

CLIENT DETAILS

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Project **Project No. 10806**
Order Number **(Not specified)**
Samples **31**

LABORATORY DETAILS

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SGS Reference **PE058486 R0**
Report Number **0000022437**
Date Reported **04 Jul 2011**
Date Received **17 Jun 2011**

COMMENTS

The document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(898/20210).

Total S was analysed by Oretest (report # ML 003916).

Replicate outside acceptance criteria due to sample heterogeneity. Re-analysed and confirmed.

SIGNATORIES



Jeremy Truong
Inorganics Co-ordinator



Michael McKay
Inorganic Team Leader - Waters

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE058486.001 Pulp 520901	PE058486.002 Pulp 520902	PE058486.003 Pulp 520903	PE058486.004 Pulp 520904	PE058486.005 Pulp 520905
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pH in soil (1:5) Method: AN101

pH	No unit	-	7.0	8.5	4.3	4.5	5.1
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Conductivity and TDS by Calculation - Soil Method: AN106

Conductivity	µS/cm	1	100	38	290	410	360
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Single Addition Net Acid Generation (NAG) Method: AN216

pHox (NAG pH)	No unit	-	4.2	6.6	2.3	2.8	2.8
ECox (NAG Conductivity)	µS/cm	1	86	30	3200	1100	1300
NAG as kg H ₂ SO ₄ /tonne to pH 4.5	kg H ₂ SO ₄ /T	0.5	<0.5	<0.5	49	13	14
NAG as kg H ₂ SO ₄ /tonne to pH 7	kg H ₂ SO ₄ /T	0.5	1.8	<0.5	55	16	18
NAG as kg CaCO ₃ /tonne to pH 4.5	kg CaCO ₃ /T	0.5	<0.5	<0.5	50	13	15
NAG as kg CaCO ₃ /tonne to pH 7	kg CaCO ₃ /T	0.5	1.8	<0.5	56	16	18

Total Carbon/Sulphur in soil by LECO Method: CSA06V

Sulphur*	%	0.005	0.04	0.02	3.09	0.65	0.67
Maximum Potential Acidity*	kg H ₂ SO ₄ /T	0.1	1.2	0.6	95	20	21

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

Acid Extractable Sulphate	mg/L	-	1	<0	9	15	8
Acid Soluble Sulphur (SHCl)*	%w/w	0.005	0.008	<0.005	0.043	0.073	0.040

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

Fizz Rating Reaction*	No unit	-	None.	None.	None.	None.	None.
Initial Effervescence*	No unit	-	None.	None.	None.	None.	None.
Effervescence on Warming*	No unit	-	None.	None.	None.	None.	None.
Titration - Green Colouration?*	No unit	-	None.	None.	None.	None.	None.
Titration - Precipitate Formed?*	No unit	-	None.	None.	None.	None.	None.
ANC as % CaCO ₃	% CaCO ₃	0.1	0.3	0.4	<0.1	0.2	0.2
ANC as % CaMg(CO ₃) ₂	%w/w	0.1	0.4	0.5	0.1	0.2	0.2
Acid Neutralisation Capacity/Neutralisation Potential	kg CaCO ₃ /T	1	3.2	4.4	<1.0	2.0	2.0
Acid Neutralisation Capacity/Neutralisation Potential kg	kg H ₂ SO ₄ /T	1	3.2	4.3	<1.0	1.9	2.0
ANC/NP Siderite Corrected	kg CaCO ₃ /T	1	3.2	4.4	<1.0	2.0	2.0
ANC/NP kg H ₂ SO ₄ /t Siderite Corrected	kg H ₂ SO ₄ /T	1	3.2	4.3	<1.0	1.9	2.0

Net Acid Generation Potential (NAGP) Method: AN215

Total Oxidisable Sulphur	kg H ₂ SO ₄ /T	0.25	0.98	0.56	93	18	19
Net Acid Production Potential	kg H ₂ SO ₄ /T	-400	-2	-4	92	16	17
Total Oxidisable Sulphur	%w/w	0.005	0.032	0.018	3.0	0.58	0.63

pH in soil (1:2) Method: AN101

pH (1:2) aged	pH Units	-	6.8	8.0	5.0	5.1	5.7
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Conductivity (1:2) in soil Method: AN106

Conductivity (1:2) aged*	µS/cm	1	230	65	560	800	690
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Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE058486.001 Pulp 520901	PE058486.002 Pulp 520902	PE058486.003 Pulp 520903	PE058486.004 Pulp 520904	PE058486.005 Pulp 520905
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TCLP (Toxicity Characteristic Leaching Procedure) Method: AN006

pH 1:20	pH Units	-	7.0	8.7	4.6	4.9	5.2
pH 1:20 plus HCL	pH Units	-	1.5	1.6	-	-	1.6
Extraction Solution Used	No unit	-	1	1	1	1	1
Mass of Sample Used*	g	-	25	25	25	25	25
Volume of Extraction Solution Used*	mL	-	500	500	500	500	500
pH TCLP after 18 hours	pH Units	-	5.0	5.0	4.9	4.9	5.0

Metals in Soil (TCLP) by ICPOES Method: AN320/AN321

Arsenic, As	mg/L	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Cadmium, Cd	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium, Cr	mg/L	0.005	0.007	0.037	0.010	<0.005	0.008
Copper, Cu	mg/L	0.005	0.005	<0.005	0.079	<0.005	0.096
Lead, Pb	mg/L	0.005	<0.005	0.16	0.009	<0.005	<0.005
Nickel, Ni	mg/L	0.005	0.046	0.008	0.13	0.066	0.047
Zinc, Zn	mg/L	0.01	0.01	0.02	0.06	0.01	0.03

Mercury in Soil by TCLP Extract Method: AN311/AN312

Mercury	mg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
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Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE058486.006 Pulp 520906	PE058486.007 Pulp 520907	PE058486.008 Pulp 520908	PE058486.009 Pulp 520909	PE058486.010 Pulp 520910
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pH in soil (1:5) Method: AN101

pH	No unit	-	7.4	6.6	4.6	6.2	5.7
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Conductivity and TDS by Calculation - Soil Method: AN106

Conductivity	µS/cm	1	82	37	240	51	97
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Single Addition Net Acid Generation (NAG) Method: AN216

pHox (NAG pH)	No unit	-	2.7	3.8	2.7	4.0	3.2
ECox (NAG Conductivity)	µS/cm	1	1500	130	1400	110	490
NAG as kg H ₂ SO ₄ /tonne to pH 4.5	kg H ₂ SO ₄ /T	0.5	17	1.0	17	1.0	5.0
NAG as kg H ₂ SO ₄ /tonne to pH 7	kg H ₂ SO ₄ /T	0.5	20	2.5	20	2.6	7.8
NAG as kg CaCO ₃ /tonne to pH 4.5	kg CaCO ₃ /T	0.5	18	1.0	17	1.0	5.2
NAG as kg CaCO ₃ /tonne to pH 7	kg CaCO ₃ /T	0.5	20	2.6	21	2.6	8.0

Total Carbon/Sulphur in soil by LECO Method: CSA06V

Sulphur*	%	0.005	0.78	0.07	0.71	0.08	0.28
Maximum Potential Acidity*	kg H ₂ SO ₄ /T	0.1	24	2.1	22	2.5	8.6

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

Acid Extractable Sulphate	mg/L	-	0	<0	6	<0	1
Acid Soluble Sulphur (SHCl)*	%w/w	0.005	<0.005	<0.005	0.031	<0.005	0.007

Sample Number	PE058486.006	PE058486.007	PE058486.008	PE058486.009	PE058486.010
Sample Matrix	Pulp	Pulp	Pulp	Pulp	Pulp
Sample Name	520906	520907	520908	520909	520910
Parameter	Units	LOR			

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

Fizz Rating Reaction*	No unit	-	None.	None.	None.	None.	None.
Initial Effervescence*	No unit	-	None.	None.	None.	None.	None.
Effervescence on Warming*	No unit	-	None.	None.	None.	None.	None.
Titration - Green Colouration?*	No unit	-	None.	None.	None.	None.	None.
Titration - Precipitate Formed?*	No unit	-	None.	None.	None.	None.	None.
ANC as % CaCO ₃	% CaCO ₃	0.1	0.2	0.1	<0.1	0.1	0.1
ANC as % CaMg(CO ₃) ₂	%w/w	0.1	0.2	0.1	<0.1	0.2	0.1
Acid Neutralisation Capacity/Neutralisation Potential	kg CaCO ₃ /T	1	2.3	1.2	<1.0	1.4	1.2
Acid Neutralisation Capacity/Neutralisation Potential kg	kg H ₂ SO ₄ /T	1	2.2	1.2	<1.0	1.4	1.2
ANC/NP Siderite Corrected	kg CaCO ₃ /T	1	2.3	1.2	<1.0	1.4	1.2
ANC/NP kg H ₂ SO ₄ /t Siderite Corrected	kg H ₂ SO ₄ /T	1	2.2	1.2	<1.0	1.4	1.2

Net Acid Generation Potential (NAGP) Method: AN215

Total Oxidisable Sulphur	kg H ₂ SO ₄ /T	0.25	24	2.1	21	2.4	8.4
Net Acid Production Potential	kg H ₂ SO ₄ /T	-400	22	1	20	1	7
Total Oxidisable Sulphur	%w/w	0.005	0.78	0.089	0.68	0.079	0.27

pH in soil (1:2) Method: AN101

pH (1:2) aged	pH Units	-	7.6	6.6	5.4	6.5	5.5
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Conductivity (1:2) in soil Method: AN106

Conductivity (1:2) aged*	μS/cm	1	150	85	530	96	190
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TCLP (Toxicity Characteristic Leaching Procedure) Method: AN006

pH 1:20	pH Units	-	8.1	6.2	4.5	6.6	6.0
pH 1:20 plus HCL	pH Units	-	1.5	1.6	-	1.5	1.6
Extraction Solution Used	No unit	-	1	1	1	1	1
Mass of Sample Used*	g	-	25	25	25	25	25
Volume of ExtractionSolution Used*	mL	-	500	500	500	500	500
pH TCLP after 18 hours	pH Units	-	5.0	4.9	4.9	4.9	4.9

Metals in Soil (TCLP) by ICPOES Method: AN320/AN321

Arsenic, As	mg/L	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Cadmium, Cd	mg/L	0.001	<0.001	<0.001	0.001	<0.001	<0.001
Chromium, Cr	mg/L	0.005	0.009	0.043	0.089	0.14	0.005
Copper, Cu	mg/L	0.005	0.006	0.032	0.021	0.021	0.026
Lead, Pb	mg/L	0.005	0.040	0.028	0.019	0.024	0.034
Nickel, Ni	mg/L	0.005	0.022	0.018	0.14	0.012	0.031
Zinc, Zn	mg/L	0.01	0.01	0.03	1.5	0.03	0.05

Mercury in Soil by TCLP Extract Method: AN311/AN312

Mercury	mg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
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Sample Number	PE058486.011	PE058486.012	PE058486.013	PE058486.014	PE058486.015
Sample Matrix	Pulp	Pulp	Pulp	Pulp	Pulp
Sample Name	520911	520912	520913	520914	520915
Parameter	Units	LOR			

pH in soil (1:5) Method: AN101

pH	No unit	-	4.2	6.7	9.1	4.7	4.9
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Conductivity and TDS by Calculation - Soil Method: AN106

Conductivity	µS/cm	1	320	34	54	200	270
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Single Addition Net Acid Generation (NAG) Method: AN216

pHox (NAG pH)	No unit	-	3.0	5.4	4.5	3.6	3.0
ECox (NAG Conductivity)	µS/cm	1	860	36	82	220	810
NAG as kg H ₂ SO ₄ /tonne to pH 4.5	kg H ₂ SO ₄ /T	0.5	10	<0.5	<0.5	2.1	9.1
NAG as kg H ₂ SO ₄ /tonne to pH 7	kg H ₂ SO ₄ /T	0.5	13	0.8	1.5	4.2	13
NAG as kg CaCO ₃ /tonne to pH 4.5	kg CaCO ₃ /T	0.5	10	<0.5	<0.5	2.2	9.3
NAG as kg CaCO ₃ /tonne to pH 7	kg CaCO ₃ /T	0.5	13	0.8	1.6	4.3	13

Total Carbon/Sulphur in soil by LECO Method: CSA06V

Sulphur*	%	0.005	0.52	0.03	<0.005	0.13	0.43
Maximum Potential Acidity*	kg H ₂ SO ₄ /T	0.1	16	0.9	<0.1	4.0	13

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

Acid Extractable Sulphate	mg/L	-	10	<0	0	5	7
Acid Soluble Sulphur (SHCl)*	%w/w	0.005	0.054	<0.005	<0.005	0.026	0.036

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

Fizz Rating Reaction*	No unit	-	None.	None.	None.	None.	None.
Initial Effervescence*	No unit	-	None.	None.	None.	None.	None.
Effervescence on Warming*	No unit	-	None.	None.	None.	None.	None.
Titration - Green Colouration?*	No unit	-	None.	None.	None.	None.	None.
Titration - Precipitate Formed?*	No unit	-	None.	None.	None.	None.	None.
ANC as % CaCO ₃	% CaCO ₃	0.1	<0.1	0.2	0.2	0.2	0.2
ANC as % CaMg(CO ₃) ₂	%w/w	0.1	<0.1	0.2	0.3	0.2	0.2
Acid Neutralisation Capacity/Neutralisation Potential	kg CaCO ₃ /T	1	<1.0	2.0	2.3	1.8	1.6
Acid Neutralisation Capacity/Neutralisation Potential kg	kg H ₂ SO ₄ /T	1	<1.0	2.0	2.3	1.7	1.6
ANC/NP Siderite Corrected	kg CaCO ₃ /T	1	<1.0	2.0	2.3	1.8	1.6
ANC/NP kg H ₂ SO ₄ /t Siderite Corrected	kg H ₂ SO ₄ /T	1	<1.0	2.0	2.3	1.7	1.6

Net Acid Generation Potential (NAGP) Method: AN215

Total Oxidisable Sulphur	kg H ₂ SO ₄ /T	0.25	14	0.87	<0.25	3.2	12
Net Acid Production Potential	kg H ₂ SO ₄ /T	-400	14	-1	-2	1	10
Total Oxidisable Sulphur	%w/w	0.005	0.47	0.029	<0.005	0.10	0.39

pH in soil (1:2) Method: AN101

pH (1:2) aged	pH Units	-	4.4	6.5	9.0	4.6	5.1
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Conductivity (1:2) in soil Method: AN106

Conductivity (1:2) aged*	µS/cm	1	570	70	88	370	520
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Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE058486.011 Pulp 520911	PE058486.012 Pulp 520912	PE058486.013 Pulp 520913	PE058486.014 Pulp 520914	PE058486.015 Pulp 520915
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TCLP (Toxicity Characteristic Leaching Procedure) Method: AN006

pH 1:20	pH Units	-	4.6	6.9	9.1	5.2	5.2
pH 1:20 plus HCL	pH Units	-	-	1.5	1.6	1.5	1.6
Extraction Solution Used	No unit	-	1	1	1	1	1
Mass of Sample Used*	g	-	25	25	25	25	25
Volume of ExtractionSolution Used*	mL	-	500	500	500	500	500
pH TCLP after 18 hours	pH Units	-	4.9	4.9	5.0	4.9	4.9

Metals in Soil (TCLP) by ICPOES Method: AN320/AN321

Arsenic, As	mg/L	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Cadmium, Cd	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium, Cr	mg/L	0.005	0.013	0.008	0.22	<0.005	<0.005
Copper, Cu	mg/L	0.005	0.016	0.007	<0.005	0.011	0.036
Lead, Pb	mg/L	0.005	0.017	0.008	0.050	0.12	0.025
Nickel, Ni	mg/L	0.005	0.10	0.007	0.015	0.031	0.080
Zinc, Zn	mg/L	0.01	0.02	0.01	0.02	0.02	0.05

Mercury in Soil by TCLP Extract Method: AN311/AN312

Mercury	mg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
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Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE058486.016 Pulp 520916	PE058486.017 Pulp 520917	PE058486.018 Pulp 520918	PE058486.019 Pulp 520919	PE058486.020 Pulp 520920
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pH in soil (1:5) Method: AN101

pH	No unit	-	6.9	4.0	5.8	6.4	8.6
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Conductivity and TDS by Calculation - Soil Method: AN106

Conductivity	µS/cm	1	40	280	130	110	98
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Single Addition Net Acid Generation (NAG) Method: AN216

pHox (NAG pH)	No unit	-	4.7	2.7	5.6	4.3	6.2
ECox (NAG Conductivity)	µS/cm	1	83	1500	30	110	57
NAG as kg H ₂ SO ₄ /tonne to pH 4.5	kg H ₂ SO ₄ /T	0.5	<0.5	17	<0.5	<0.5	<0.5
NAG as kg H ₂ SO ₄ /tonne to pH 7	kg H ₂ SO ₄ /T	0.5	1.5	21	0.5	2.3	<0.5
NAG as kg CaCO ₃ /tonne to pH 4.5	kg CaCO ₃ /T	0.5	<0.5	18	<0.5	<0.5	<0.5
NAG as kg CaCO ₃ /tonne to pH 7	kg CaCO ₃ /T	0.5	1.6	21	0.5	2.3	<0.5

Total Carbon/Sulphur in soil by LECO Method: CSA06V

Sulphur*	%	0.005	0.09	0.75	<0.005	0.09	<0.005
Maximum Potential Acidity*	kg H ₂ SO ₄ /T	0.1	2.8	23	<0.1	2.8	<0.1

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

Acid Extractable Sulphate	mg/L	-	1	14	0	1	<0
Acid Soluble Sulphur (SHCl)*	%w/w	0.005	0.008	0.073	<0.005	0.007	<0.005

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE058486.016 Pulp 520916	PE058486.017 Pulp 520917	PE058486.018 Pulp 520918	PE058486.019 Pulp 520919	PE058486.020 Pulp 520920
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Acid Neutralising Capacity or Neutralisation Potential(ANC/NP) Method: AN212

Fizz Rating Reaction*	No unit	-	None.	None.	None.	None.	None.
Initial Effervescence*	No unit	-	None.	None.	None.	None.	None.
Effervescence on Warming*	No unit	-	None.	None.	None.	None.	None.
Titration - Green Colouration?*	No unit	-	None.	None.	None.	None.	None.
Titration - Precipitate Formed?*	No unit	-	None.	None.	None.	None.	None.
ANC as % CaCO ₃	% CaCO ₃	0.1	0.4	<0.1	0.3	0.5	0.5
ANC as % CaMg(CO ₃) ₂	%w/w	0.1	0.5	<0.1	0.3	0.5	0.5
Acid Neutralisation Capacity/Neutralisation Potential	kg CaCO ₃ /T	1	4.3	<1.0	3.2	4.8	4.5
Acid Neutralisation Capacity/Neutralisation Potential kg	kg H ₂ SO ₄ /T	1	4.3	<1.0	3.2	4.7	4.4
ANC/NP Siderite Corrected	kg CaCO ₃ /T	1	4.3	<1.0	3.2	4.8	4.5
ANC/NP kg H ₂ SO ₄ /t Siderite Corrected	kg H ₂ SO ₄ /T	1	4.3	<1.0	3.2	4.7	4.4

Net Acid Generation Potential (NAGP) Method: AN215

Total Oxidisable Sulphur	kg H ₂ SO ₄ /T	0.25	2.5	21	<0.25	2.5	<0.25
Net Acid Production Potential	kg H ₂ SO ₄ /T	-400	-2	20	-3	-2	-4
Total Oxidisable Sulphur	%w/w	0.005	0.082	0.68	<0.005	0.083	<0.005

pH in soil (1:2) Method: AN101

pH (1:2) aged	pH Units	-	6.9	4.2	5.7	6.3	8.3
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Conductivity (1:2) in soil Method: AN106

Conductivity (1:2) aged*	µS/cm	1	72	470	260	210	160
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TCLP (Toxicity Characteristic Leaching Procedure) Method: AN006

pH 1:20	pH Units	-	7.3	4.6	6.0	6.7	8.9
pH 1:20 plus HCL	pH Units	-	1.6	-	1.5	1.5	1.6
Extraction Solution Used	No unit	-	1	1	1	1	1
Mass of Sample Used*	g	-	25	25	25	25	25
Volume of ExtractionSolution Used*	mL	-	500	500	500	500	500
pH TCLP after 18 hours	pH Units	-	5.0	4.9	4.9	5.0	5.0

Metals in Soil (TCLP) by ICPOES Method: AN320/AN321

Arsenic, As	mg/L	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Cadmium, Cd	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Chromium, Cr	mg/L	0.005	0.035	0.007	0.006	0.011	0.070
Copper, Cu	mg/L	0.005	<0.005	0.020	<0.005	<0.005	0.025
Lead, Pb	mg/L	0.005	4.4	<0.005	<0.005	0.034	0.017
Nickel, Ni	mg/L	0.005	0.012	0.085	0.009	0.016	0.015
Zinc, Zn	mg/L	0.01	0.02	0.02	0.04	0.03	0.03

Mercury in Soil by TCLP Extract Method: AN311/AN312

Mercury	mg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
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Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE058486.021 Pulp 520921	PE058486.022 Pulp 520922	PE058486.023 Pulp 520923	PE058486.024 Pulp 520924	PE058486.025 Pulp 520925
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pH in soil (1:5) Method: AN101

pH	No unit	-	6.3	7.9	7.9	8.3	7.4
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Conductivity and TDS by Calculation - Soil Method: AN106

Conductivity	µS/cm	1	380	77	74	65	39
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Single Addition Net Acid Generation (NAG) Method: AN216

pHox (NAG pH)	No unit	-	2.8	5.4	5.2	3.6	6.5
ECox (NAG Conductivity)	µS/cm	1	1400	69	93	280	25
NAG as kg H ₂ SO ₄ /tonne to pH 4.5	kg H ₂ SO ₄ /T	0.5	16	<0.5	<0.5	2.3	<0.5
NAG as kg H ₂ SO ₄ /tonne to pH 7	kg H ₂ SO ₄ /T	0.5	22	0.8	1.0	5.0	<0.5
NAG as kg CaCO ₃ /tonne to pH 4.5	kg CaCO ₃ /T	0.5	16	<0.5	<0.5	2.3	<0.5
NAG as kg CaCO ₃ /tonne to pH 7	kg CaCO ₃ /T	0.5	22	0.8	1.1	5.1	<0.5

Total Carbon/Sulphur in soil by LECO Method: CSA06V

Sulphur*	%	0.005	0.85	0.03	0.1	0.21	<0.005
Maximum Potential Acidity*	kg H ₂ SO ₄ /T	0.1	26	0.9	3.1	6.4	<0.1

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

Acid Extractable Sulphate	mg/L	-	8	2	0	0	<0
Acid Soluble Sulphur (SHCl)*	%w/w	0.005	0.039	0.012	<0.005	<0.005	<0.005

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

Fizz Rating Reaction*	No unit	-	None.	None.	None.	None.	None.
Initial Effervescence*	No unit	-	None.	None.	None.	None.	None.
Effervescence on Warming*	No unit	-	None.	None.	None.	None.	None.
Titration - Green Colouration?*	No unit	-	None.	None.	None.	None.	None.
Titration - Precipitate Formed?*	No unit	-	None.	None.	None.	None.	None.
ANC as % CaCO ₃	% CaCO ₃	0.1	0.6	0.4	0.4	0.3	0.1
ANC as % CaMg(CO ₃) ₂	%w/w	0.1	0.6	0.4	0.4	0.4	0.1
Acid Neutralisation Capacity/Neutralisation Potential	kg CaCO ₃ /T	1	5.5	3.9	3.9	3.4	1.1
Acid Neutralisation Capacity/Neutralisation Potential kg	kg H ₂ SO ₄ /T	1	5.4	3.8	3.8	3.4	1.0
ANC/NP Siderite Corrected	kg CaCO ₃ /T	1	5.5	3.9	3.9	3.4	1.1
ANC/NP kg H ₂ SO ₄ /t Siderite Corrected	kg H ₂ SO ₄ /T	1	5.4	3.8	3.8	3.4	1.0

Net Acid Generation Potential (NAGP) Method: AN215

Total Oxidisable Sulphur	kg H ₂ SO ₄ /T	0.25	25	0.54	2.9	6.3	<0.25
Net Acid Production Potential	kg H ₂ SO ₄ /T	-400	19	-3	-1	3	-1
Total Oxidisable Sulphur	%w/w	0.005	0.81	0.018	0.095	0.21	<0.005

pH in soil (1:2) Method: AN101

pH (1:2) aged	pH Units	-	6.4	8.0	7.7	8.2	7.3
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Conductivity (1:2) in soil Method: AN106

Conductivity (1:2) aged*	µS/cm	1	650	140	120	120	69
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Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE058486.021 Pulp 520921	PE058486.022 Pulp 520922	PE058486.023 Pulp 520923	PE058486.024 Pulp 520924	PE058486.025 Pulp 520925
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TCLP (Toxicity Characteristic Leaching Procedure) Method: AN006

pH 1:20	pH Units	-	6.3	8.2	7.8	8.2	7.2
pH 1:20 plus HCL	pH Units	-	1.6	1.6	1.6	1.5	1.5
Extraction Solution Used	No unit	-	1	1	1	1	1
Mass of Sample Used*	g	-	25	25	25	25	25
Volume of ExtractionSolution Used*	mL	-	500	500	500	500	500
pH TCLP after 18 hours	pH Units	-	5.0	5.0	5.0	5.0	5.0

Metals in Soil (TCLP) by ICPOES Method: AN320/AN321

Arsenic, As	mg/L	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Cadmium, Cd	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium, Cr	mg/L	0.005	0.015	0.007	0.005	0.010	0.027
Copper, Cu	mg/L	0.005	0.10	0.054	0.051	0.006	0.009
Lead, Pb	mg/L	0.005	0.035	<0.005	0.027	0.010	0.035
Nickel, Ni	mg/L	0.005	0.072	0.021	0.028	0.023	0.005
Zinc, Zn	mg/L	0.01	0.05	0.02	0.02	0.01	<0.01

Mercury in Soil by TCLP Extract Method: AN311/AN312

Mercury	mg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
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Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE058486.026 Pulp 520926	PE058486.027 Pulp 520927	PE058486.028 Pulp 520928	PE058486.029 Pulp 520929	PE058486.030 Pulp 520930
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pH in soil (1:5) Method: AN101

pH	No unit	-	7.4	8.0	4.2	7.7	8.7
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Conductivity and TDS by Calculation - Soil Method: AN106

Conductivity	µS/cm	1	47	56	420	70	66
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Single Addition Net Acid Generation (NAG) Method: AN216

pHox (NAG pH)	No unit	-	6.4	4.3	3.1	4.5	4.2
ECox (NAG Conductivity)	µS/cm	1	33	110	770	90	140
NAG as kg H ₂ SO ₄ /tonne to pH 4.5	kg H ₂ SO ₄ /T	0.5	<0.5	<0.5	7.6	<0.5	0.5
NAG as kg H ₂ SO ₄ /tonne to pH 7	kg H ₂ SO ₄ /T	0.5	0.8	2.5	11	1.5	2.8
NAG as kg CaCO ₃ /tonne to pH 4.5	kg CaCO ₃ /T	0.5	<0.5	<0.5	7.8	<0.5	0.5
NAG as kg CaCO ₃ /tonne to pH 7	kg CaCO ₃ /T	0.5	0.8	2.5	12	1.6	2.8

Total Carbon/Sulphur in soil by LECO Method: CSA06V

Sulphur*	%	0.005	0.02	0.11	0.46	0.09	0.14
Maximum Potential Acidity*	kg H ₂ SO ₄ /T	0.1	0.6	3.4	14	2.8	4.3

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

Acid Extractable Sulphate	mg/L	-	0	<0	19	1	4
Acid Soluble Sulphur (SHCl)*	%w/w	0.005	<0.005	<0.005	0.097	0.005	0.022

Parameter	Units	LOR	Sample Number Sample Matrix Sample Name	PE058486.026 Pulp 520926	PE058486.027 Pulp 520927	PE058486.028 Pulp 520928	PE058486.029 Pulp 520929	PE058486.030 Pulp 520930
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Acid Neutralising Capacity or Neutralisation Potential(ANC/NP) Method: AN212

Fizz Rating Reaction*	No unit	-	None.	None.	None.	None.	None.
Initial Effervescence*	No unit	-	None.	None.	None.	None.	None.
Effervescence on Warming*	No unit	-	None.	None.	None.	None.	None.
Titration - Green Colouration?*	No unit	-	None.	None.	None.	None.	None.
Titration - Precipitate Formed?*	No unit	-	None.	None.	None.	None.	None.
ANC as % CaCO ₃	% CaCO ₃	0.1	0.2	0.4	<0.1	0.3	0.5
ANC as % CaMg(CO ₃) ₂	%w/w	0.1	0.2	0.4	<0.1	0.3	0.6
Acid Neutralisation Capacity/Neutralisation Potential	kg CaCO ₃ /T	1	1.8	3.8	<1.0	3.1	5.3
Acid Neutralisation Capacity/Neutralisation Potential kg	kg H ₂ SO ₄ /T	1	1.8	3.8	<1.0	3.0	5.2
ANC/NP Siderite Corrected	kg CaCO ₃ /T	1	1.8	3.8	<1.0	3.1	5.3
ANC/NP kg H ₂ SO ₄ /t Siderite Corrected	kg H ₂ SO ₄ /T	1	1.8	3.8	<1.0	3.0	5.2

Net Acid Generation Potential (NAGP) Method: AN215

Total Oxidisable Sulphur	kg H ₂ SO ₄ /T	0.25	0.51	3.3	11	2.6	3.6
Net Acid Production Potential	kg H ₂ SO ₄ /T	-400	-1	0	10	0	-2
Total Oxidisable Sulphur	%w/w	0.005	0.017	0.11	0.36	0.085	0.12

pH in soil (1:2) Method: AN101

pH (1:2) aged	pH Units	-	7.1	7.8	4.4	8.0	8.7
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Conductivity (1:2) in soil Method: AN106

Conductivity (1:2) aged*	μS/cm	1	92	100	770	110	94
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TCLP (Toxicity Characteristic Leaching Procedure) Method: AN006

pH 1:20	pH Units	-	7.5	8.3	4.6	8.5	8.9
pH 1:20 plus HCL	pH Units	-	1.5	1.6	-	1.5	1.5
Extraction Solution Used	No unit	-	1	1	1	1	1
Mass of Sample Used*	g	-	25	25	25	25	25
Volume of ExtractionSolution Used*	mL	-	500	500	500	500	500
pH TCLP after 18 hours	pH Units	-	5.0	5.0	4.9	5.0	5.0

Metals in Soil (TCLP) by ICPOES Method: AN320/AN321

Arsenic, As	mg/L	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Cadmium, Cd	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium, Cr	mg/L	0.005	<0.005	0.019	0.016	0.008	0.010
Copper, Cu	mg/L	0.005	0.37	0.005	0.062	0.011	0.016
Lead, Pb	mg/L	0.005	0.87	0.036	<0.005	0.028	0.021
Nickel, Ni	mg/L	0.005	0.027	0.060	0.16	0.027	0.010
Zinc, Zn	mg/L	0.01	0.03	0.02	0.04	0.01	0.02

Mercury in Soil by TCLP Extract Method: AN311/AN312

Mercury	mg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
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		Sample Number	PE058486.031
		Sample Matrix	Pulp
		Sample Name	520931
Parameter	Units	LOR	

pH in soil (1:5) Method: AN101

pH	No unit	-	7.5
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Conductivity and TDS by Calculation - Soil Method: AN106

Conductivity	µS/cm	1	200
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Single Addition Net Acid Generation (NAG) Method: AN216

pHox (NAG pH)	No unit	-	5.0
ECox (NAG Conductivity)	µS/cm	1	310
NAG as kg H ₂ SO ₄ /tonne to pH 4.5	kg H ₂ SO ₄ /T	0.5	<0.5
NAG as kg H ₂ SO ₄ /tonne to pH 7	kg H ₂ SO ₄ /T	0.5	2.0
NAG as kg CaCO ₃ /tonne to pH 4.5	kg CaCO ₃ /T	0.5	<0.5
NAG as kg CaCO ₃ /tonne to pH 7	kg CaCO ₃ /T	0.5	2.0

Total Carbon/Sulphur in soil by LECO Method: CSA06V

Sulphur*	%	0.005	0.56
Maximum Potential Acidity*	kg H ₂ SO ₄ /T	0.1	17

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

Acid Extractable Sulphate	mg/L	-	3
Acid Soluble Sulphur (SHCl)*	%w/w	0.005	0.019

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

Fizz Rating Reaction*	No unit	-	None.
Initial Effervescence*	No unit	-	None.
Effervescence on Warming*	No unit	-	None.
Titration - Green Colouration?*	No unit	-	None.
Titration - Precipitate Formed?*	No unit	-	None.
ANC as % CaCO ₃	% CaCO ₃	0.1	1.1
ANC as % CaMg(CO ₃) ₂	%w/w	0.1	1.2
Acid Neutralisation Capacity/Neutralisation Potential	kg CaCO ₃ /T	1	11
Acid Neutralisation Capacity/Neutralisation Potential kg	kg H ₂ SO ₄ /T	1	11
ANC/NP Siderite Corrected	kg CaCO ₃ /T	1	11
ANC/NP kg H ₂ SO ₄ /t Siderite Corrected	kg H ₂ SO ₄ /T	1	11

Net Acid Generation Potential (NAGP) Method: AN215

Total Oxidisable Sulphur	kg H ₂ SO ₄ /T	0.25	17
Net Acid Production Potential	kg H ₂ SO ₄ /T	-400	6
Total Oxidisable Sulphur	%w/w	0.005	0.54

pH in soil (1:2) Method: AN101

pH (1:2) aged	pH Units	-	7.5
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Conductivity (1:2) in soil Method: AN106

Conductivity (1:2) aged*	µS/cm	1	370
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ANALYTICAL REPORT

PE058486 R0

		Sample Number	PE058486.031
		Sample Matrix	Pulp
		Sample Name	520931
Parameter	Units	LOR	

TCLP (Toxicity Characteristic Leaching Procedure) Method: AN006

pH 1:20	pH Units	-	7.8
pH 1:20 plus HCL	pH Units	-	1.6
Extraction Solution Used	No unit	-	1
Mass of Sample Used*	g	-	25
Volume of ExtractionSolution Used*	mL	-	500
pH TCLP after 18 hours	pH Units	-	5.0

Metals in Soil (TCLP) by ICPOES Method: AN320/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	0.017
Lead, Pb	mg/L	0.005	<0.005
Nickel, Ni	mg/L	0.005	0.011
Zinc, Zn	mg/L	0.01	0.13

Mercury in Soil by TCLP Extract Method: AN311/AN312

Mercury	mg/L	0.0005	<0.0005
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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
Fizz Rating Reaction*	LB022270	No unit	-	None.		
Initial Effervescence*	LB022270	No unit	-	None.		
Effervescence on Warming*	LB022270	No unit	-	None.		
Titration - Green Colouration?*	LB022270	No unit	-	None.		
Titration - Precipitate Formed?*	LB022270	No unit	-	None.		
ANC as % CaCO ₃	LB022270	% CaCO ₃	0.1	<0.1		
ANC as % CaMg(CO ₃) ₂	LB022270	%w/w	0.1	<0.1		
Acid Neutralisation Capacity/Neutralisation Potential	LB022270	kg	1	<1.0	0 - 4%	NA
Acid Neutralisation Capacity/Neutralisation Potential kg H ₂ SO ₄ /t	LB022270	kg	1	<1.0	0 - 4%	NA

Conductivity (1:2) in soil Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	DUP %RPD
Conductivity (1:2) aged*	LB022371	µS/cm	1	<1	1 - 4%

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity	LB022373	µS/cm	1	<1	5 - 10%	99%

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Acid Soluble Sulphur (SHCl)*	LB022107	%w/w	0.005	<0.005	0 - 13%	108 - 110%

Mercury in Soil by TCLP Extract Method: ME-(AU)-[ENV]AN311/AN312

Parameter	QC Reference	Units	LOR	MB	DUP %RPD
Mercury	LB022352	mg/L	0.0005	<0.0005	0%

Metals in Soil (TCLP) by ICPOES Method: ME-(AU)-[ENV]AN320/AN321

Parameter	QC Reference	Units	LOR	MB	DUP %RPD
Arsenic, As	LB022353	mg/L	0.02	<0.020	0%
Cadmium, Cd	LB022353	mg/L	0.001	<0.001	0%
Chromium, Cr	LB022353	mg/L	0.005	<0.005	0 - 11%
Copper, Cu	LB022353	mg/L	0.005	<0.005	0 - 8%
Lead, Pb	LB022353	mg/L	0.005	<0.005	36%
Nickel, Ni	LB022353	mg/L	0.005	<0.005	0 - 7%
Zinc, Zn	LB022353	mg/L	0.01	<0.01	0 - 4%

pH in soil (1:2) Method: ME-(AU)-[ENV]AN101

Parameter	QC Reference	Units	LOR	MB	DUP %RPD
pH (1:2) aged	LB022370	pH Units	-	6.0	0 - 3%

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.

pH in soil (1:5) Method: ME-(AU)-[ENV]AN101

Parameter	QC Reference	Units	LOR	DUP %RPD	LCS %Recovery
pH	LB022372	No unit	-	0 - 5%	100%

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pHox (NAG pH)	LB022101	No unit	-	6.0 - 6.2	0 - 4%	109 - 110%
ECox (NAG Conductivity)	LB022101	µS/cm	1	22 - 23	1 - 8%	98 - 100%
NAG as kg H ₂ SO ₄ /tonne to pH 4.5	LB022101	kg	0.5	<0.5	0%	111%
NAG as kg H ₂ SO ₄ /tonne to pH 7	LB022101	kg	0.5	0.5 - 0.8	0 - 9%	102 - 104%
NAG as kg CaCO ₃ /tonne to pH 4.5	LB022101	kg	0.5	<0.5	0%	111%
NAG as kg CaCO ₃ /tonne to pH 7	LB022101	kg	0.5	0.5 - 0.8	0 - 9%	102 - 104%

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD
pH 1:20	LB022077	pH Units	-	5.6 - 5.7	0 - 1%
pH 1:20 plus HCL	LB022077	pH Units	-	1.5	1 - 3%
Extraction Solution Used	LB022077	No unit	-	1	0%
Mass of Sample Used*	LB022077	g	-	25	0%
Volume of ExtractionSolution Used*	LB022077	mL	-	500	0%
pH TCLP after 18 hours	LB022077	pH Units	-	4.9 - 5.0	0%

METHOD

METHODOLOGY SUMMARY

AN002	Into a glass bottle or plastic jar weigh 20g of air-dried or as received sample, and add 100mL distilled water. If suspensions are prepared on different sample weights, ensure that the 1:5 soil to water ratio is maintained.
AN006	Contaminants of interest in a waste material are leached out of the waste with a selected leaching solution under controlled conditions. The ratio of sample to extraction fluid is 100g to 2L (1 to 20 by mass). The concentration of each contaminant of interest is determined in the leachate by appropriate methods after separation from the sample by filtering. Base on USEPA 1311.
AN006	Extraction Fluid #1: This fluid is made by combining 128.6mL of dilute sodium hydroxide solution and 11.5mL glacial acetic acid with water and diluting to a volume of 2 litres. The pH of this fluid should be 4.93 ± 0.05 .
AN006	Extraction Fluid #2: This fluid is made by diluting 5.7mL glacial acetic acid with water to a volume of 1 litre. The pH of this fluid should be 2.88 ± 0.05 .
AN014	This method is for the determination of soluble sulphate (SO ₄ -S) by extraction with hydrochloric acid. Sulphides should not react and would normally be expelled. Sulphur is determined by ICP.
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.
AN212	Samples are initially evaluated to determine the strength of reagents needed using a 'fizz' test. Samples are then subjected to an excess of hydrochloric acid followed by alkaline back titration to pH 7. Results are expressed in kg H ₂ SO ₄ /tonne or Kg CaCO ₃ /tonne after correction for moisture content if applicable.
AN215	This is purely a calculation based on results obtained from Total Sulphur, Sulphate Method, and Acid Neutralisation Capacity Method (ME-(AU)-[ENV]AN212).
AN216	Pulverised sub-sample of a waste rock or an as received sample of filter cake, soil or sludge is subjected to an oxidising digest with hydrogen peroxide. The pH and EC of the NAG suspension is recorded at various stages in the digest. The acid produced (if any) is titrated using standardised NaOH to pH 7.0. NAG results are reported to 0.5 kg H ₂ SO ₄ /tonne.
AN311/AN312	Mercury by Cold Vapour AAS in Waters: 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.
AN320/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.
AN320/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.	NVL	Not Validated
LOR	Limit of Reporting		
↑↓	Raised or Lowered Limit of Reporting		

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

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

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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