Sulphur	kg H ₂ SO ₄ /T	0.25	21
Net Acid Production Potential	kg H ₂ SO ₄ /T	-	18

Single Addition Net Acid Generation (NAG) Method: AN216

pHox (NAG pH)	No unit	-	3.0
ECox (NAG Conductivity)	µS/cm	1	730
NAG as kg H ₂ SO ₄ /tonne to pH 4.5	kg H ₂ SO ₄ /T	0.5	9.7
NAG as kg H ₂ SO ₄ /tonne to pH 7	kg H ₂ SO ₄ /T	0.5	15
NAG as kg CaCO ₃ /tonne to pH 4.5	kg CaCO ₃ /T	1	9.9
NAG as kg CaCO ₃ /tonne to pH 7	kg CaCO ₃ /T	1	16

Acid Neutralising Capacity or Neutralisation Potential(ANC/NP) Method: AN212

ANC as % CaCO ₃	% CaCO ₃	0.1	0.3
ANC as % CaMg(CO ₃) ₂	%w/w	0.1	0.3
Acid Neutralisation Capacity/Neutralisation Potential	kg CaCO ₃ /T	1	2.6
Acid Neutralisation Capacity/Neutralisation Potential kg	kg H ₂ SO ₄ /T	1	2.6
ANC/NP Siderite Corrected	kg CaCO ₃ /T	1	2.6
ANC/NP kg H ₂ SO ₄ /t Siderite Corrected	kg H ₂ SO ₄ /T	1	2.6



ANALYTICAL REPORT

PE053398 R0

		Sample Number	PE053398.001
		Sample Matrix	Composite
		Sample Name	78911
Parameter	Units	LOR	

Total Carbon/Sulphur in soil by LECO Method: CSA06V

Sulphur*	%	0.005	0.695
Maximum Potential Acidity*	kg H2SO4/T	0.1	21

HCl Extractable S, Ca and Mg in Soil ICP OES Method: AN014

Acid Soluble Sulphur (SHCI)*	%w/w	0.005	0.009
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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 or Neutralisation Potential(ANC/NP) Method: ME-(AU)-[ENV]AN212

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
ANC as % CaCO ₃	LB008693	% CaCO ₃	0.1	<0.1		
ANC as % CaMg(CO ₃) ₂	LB008693	%w/w	0.1	<0.1		
Acid Neutralisation Capacity/Neutralisation Potential	LB008693	kg	1	<1.0	8%	NA
Acid Neutralisation Capacity/Neutralisation Potential kg H ₂ SO ₄ /t	LB008693	kg	1	<1.0	8%	NA
ANC/NP Siderite Corrected	LB008693	kg	1	<1.0	8%	NA
ANC/NP kg H ₂ SO ₄ /t Siderite Corrected	LB008693	kg	1	<1.0	8%	NA

Conductivity and TDS by Calculation - Soil Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity	LB008421	µS/cm	1	<1	0%	99%

HCl Extractable S, Ca and Mg in Soil ICP OES Method: ME-(AU)-[ENV]AN014

Parameter	QC Reference	Units	LOR	MB
Acid Soluble Sulphur (SHCI)*	LB008695	%w/w	0.005	<0.005

Mercury in Soil by TCLP Extract Method: ME-(AU)-[ENV]AN311

Parameter	QC Reference	Units	LOR	MB	DUP %RPD
Mercury	LB008235	mg/L	0.0005	<0.0005	22%

Metals in Soil (TCLP) by ICPOES Method: ME-(AU)-[ENV]AN321

Parameter	QC Reference	Units	LOR	MB	DUP %RPD
Arsenic, As	LB008236	mg/L	0.02	<0.020	0%
Cadmium, Cd	LB008236	mg/L	0.001	<0.001	22%
Chromium, Cr	LB008236	mg/L	0.005	<0.005	0%
Copper, Cu	LB008236	mg/L	0.005	<0.005	16%
Lead, Pb	LB008236	mg/L	0.005	<0.005	5%
Nickel, Ni	LB008236	mg/L	0.005	<0.005	3%
Zinc, Zn	LB008236	mg/L	0.01	<0.01	20%

pH in soil Method: ME-(AU)-[ENV]AN101

Parameter	QC Reference	Units	LOR	MB
pH	LB008420	No unit	-	7.3

Single Addition Net Acid Generation (NAG) Method: ME-(AU)-[ENV]AN216

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pHox (NAG pH)	LB008694	No unit	-	6.5	2%	NA
ECox (NAG Conductivity)	LB008694	µS/cm	1	22	3%	NA
NAG as kg H ₂ SO ₄ /tonne to pH 4.5	LB008694	kg	0.5	<0.5		
NAG as kg H ₂ SO ₄ /tonne to pH 7	LB008694	kg	0.5	<0.5		
NAG as kg CaCO ₃ /tonne to pH 4.5	LB008694	kg	1	<1.0		
NAG as kg CaCO ₃ /tonne to pH 7	LB008694	kg	1	<1.0		

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.

TCLP (Toxicity Characteristic Leaching Procedure) Method: ME-(AU)-[ENV]AN006

Parameter	QC Reference	Units	LOR	MB	DUP %RPD
pH 1:20	LB008234	pH Units	-		2%
pH 1:20 plus HCL	LB008234	pH Units	-		3%
pH TCLP after 18 hours	LB008234	pH Units	-	5.1	0%
Solution Used	LB008234	No unit	-	1	0%

METHOD

METHODOLOGY SUMMARY

AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as $\mu\text{mhos/cm}$ or $\mu\text{S/cm}$ @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Salinity can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. Reference APHA 2520 B.
AN215	This is purely a calculation based on results obtained from Total Sulphur, Sulphate Method, and Acid Neutralisation Capacity Method (ME-(AU)-[ENV]AN212).
AN234	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.
AN321	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN321	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.

FOOTNOTES

IS	Insufficient sample for analysis.	QFH	QC result is above the upper tolerance
LNR	Sample listed, but not received.	QFL	QC result is below the lower tolerance
*	This analysis is not covered by the scope of accreditation.	-	The sample was not analysed for this analyte
^	Performed by outside laboratory.		
LOR	Limit of Reporting		
↑↓	Raised or Lowered Limit of Reporting		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

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.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf>

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