

APPENDIX B3:B

Acid Sulphate Soil Table A1 A2

Golder Associates

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10 Oct 2013

APPENDIX B

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13/06/2019 04:13:48 (REV)

TABLE A1 - SUMMARY OF ACID SULFATE SOIL FIELD AND LABORATORY ANALYSIS RESULTS

BH ID	Depth (m)	Description	Quick Screening Test		Remarks	Existing Acidity		Acid Neutralising Capacity			Retained Acidity		Acid Base Accounting		Required Lime Rate				
			pH _i	AASS likelihood ¹		pH _{test}	PASS likelihood ²	Reaction	Titrateable Actual Acidity (pH/KCI)	Chromium Reducible Sulfur	Chromium Reducible Sulfur	acid - Chromium Sulfur	acid - Acid Neutralising Capacity	acid - Sulfur	acid - Sulfur	Net Acidity (acid units)	ANC Fineness Factor	Net Acidity (acid units)	kg CaCO ₃ /m ³
ASS 912	0.25	Steady CLAY, dark grey, organics	4.9	M	H	4.7	<10	<10							1.5	0.11	70	5	8
	0.50	Steady CLAY, dark grey, organics	4.7	M	H														
	0.75	Steady CLAY, dark grey, organics	4.8	M	H														
	1.00	Steady CLAY, dark grey, organics	4.8	M	H														
	1.25	Steady CLAY, dark grey, organics	4.7	M	H														
ASS 912	0.25	Steady CLAY, dark grey, organics	4.9	M	H	4.5	<10	<10							1.5	0.11	72	5	8
	0.50	Steady CLAY, dark grey, organics	4.8	M	H														
	0.75	Steady CLAY, dark grey, organics	4.8	M	H														
	1.00	Steady CLAY, dark grey, organics	4.8	M	H														
	1.25	Steady CLAY, dark grey, organics	4.8	M	H														
ASS 1012	0.25	Steady CLAY, dark brown	5.0	M	H	5.2	<10	<10							1.5	0.17	109	8	14
	0.50	Steady CLAY, dark brown	5.0	M	H														
	0.75	Steady CLAY, dark brown	5.1	M	H														
	1.00	Steady CLAY, dark brown	5.1	M	H														
	1.25	Steady CLAY, dark brown	5.0	M	H														
ASS 1102	0.25	Steady CLAY, dark grey, organics	4.6	M	L	4.6	<10	<10							1.5	0.09	54	4	6
	0.50	Steady CLAY, dark grey, organics	4.9	M	L														
	0.75	Steady CLAY, dark grey, organics	4.9	M	L														
	1.00	Steady CLAY, dark grey, organics	5.2	M	L														
	1.25	Steady CLAY, dark grey, organics	5.0	M	L														
ASS 1312	0.25	Steady CLAY, dark grey, organics	4.2	M	L	4.9	<10	<10							1.5	0.03	19	1	2
	0.50	Steady CLAY, dark grey, organics	4.2	M	L														
	0.75	Steady CLAY, dark grey, organics	4.2	M	L														
	1.00	Steady CLAY, dark grey, organics	4.2	M	L														
	1.25	Steady CLAY, dark grey, organics	4.2	M	L														
ASS 1412	0.25	Steady CLAY, dark grey, organics	4.5	M	L	6.0	<2	<10							1.5	<0.02	<10	<1	<1
	0.50	Steady CLAY, dark grey, organics	4.5	M	L														
	0.75	Steady CLAY, dark grey, organics	4.5	M	L														
	1.00	Steady CLAY, dark grey, organics	4.5	M	L														
	1.25	Steady CLAY, dark grey, organics	4.3	M	L														
ASS 1612	0.25	Steady CLAY, dark brown	4.3	M	L	4.9	<10	<10							1.5	0.09	54	4	6
	0.50	Steady CLAY, dark brown	4.3	M	L														
	0.75	Steady CLAY, dark brown	4.3	M	L														
	1.00	Steady CLAY, dark brown	4.3	M	L														
	1.25	Steady CLAY, dark brown	4.3	M	L														

1. Actual Acid Sulfate Soil (AASS) likelihood is indicated by Low (L), Medium (M) and High (H).
2. Potential Acid Sulfate Soil (PASS) likelihood is indicated by Low (L), Medium (M) and High (H).
3. The table in the main column indicates the pH test result for pH_{test} (2 pH units) and the pH_i (1 & 2 pH units) and pH CO₂ (3 & 4 pH units).
4. The table in the main column indicates the acid neutralising capacity (ANC) for pH_{test} (2 pH units) and the ANC for pH_i (1 & 2 pH units).
5. Shaded AA & SA results are those exceeding the CASST action levels of 0.03 for H and 0.15 for S.
6. Shaded HA & SA results are those exceeding the CASST action levels of 0.03 for H and 0.15 for S.
7. Shaded Net Acidity (acid units) and Net Acidity (acid units) results are those exceeding the CASST action levels of 0.03 for H and 0.15 for S.
8. Required Lime Rate is calculated from the net Acidity values with a factor of safety = 1.5 and bulk density of 1.5 t/m³.

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October 2013 13743099-01-R (Rev0) TABLE AT - SUMMARY OF ACID SULFATE SOIL FIELD AND LABORATORY ANALYSIS RESULTS

ASS 1912	0.05 SAND, dark grey/black	4.9	M	3.6	L	M	4.3	84	0.01	<10	<1	13	177	0.28	<10	23
0.25	Stony clay	4.4	M	2.7	M	L	5.7	3	<0.005	<10	<1	<1	<10	<0.02	<1	nil
0.50	Stony clay	3.0	H	2.0	M	L	5.7	3	<0.005	<10	<1	<1	<10	<0.02	<1	nil
1.00	Stony clay	4.7	M	2.9	H	L	5.7	3	<0.005	<10	<1	<1	<10	<0.02	<1	nil
1.25	Stony clay	4.0	L	2.9	M	M	5.7	3	<0.005	<10	<1	<1	<10	<0.02	<1	nil
ASS 1912	0.10 SAND, dark grey, some calcareous	4.2	M	3.6	L	L	4.5	77	0.05	29	8	14	106	0.17	8	14
0.25	SAND, dark grey, fine silt	4.2	M	3.6	L	L	4.5	77	0.05	29	8	14	106	0.17	8	14
0.50	SAND, dark grey, some calcareous	4.2	M	3.6	L	L	4.5	77	0.05	29	8	14	106	0.17	8	14
0.75	SAND, dark grey, some calcareous	4.2	M	3.6	L	L	4.5	77	0.05	29	8	14	106	0.17	8	14
1.00	Medium SAND, dark grey, some calcareous	4.9	M	2.6	M	L	4.5	77	0.05	29	8	14	106	0.17	8	14
1.25	Medium SAND, dark grey, some calcareous	4.6	M	2.7	M	L	4.5	77	0.05	29	8	14	106	0.17	8	14
1.50	Medium SAND, dark grey, some calcareous	4.3	M	1.1	H	H	4.5	77	0.05	29	8	14	106	0.17	8	14
2.00	SPY SAND, dark grey, trace organics	5.4	L	3.9	L	H	4.5	77	0.05	29	8	14	106	0.17	8	14
ASS 1912	0.10 SPY SAND, dark grey, trace organics	6.4	L	4.3	M	M	5.4	7	<0.005	<10	<1	<1	<10	<0.02	<1	nil
0.25	SPY SAND, dark grey, trace organics	3.9	L	1.9	M	L	5.4	7	<0.005	<10	<1	<1	<10	<0.02	<1	nil
0.50	SPY SAND, dark grey, trace organics	4.6	M	2.0	H	L	5.4	7	<0.005	<10	<1	<1	<10	<0.02	<1	nil
0.75	SPY SAND, dark grey, trace organics	3.5	L	1.9	M	L	5.4	7	<0.005	<10	<1	<1	<10	<0.02	<1	nil
1.00	Medium SAND, dark brown	3.5	L	1.9	M	L	4.8	36	0.01	<10	<1	3	39	0.06	3	5
1.25	Medium SAND, dark brown	4.9	M	2.7	M	L	4.8	36	0.01	<10	<1	3	39	0.06	3	5
1.50	Medium SAND, dark brown	4.9	M	2.7	M	L	4.8	36	0.01	<10	<1	3	39	0.06	3	5
1.75	SAND, calcareous, some ill. trace organics	4.5	M	2.8	M	L	4.9	18	<0.005	<10	<1	1	18	0.03	1	2
2.00	Medium SAND, dark brown, trace ill.	4.0	M	1.8	H	L	4.9	18	<0.005	<10	<1	1	18	0.03	1	2
ASS 2012	0.10 SAND, calcareous, some ill. trace organics	4.9	M	2.8	M	L	4.9	18	<0.005	<10	<1	1	18	0.03	1	2
0.25	Medium SAND, dark brown, trace ill.	4.0	M	1.8	H	L	4.9	18	<0.005	<10	<1	1	18	0.03	1	2
0.50	Medium SAND, dark brown, trace ill.	4.9	M	3.5	H	L	4.9	18	<0.005	<10	<1	1	18	0.03	1	2
0.75	Medium SAND, dark brown, trace ill.	4.9	M	3.5	H	L	4.9	18	<0.005	<10	<1	1	18	0.03	1	2
1.00	Medium SAND, dark brown, trace ill.	3.9	H	2.6	M	L	4.9	18	<0.005	<10	<1	1	18	0.03	1	2
1.25	Medium SAND, dark brown, trace ill.	3.9	H	2.1	M	L	4.9	18	<0.005	<10	<1	1	18	0.03	1	2
1.50	Medium SAND, dark brown, trace ill.	3.9	H	2.1	M	L	4.9	18	<0.005	<10	<1	1	18	0.03	1	2
1.75	Medium SAND, dark brown, trace ill.	4.5	M	2.1	H	L	4.9	18	<0.005	<10	<1	1	18	0.03	1	2
2.00	Medium SAND, dark brown, trace ill.	4.4	M	2.5	M	L	4.9	18	<0.005	<10	<1	1	18	0.03	1	2

1. Actual Acid Sulfate Soil (ASS) likelihood is indicated by Low (L), non-likely (N), Medium (M), yellow (light to 5), High (H), and Very High (VH) (H, and non-likely (N)).
 2. Potential Acid Sulfate Soil (PASS) likelihood is indicated by Low (L), and non-likely (N), Medium (M), yellow (light to 5), High (H), and Very High (VH) (H, and non-likely (N)).
 3. The pH in the water column indicates the presence of the following: O - Organic; S - Sulfate; Fe - Iron; Mn - Manganese; Ca - Calcium; Mg - Magnesium; Na - Sodium; K - Potassium; Cl - Chloride; SO₄ - Sulfate; NO₃ - Nitrate; NH₄ - Ammonium; CO₃ - Carbonate; HCO₃ - Bicarbonate; PO₄ - Phosphate; and C - Other.
 4. The pH in the water column indicates the presence of the following: O - Organic; S - Sulfate; Fe - Iron; Mn - Manganese; Ca - Calcium; Mg - Magnesium; Na - Sodium; K - Potassium; Cl - Chloride; SO₄ - Sulfate; NO₃ - Nitrate; NH₄ - Ammonium; CO₃ - Carbonate; HCO₃ - Bicarbonate; PO₄ - Phosphate; and C - Other.
 5. Shaded PA & S_{oc} results are those exceeding the CASST action levels of 16 mg/l for O₂ S_{oc}.
 6. Shaded PA & S_{oc} results are those exceeding the CASST action levels of 16 mg/l for O₂ S_{oc}.
 7. Shaded PA & S_{oc} results are those exceeding the CASST action levels of 16 mg/l for O₂ S_{oc}.
 8. Required Lime Rate is calculated from the net Acid Base Account with a factor of safety = 1.5 and bulk density of 1.5 t/m³ for sands and 1.5 t/m³ for clays.

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TABLE A2 - SUMMARY OF ACID SULFATE SOIL FIELD AND LABORATORY ANALYSIS RESULTS

BHID	Depth (m)	Description	Quick Screening Test		Reaction	Remark	Existing Acidity		Potential Acidity		Acid Neutralising Capacity		Retained Acidity		Acid Base Accounting		Required Lime Rate		
			pH _i	pH _{ox}			Titration pH (KCl)	Chromium Reducible Sulfur	Chromium Reducible Sulfur	acid - Acid Neutralising Capacity	acid - Acid Neutralising Capacity	acid - Net Acid Soluble Sulfur	acid - Net Acid Soluble Sulfur	ANC Fineness Factor	Net Acidity (sulfur units)	Net Acidity (sulfur units)	kg CaCO ₃ /m ³	kg CaCO ₃ /m ³	
BH112	025	Silty SAND, dark gray, trace clay, organics	3.3	M	L		5.8	<2	<0.005	<10					1.5	<0.02	<10	Nil	
	075	SAND, pale gray, silty	3.4	M	L		5.8								1.5			Nil	
	100	SAND, pale gray, silty	5.0	L	L		4.8	53	0.008	<10					1.5	0.09	58	4	
	150	Interstratified SAND, dark gray, trace brown	5.4	L	L														7
	175	SAND, pale gray, silty	5.3	L	L														
BH112	025	Silty SAND, dark gray, organics	4.6	M	L		5.2	15	<0.005	<10					1.5	0.01	15	1	
	075	SAND, yellow, silty, silty	4.2	M	L														2
	100	Interstratified SAND, dark gray	3.9	H	L														
	125	SAND, pale gray, silty	4.5	M	L														
	175	SAND, pale gray, silty	4.4	M	L														
BH112	025	SAND, dark gray, trace clay, organics	4.6	M	L		4.9	30	<0.005	<10					1.5	0.05	30	2	
	075	SAND, dark gray, trace clay, organics	4.8	M	L														3
	100	SAND, dark gray, trace clay, organics	3.5	H	L														
	125	SAND, dark gray, trace clay, organics	3.4	H	L														
	175	SAND, dark gray, trace clay, organics	3.1	H	L														
BH112	025	bleeding brown with some silt	3.3	H	L														
	075	SAND, dark gray, trace clay, organics	3.5	H	L		5.1	13	<0.005	<10					1.5	0.02	13	Nil	
	100	SAND, pale gray, trace silt	2.9	H	L														Nil
	125	SAND, pale gray, trace silt	2.6	H	L		5.1	20	1.020	638					1.5	1.05	658	49	
	175	SAND, dark gray, trace clay, organics	4.9	M	L														74
BH112	025	SAND, dark gray, trace clay, organics	4.4	M	L		4.5	86	<0.005	<10					1.5	0.14	86	6	
	075	SAND, dark gray, trace clay, organics	4.4	M	L														9
	100	SAND, dark gray, trace clay, organics	4.4	M	L														
	125	SAND, dark gray, trace clay, organics	4.4	M	L														
	175	SAND, dark gray, trace clay, organics	4.4	M	L														
BH112	025	SAND, CLAY, dark gray, trace clay, organics	5.3	L	L		5.2	16	0.855	539					1.5	0.89	655	42	
	075	SAND, CLAY, dark gray, trace clay, organics	4.0	H	L														76
	100	SAND, CLAY, dark gray, trace clay, organics	5.6	L	L														
	125	SAND, CLAY, dark gray, trace clay, organics	5.9	L	L														
	175	SAND, CLAY, dark gray, trace clay, organics	6.4	L	L		7.8	<2	1.420	887	1.09	217	0.35		1.5	1.19	742	56	
BH112	025	SAND, CLAY, dark gray, trace clay, organics	5.3	L	L		4.8	39	0.697	29					1.5	0.11	68	5	
	075	SAND, CLAY, dark gray, trace clay, organics	4.4	M	L														8
	100	SAND, CLAY, dark gray, trace clay, organics	4.7	M	L														
	125	SAND, CLAY, dark gray, trace clay, organics	4.7	M	L														
	175	SAND, CLAY, dark gray, trace clay, organics	4.4	M	L														
BH112	025	SAND, CLAY, dark gray, trace clay, organics	4.2	M	L		4.8	25	0.015	<10					1.5	0.06	35	3	
	075	SAND, CLAY, dark gray, trace clay, organics	3.4	H	L														5
	100	SAND, CLAY, dark gray, trace clay, organics	4.0	H	L														
	125	SAND, CLAY, dark gray, trace clay, organics	4.5	M	L														
	175	SAND, CLAY, dark gray, trace clay, organics	4.8	M	L														
BH112	025	SAND, CLAY, dark gray, trace clay, organics	4.3	M	L		4.8	32	0.007	<10					1.5	0.06	37	3	
	075	SAND, CLAY, dark gray, trace clay, organics	4.7	M	L														5
	100	SAND, CLAY, dark gray, trace clay, organics	4.6	M	L														
	125	SAND, CLAY, dark gray, trace clay, organics	4.4	M	L														
	175	SAND, CLAY, dark gray, trace clay, organics	4.4	M	L		4.3	94	0.077	46					1.5	0.24	149	11	

1. Actual Acid Sulfate Soil (AASS) likelihood is indicated by Low (L), no analysis (N), Medium (M), yellow shaded (5 spH), <4 and High (H) & red shaded (4.4).
 2. Potential Acid Sulfate Soil (PASS) likelihood is indicated by Low (L), no analysis (N), Medium (M), yellow shaded (5 spH), <4 and High (H) & red shaded (4.4).
 3. The likelihood in the remarks column indicates the presence of the following: O - Organic S; S - Sulfur; Fe - Ferric Iron; Cu - Copper; P - Phosphate; C - Carbon.
 4. The likelihood in the remarks column indicates the presence of the following: O - Organic S; S - Sulfur; Fe - Ferric Iron; Cu - Copper; P - Phosphate; C - Carbon.
 5. Shaded (AASS) results are those exceeding the CASBIT action levels of 0.03 NS or 10 mg H+.
 6. Shaded (PASS) results are those exceeding the CASBIT action levels of 0.03 NS or 10 mg H+.
 7. Shaded Net Acidity (sulfur units) and Net Acidity (acid units) results are those exceeding the CASBIT action levels of 0.03 NS or 10 mg H+.
 8. Required Lime Rate is calculated from the net Acid Sulfate Soil (AASS) with a factor of safety = 1.5 and a bulk density of 1.3 t/m³.

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TABLE A2 - SUMMARY OF ACID SULFATE SOIL FIELD AND LABORATORY ANALYSIS RESULTS

Column ID	Parameter	Value	Unit	Limit	Notes	Column ID	Parameter	Value	Unit	Limit	Notes
BH1212	025 SHY SNTU dark grey organics	4.0	M	2.7	M	0.03	18				1
	075 SNTU dark grey	3.7	H	3.2	L						2
	100 SHY SNTU dark grey face soil	3.3	H	2.9	M						
	150 SHY SNTU dark grey face soil	3.5	H	2.1	M						
	175 SHY SNTU dark grey face soil	4.3	M	2.3	H	0.12	72				5
	200 SHY SNTU dark grey organics	4.5	M	3.2	H						
BH1312	025 SHY SNTU dark grey organics	3.1	H	2.2	M	0.07	43				3
	075 SNTU dark grey	4.2	M	3.5	L						
	100 SHY SNTU dark grey face soil	4.0	M	1.9	H						
	150 SHY SNTU dark grey face soil	4.5	M	2.0	H	0.10	60				4
	175 SHY SNTU dark grey face soil	4.9	M	3.0	M						
	200 SHY SNTU dark grey organics	4.2	M	2.6	M	0.04	25				2
BH1412	025 SHY SNTU dark grey organics	4.2	M	2.7	M						
	075 SNTU dark grey	3.7	H	3.0	L						
	100 SHY SNTU dark grey face soil	4.3	M	2.0	H	0.10	63				5
	150 SHY SNTU dark grey face soil	4.7	M	2.2	H						
	175 SHY SNTU dark grey face soil	4.8	M	3.0	M						
	200 SHY SNTU dark grey organics	4.4	M	2.3	H						
BH1512	025 SHY SNTU dark grey organics	4.4	M	1.7	H						
	075 SNTU dark grey	4.4	M	2.0	H						
	100 SHY SNTU dark grey face soil	5.0	M	2.6	H						
	125 SHY SNTU dark brown dark grey	4.9	M	2.4	H						
	150 SHY SNTU dark brown dark grey	4.6	M	2.1	H	0.08	52				4
	175 SHY SNTU dark grey face organics	4.7	M	2.7	H						
	200 SHY SNTU dark grey organics	4.7	M	3.2	L						
BH1612	025 SHY SNTU dark grey organics	4.8	M	3.9	L						
	075 SNTU dark grey	4.4	M	2.3	H						
	100 SHY SNTU dark brown dark grey face soil	4.7	M	2.2	H	0.11	67				5
	125 SHY SNTU dark brown dark grey	4.7	M	2.2	H						
	150 SHY SNTU dark brown dark grey	4.3	M	2.9	M						
	175 SHY SNTU dark grey face organics	4.5	M	2.9	M						
	200 SHY SNTU dark grey organics	5.1	L	2.8	H						
BH1712	025 SHY SNTU dark grey organics	4.1	M	1.9	H						
	075 SNTU dark grey	3.7	H	2.2	H						
	100 SHY SNTU dark grey face soil	3.4	H	1.8	M	0.15	91				7
	150 SHY SNTU dark grey face soil	4.0	H	1.4	H						
	175 SHY SNTU dark grey face soil	4.7	M	1.9	H	0.14	89				7
	200 SHY SNTU dark grey organics	4.4	M	2.4	H						

1. Actual Acid Sulfate Soil (AASS) likelihood is indicated by Low (L), no analysis (N), Medium (M), yellow shaded (S), High (H) and Very High (VH) and not analyzed (NA).
 2. Likelihood is based on the following: Low (L), no analysis (N), Medium (M), yellow shaded (S), High (H) and Very High (VH) and not analyzed (NA).
 3. Thresholds are: Low (L) < 2.0 mg/kg, Medium (M) < 5.0 mg/kg, High (H) < 10.0 mg/kg, Very High (VH) > 10.0 mg/kg.
 4. Thresholds in the same column indicates the presence of the following: O - Organic, S - Sulfide, Fe - Iron, Mn - Manganese, Cu - Copper, P - Phosphate, C - Carbon.
 5. Thresholds in the same column indicates the presence of the following: O - Organic, S - Sulfide, Fe - Iron, Mn - Manganese, Cu - Copper, P - Phosphate, C - Carbon.
 6. Acid Base Action = Total Acidity (M) - Total Alkalinity (M).
 7. Shaded Net Acidity (for units) and Net Acidity (acid) units. If results are those exceeding the OASSTI action levels of 0.03 NS or 10 mEq H+.
 8. Required Lime Rate is calculated from the net Acid Base Action with a factor of safety = 1.5 and bulk density of 1.3 t/m³ for sand and 1.5 t/m³ for clays.



Environmental Division



CERTIFICATE OF ANALYSIS

Work Order	: EB1223943	Page	: 1 of 8
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR LYNDON GORDON	Contact	: Carsten Emrich
Address	: P O BOX 5569 55 KINGSFORD SMITH PARADE MAROOCHYDORE QLD, AUSTRALIA 4558	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: lgordon@golder.com.au	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 07 5475 5900	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 5475 5901	Facsimile	: +61 7 3243 7218
Project	: SCA Expansion - ASS Investigation 127683017	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: M27974	Date Samples Received	: 10-SEP-2012
C-O-C number	: SCA-01	Issue Date	: 17-SEP-2012
Sampler	: Golder	No. of samples received	: 26
Site	: -----	No. of samples analysed	: 26
Quote number	: EN/002/12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825
Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
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Page : 2 of 8
Work Order : EB1223943
Client : GOLDER ASSOCIATES
Project : SCA Expansion - ASS Investigation 127683017

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

● **ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5**

● **ASS: EA033 (CRS Suite): Limiting rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Limiting Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**



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 Work Order : EB1223943
 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number		Client sampling date / time		Client sample ID	
	LOR	Unit	31-AUG-2012 15:00	31-AUG-2012 15:00	31-AUG-2012 15:00	31-AUG-2012 15:00
EA033-A: Actual Acidity						
pH KGI (23A)	0.1	pH Unit	4.7	4.8	4.5	4.8
Titratable Actual Acidity (23F)	2	mole H+ / t	70	30	72	27
sulfidic - Titratable Actual Acidity (s-23F)	0.02	% pyrite S	0.11	0.05	0.11	0.04
EA033-B: Potential Acidity						
Chromium Reducible Sulfur (a-22B)	0.005	% S	<0.005	0.039	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	10	mole H+ / t	<10	24	<10	<10
EA033-E: Acid Base Accounting						
ANC Fineness Factor	0.5	-	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	0.02	% S	0.11	0.09	0.11	0.04
Net Acidity (acidity units)	10	mole H+ / t	70	55	72	27
Liming Rate	1	kg CaCO3/t	5	4	5	2



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 Work Order : EB1223943
 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID			
				Client sampling date / time	ASS BH09	ASS BH10	ASS BH10
EA033-A: Actual Acidity							EB1223943-010
pH KGI (23A)	----	0.1	pH Unit	31-AUG-2012 15:00	0.0-0.1m	1.5-1.75m	1.25-1.5m
Titratable Actual Acidity (23F)	----	2	mole H+ / t	31-AUG-2012 15:00	0.0-0.1m	1.5-1.75m	0.1-0.25m
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	31-AUG-2012 15:00	0.0-0.1m	1.5-1.75m	0.1-0.25m
EA033-B: Potential Acidity							EB1223943-009
Chromium Reducible Sulfur (a-22B)	----	0.005	% S	31-AUG-2012 15:00	0.0-0.1m	1.5-1.75m	0.1-0.25m
Chromium Reducible Sulfur	----	10	mole H+ / t	31-AUG-2012 15:00	0.0-0.1m	1.5-1.75m	0.1-0.25m
EA033-E: Acid Base Accounting							EB1223943-008
ANC Fineness Factor	----	0.5	-	31-AUG-2012 15:00	0.0-0.1m	1.5-1.75m	0.1-0.25m
Net Acidity (sulfur units)	----	0.02	% S	31-AUG-2012 15:00	0.0-0.1m	1.5-1.75m	0.1-0.25m
Net Acidity (acidity units)	----	10	mole H+ / t	31-AUG-2012 15:00	0.0-0.1m	1.5-1.75m	0.1-0.25m
Liming Rate	----	1	kg CaCO3/t	31-AUG-2012 15:00	0.0-0.1m	1.5-1.75m	0.1-0.25m



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 Work Order : EB1223943
 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number		Client sampling date / time		Client sample ID	
	EB1223943-011	EB1223943-012	31-AUG-2012 15:00	31-AUG-2012 15:00	31-AUG-2012 15:00	31-AUG-2012 15:00
	LOR	Unit				
EA033-A: Actual Acidity						
pH KGI (23A)	0.1	pH Unit	4.9	5.0	4.7	4.5
Titratable Actual Acidity (23F)	2	mole H+ / t	19	18	22	51
sulfidic - Titratable Actual Acidity (s-23F)	0.02	% pyrite S	0.03	0.03	0.04	0.08
EA033-B: Potential Acidity						
Chromium Reducible Sulfur (a-22B)	0.005	% S	<0.005	0.127	<0.005	0.006
Chromium Reducible Sulfur (a-22B)	10	mole H+ / t	<10	79	<10	<10
EA033-E: Acid Base Accounting						
ANC Fineness Factor	0.5	-	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	0.02	% S	0.03	0.16	0.04	0.09
Net Acidity (acidity units)	10	mole H+ / t	19	97	22	54
Liming Rate	1	kg CaCO3/t	1	7	2	4



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 Work Order : EB1223943
 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID				
				ASS BH14 1.75-2.0m 31-AUG-2012 15:00 EB1223943-016	ASS BH15 0.0-0.1m 31-AUG-2012 15:00 EB1223943-017	ASS BH15 1.0-1.25m 31-AUG-2012 15:00 EB1223943-018	ASS BH16 0.1-0.25m 31-AUG-2012 15:00 EB1223943-019	ASS BH16 1.0-1.25m 31-AUG-2012 15:00 EB1223943-020
EA033-A: Actual Acidity								
pH KGI (23A)	----	0.1	pH Unit	4.9	4.1	4.0	4.3	5.7
Titratable Actual Acidity (23F)	----	2	mole H+ / t	25	229	182	84	3
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.04	0.37	0.29	0.14	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.098	0.008	0.537	0.011	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	61	<10	335	<10	<10
EA033-D: Retained Acidity								
KCl Extractable Sulfur (23Ca)	----	0.02	% S	----	<0.02	0.05	<0.02	----
HCl Extractable Sulfur (20Be)	----	0.02	% S	----	0.10	0.29	0.18	----
Net Acid Soluble Sulfur (20Je)	----	0.02	% S	----	0.10	0.24	0.18	----
acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	----	48	115	86	----
sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	----	0.08	0.18	0.14	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.14	0.45	1.01	0.28	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	86	283	631	177	<10
Liming Rate	----	1	kg CaCO3/t	6	21	47	13	<1



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 Work Order : EB1223943
 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID					
				Client sampling date / time	ASS BH18	ASS BH19	ASS BH19	ASS BH20	
EA033-A: Actual Acidity									
pH KGI (23A)	----	0.1	pH Unit	30-AUG-2012 15:00	1.5-1.75m	0.5-0.75m	1.5-1.75m	0.0-0.1m	EB1223943-025
Titratable Actual Acidity (23F)	----	2	mole H+ / t	30-AUG-2012 15:00	77	7	36	18	EB1223943-024
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	30-AUG-2012 15:00	0.12	<0.02	0.06	0.03	EB1223943-023
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (a-22B)	----	0.005	% S	30-AUG-2012 15:00	0.046	<0.005	0.005	<0.005	EB1223943-022
Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	30-AUG-2012 15:00	29	<10	<10	<10	EB1223943-021
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-	30-AUG-2012 15:00	1.5	1.5	1.5	1.5	EB1223943-022
Net Acidity (sulfur units)	----	0.02	% S	30-AUG-2012 15:00	0.17	<0.02	0.06	0.03	EB1223943-024
Net Acidity (acidity units)	----	10	mole H+ / t	30-AUG-2012 15:00	106	<10	39	18	EB1223943-023
Liming Rate	----	1	kg CaCO3/t	30-AUG-2012 15:00	8	<1	3	1	EB1223943-021



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 Work Order : EB1223943
 Client : GOLDR ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID			
				Client sampling date / time	ASS BH20	1.5-1.75m	30-AUG-2012 15:00
EA033-A: Actual Acidity							
pH KCl (23A)		0.1	pH Unit				
Titratable Actual Acidity (23F)		2	mole H+ / t				
sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S				
EA033-B: Potential Acidity							
Chromium Reducible Sulfur (22B)		0.005	% S				
acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t				
EA033-E: Acid Base Accounting							
ANC Fineness Factor		0.5	-				
Net Acidity (sulfur units)		0.02	% S				
Net Acidity (acidity units)		10	mole H+ / t				
Liming Rate		1	kg CaCO3/t				



QUALITY CONTROL REPORT

Work Order	: EB1223943	Page	: 1 of 4
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR LYNDON GORDON	Contact	: Carsten Emrich
Address	: P O BOX 5569 55 KINGSFORD SMITH PARADE MAROOCHYDORE QLD, AUSTRALIA 4558	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: lgordon@golder.com.au	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 07 5475 5900	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 5475 5901	Facsimile	: +61 7 3243 7218
Project	: SCA Expansion -- ASS Investigation 127683017	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ---	Date Samples Received	: 10-SEP-2012
C-O-C number	: SCA-01	Issue Date	: 17-SEP-2012
Sampler	: Golder	No. of samples received	: 26
Order number	: M27974	No. of samples analysed	: 26
Quote number	: EN/002/12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



NATA Accredited Laboratory 825
Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
SATISH TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils

Address 32 Shand Street, Stafford QLD Australia 4053 | PHONE +617 3243 7222 | Facsimile +617 3243 7218
Environmental Division Brisbane ABN 84 009 936 029 Part of the ALS Group A Campbell Brothers Limited Company

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Page : 2 of 4
Work Order : EB1223943
Client : GOLDER ASSOCIATES
Project : SCA Expansion - ASS Investigation 127683017

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :

Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC



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 Work Order : EB1223943
 Client : GOLDR ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intra-laboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method, Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
EA033-A: Actual Acidity (QC Lot: 2497392)									
EB1223863-001	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.28	0.28	0.0	0% - 50%
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	176	176	0.0	0% - 20%
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.0	4.1	2.5	0% - 20%
EB1223943-005	ASS BH09 0.1+0.25m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.04	0.04	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	27	26	0.0	0% - 50%
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.8	4.8	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 2497393)									
EB1223943-015	ASS BH14 0.1+0.25m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.08	0.08	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	51	53	5.1	0% - 20%
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.5	4.6	2.2	0% - 20%
EB1223943-025	ASS BH20 0.0-0.1m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.03	0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	18	16	10.7	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.9	4.9	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 2497392)									
EB1223863-001	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EB1223943-005	ASS BH09 0.1+0.25m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 2497393)									
EB1223943-015	ASS BH14 0.1+0.25m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EB1223943-025	ASS BH20 0.0-0.1m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit



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 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: SOIL

Method/Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Recovery (%)	Spike Concentration	Spike Recovery (%)	Low	High
EA033-A: Actual Acidity (QC Lot: 2497392)									
EA033: pH KCl (23A)		0.1	pH Unit	---	---	4.5 pH Unit	102	94	120
EA033: Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2	30 mole H+ / t	98.5	93	115
EA033: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	---	---	---	---
EA033-A: Actual Acidity (QC Lot: 2497393)									
EA033: pH KCl (23A)		0.1	pH Unit	---	---	4.5 pH Unit	102	94	120
EA033: Titratable Actual Acidity (23F)		2	mole H+ / t	<2	<2	30 mole H+ / t	101	93	115
EA033: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	<0.02	---	---	---	---
EA033-B: Potential Acidity (QC Lot: 2497392)									
EA033: Chromium Reducible Sulfur (22B)		0.005	% S	<0.005	<0.005	.28 % S	90.2	80	120
EA033: acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	---	---	---	---
EA033-B: Potential Acidity (QC Lot: 2497393)									
EA033: Chromium Reducible Sulfur (22B)		0.005	% S	<0.005	<0.005	.28 % S	87.4	80	120
EA033: acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	<10	---	---	---	---
EA033-D: Retained Acidity (QC Lot: 2497393)									
EA033: Net Acid Soluble Sulfur (20Je)		0.02	% S	<0.02	<0.02	---	---	---	---
EA033: acidity - Net Acid Soluble Sulfur (a-20J)		10	mole H+ / t	<10	<10	---	---	---	---
EA033: sulfidic - Net Acid Soluble Sulfur (s-20J)		0.02	% pyrite S	<0.02	<0.02	---	---	---	---
EA033: KCl Extractable Sulfur (23Ce)		0.02	% S	<0.02	<0.02	0.036110 % S	91.4	90	110
EA033: HCl Extractable Sulfur (20Be)		0.02	% S	<0.02	<0.02	.06 % S	100	90	110

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) Results are required to be reported.**

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**



INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: EB1223943	Page	: 1 of 7
Client	: GOLDR ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR LYNDON GORDON	Contact	: Carsten Emrich
Address	: P O BOX 5569 55 KINGSFORD SMITH PARADE MAROOCHYDORE QLD, AUSTRALIA 4558	Address	: 32 Shand Street Stafford QLD Australia 4053
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Telephone	: +61 07 5475 5900	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 5475 5901	Facsimile	: +61 7 3243 7218
Project	: SCA Expansion - ASS Investigation	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: -----	Date Samples Received	: 10-SEP-2012
C-O-C number	: SCA-01	Issue Date	: 17-SEP-2012
Sampler	: Golder	No. of samples received	: 26
Order number	: MZ7974	No. of samples analysed	: 26
Quote number	: EN/002/12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

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 Work Order : EB1223943
 Client : GOLDR ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Analysis	
			Date extracted	Due for extraction	Date analysed	Due for analysis
EA033-E: Acid Base Accounting						
Snap Lock Bag - frozen (EA033)						
ASS BH19 - 0.5-0.75m,	ASS BH19 - 1.5-1.75m	27-AUG-2012	13-SEP-2012	27-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH18 - 0.5-0.75m,	ASS BH18 - 1.5-1.75m,	30-AUG-2012	13-SEP-2012	30-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH20 - 0.0-0.1m,	ASS BH20 - 1.5-1.75m					
Snap Lock Bag - frozen (EA033)						
ASS BH07 - 0.1-0.25m,	ASS BH07 - 1.5-1.75m,	31-AUG-2012	13-SEP-2012	31-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH08 - 0.1-0.25m,	ASS BH08 - 1.5-1.75m,					
ASS BH09 - 0.1-0.25m,	ASS BH09 - 1.25-1.5m,					
ASS BH10 - 0.0-0.1m,	ASS BH10 - 1.5-1.75m,					
ASS BH11 - 0.1-0.25m,	ASS BH11 - 1.25-1.5m,					
ASS BH12 - 0.25-0.5m,	ASS BH12 - 1.5-1.75m,					
ASS BH13 - 0.25-0.5m,	ASS BH13 - 1.25-1.5m,					
ASS BH14 - 0.1-0.25m,	ASS BH14 - 1.75-2.0m,					
ASS BH15 - 0.0-0.1m,	ASS BH15 - 1.0-1.25m,					
ASS BH16 - 0.1-0.25m,	ASS BH16 - 1.0-1.25m					
EA033-C: Acid Neutralising Capacity						
Snap Lock Bag - frozen (EA033)						
ASS BH19 - 0.5-0.75m,	ASS BH19 - 1.5-1.75m	27-AUG-2012	13-SEP-2012	27-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH18 - 0.5-0.75m,	ASS BH18 - 1.5-1.75m,	30-AUG-2012	13-SEP-2012	30-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH20 - 0.0-0.1m,	ASS BH20 - 1.5-1.75m					
Snap Lock Bag - frozen (EA033)						
ASS BH07 - 0.1-0.25m,	ASS BH07 - 1.5-1.75m,	31-AUG-2012	13-SEP-2012	31-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH08 - 0.1-0.25m,	ASS BH08 - 1.5-1.75m,					
ASS BH09 - 0.1-0.25m,	ASS BH09 - 1.25-1.5m,					
ASS BH10 - 0.0-0.1m,	ASS BH10 - 1.5-1.75m,					
ASS BH11 - 0.1-0.25m,	ASS BH11 - 1.25-1.5m,					
ASS BH12 - 0.25-0.5m,	ASS BH12 - 1.5-1.75m,					
ASS BH13 - 0.25-0.5m,	ASS BH13 - 1.25-1.5m,					
ASS BH14 - 0.1-0.25m,	ASS BH14 - 1.75-2.0m,					
ASS BH15 - 0.0-0.1m,	ASS BH15 - 1.0-1.25m,					
ASS BH16 - 0.1-0.25m,	ASS BH16 - 1.0-1.25m					

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 Work Order : EB1223943
 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Date analysed	Due for analysis
EA033-A: Actual Acidity					
Snap Lock Bag - frozen (EA033)					
ASS BH19 - 0.5-0.75m,	27-AUG-2012	13-SEP-2012	27-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH18 - 1.5-1.75m,	30-AUG-2012	13-SEP-2012	30-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH20 - 0.0-0.1m,					
Snap Lock Bag - frozen (EA033)					
ASS BH07 - 0.1-0.25m,	31-AUG-2012	13-SEP-2012	31-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH08 - 0.1-0.25m,					
ASS BH09 - 0.1-0.25m,					
ASS BH10 - 0.0-0.1m,					
ASS BH11 - 0.1-0.25m,					
ASS BH12 - 0.25-0.5m,					
ASS BH13 - 0.25-0.5m,					
ASS BH14 - 0.1-0.25m,					
ASS BH15 - 0.0-0.1m,					
ASS BH16 - 0.1-0.25m,					
EA033-B: Potential Acidity					
Snap Lock Bag - frozen (EA033)					
ASS BH19 - 0.5-0.75m,	27-AUG-2012	13-SEP-2012	27-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH18 - 1.5-1.75m,	30-AUG-2012	13-SEP-2012	30-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH20 - 0.0-0.1m,					
Snap Lock Bag - frozen (EA033)					
ASS BH07 - 0.1-0.25m,	31-AUG-2012	13-SEP-2012	31-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH08 - 0.1-0.25m,					
ASS BH09 - 0.1-0.25m,					
ASS BH10 - 0.0-0.1m,					
ASS BH11 - 0.1-0.25m,					
ASS BH12 - 0.25-0.5m,					
ASS BH13 - 0.25-0.5m,					
ASS BH14 - 0.1-0.25m,					
ASS BH15 - 0.0-0.1m,					
ASS BH16 - 0.1-0.25m,					

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Matrix: **SOIL** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Date analysed	Due for analysis
EA033-D: Retained Acidity					
Snap Lock Bag - frozen (EA033)					
ASS BH19 - 0.5-0.75m,	27-AUG-2012	13-SEP-2012	27-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH18 - 0.5-0.75m,	30-AUG-2012	13-SEP-2012	30-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH20 - 0.0-0.1m,					
Snap Lock Bag - frozen (EA033)					
ASS BH07 - 0.1-0.25m,	31-AUG-2012	13-SEP-2012	31-AUG-2013	17-SEP-2012	12-DEC-2012
ASS BH08 - 0.1-0.25m,					
ASS BH09 - 0.1-0.25m,					
ASS BH10 - 0.0-0.1m,					
ASS BH11 - 0.1-0.25m,					
ASS BH12 - 0.25-0.5m,					
ASS BH13 - 0.25-0.5m,					
ASS BH14 - 0.1-0.25m,					
ASS BH15 - 0.0-0.1m,					
ASS BH16 - 0.1-0.25m,					



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Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Analytical Methods	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	4	40	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCSS3 requirement
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	2	40	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCSS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	40	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCSS3 requirement



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Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Preparation Methods	EN020PR	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)			



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Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QW/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.
- For all matrices, no Matrix Spike outliers occur.

Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.

APPENDIX B3:B



Environmental Division

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: EB1223943		
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR LYNDON GORDON	Contact	: Carsten Emrich
Address	: P O BOX 5569 55 KINGSFORD SMITH PARADE MAROOCHYDORE QLD, AUSTRALIA 4558	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: lgordon@golder.com.au	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 07 5475 5900	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 5475 5901	Facsimile	: +61 7 3243 7218
Project	: SCA Expansion - ASS Investigation 127683017	Page	: 1 of 3
Order number	: M27974	Quote number	: EM2011GOLASS0405 (EN/002/11)
C-O-C number	: SCA-01	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
Sampler	: Golder		

Dates

Date Samples Received	: 10-SEP-2012	Issue Date	: 10-SEP-2012 21:31
Client Requested Due Date	: 17-SEP-2012	Scheduled Reporting Date	: 17-SEP-2012

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 2.0°C - Ice present
No. of coolers/boxes	: 1 MEDIUM	No. of samples received	: 26
Security Seal	: Intact.	No. of samples analysed	: 26

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Matt Goodwin.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.

Address 32 Shand Street Stafford QLD Australia 4053 | PHONE +61-7-3243 7222 | Facsimile +61-7-3243 7218
Environmental Division Brisbane ABN 84 009 936 029 Part of the ALS Group A Campbell Brothers Limited Company

Environmental

www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER

APPENDIX B3:B

Issue Date : 10-SEP-2012 21:31
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 Work Order : EB1223943
 Client : GOLDER ASSOCIATES



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exist.

EB1223943-001	: 31-AUG-2012 15:00	: ASS BH07 - 0.1-0.25m
EB1223943-002	: 31-AUG-2012 15:00	: ASS BH07 - 1.5-1.75m
EB1223943-003	: 31-AUG-2012 15:00	: ASS BH08 - 0.1-0.25m
EB1223943-004	: 31-AUG-2012 15:00	: ASS BH08 - 1.5-1.75m
EB1223943-005	: 31-AUG-2012 15:00	: ASS BH09 - 0.1-0.25m
EB1223943-006	: 31-AUG-2012 15:00	: ASS BH09 - 1.25-1.5m
EB1223943-008	: 31-AUG-2012 15:00	: ASS BH10 - 1.5-1.75m
EB1223943-009	: 31-AUG-2012 15:00	: ASS BH11 - 0.1-0.25m
EB1223943-010	: 31-AUG-2012 15:00	: ASS BH11 - 1.25-1.5m
EB1223943-011	: 31-AUG-2012 15:00	: ASS BH12 - 0.25-0.5m
EB1223943-012	: 31-AUG-2012 15:00	: ASS BH12 - 1.5-1.75m
EB1223943-013	: 31-AUG-2012 15:00	: ASS BH13 - 0.25-0.5m
EB1223943-014	: 31-AUG-2012 15:00	: ASS BH13 - 1.25-1.5m
EB1223943-015	: 31-AUG-2012 15:00	: ASS BH14 - 0.1-0.25m
EB1223943-016	: 31-AUG-2012 15:00	: ASS BH14 - 1.75-2.0m
EB1223943-018	: 31-AUG-2012 15:00	: ASS BH15 - 1.0-1.25m
EB1223943-019	: 31-AUG-2012 15:00	: ASS BH16 - 0.1-0.25m
EB1223943-020	: 31-AUG-2012 15:00	: ASS BH16 - 1.0-1.25m
EB1223943-021	: 30-AUG-2012 15:00	: ASS BH18 - 0.5-0.75m
EB1223943-022	: 30-AUG-2012 15:00	: ASS BH18 - 1.5-1.75m
EB1223943-023	: 27-AUG-2012 15:00	: ASS BH19 - 0.5-0.75m
EB1223943-024	: 27-AUG-2012 15:00	: ASS BH19 - 1.5-1.75m
EB1223943-026	: 30-AUG-2012 15:00	: ASS BH20 - 1.5-1.75m

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default to 15:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory for processing purposes and will be shown bracketed without a time component.

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB1223943-001	31-AUG-2012 15:00	ASS BH07 0.1-0.25m	✓
EB1223943-002	31-AUG-2012 15:00	ASS BH07 1.5-1.75m	✓
EB1223943-003	31-AUG-2012 15:00	ASS BH08 0.1-0.25m	✓
EB1223943-004	31-AUG-2012 15:00	ASS BH08 1.5-1.75m	✓
EB1223943-005	31-AUG-2012 15:00	ASS BH09 0.1-0.25m	✓
EB1223943-006	31-AUG-2012 15:00	ASS BH09 1.25-1.5m	✓
EB1223943-007	31-AUG-2012 15:00	ASS BH10 0.0-0.1m	✓
EB1223943-008	31-AUG-2012 15:00	ASS BH10 1.5-1.75m	✓
EB1223943-009	31-AUG-2012 15:00	ASS BH11 0.1-0.25m	✓
EB1223943-010	31-AUG-2012 15:00	ASS BH11 1.25-1.5m	✓
EB1223943-011	31-AUG-2012 15:00	ASS BH12 0.25-0.5m	✓
EB1223943-012	31-AUG-2012 15:00	ASS BH12 1.5-1.75m	✓
EB1223943-013	31-AUG-2012 15:00	ASS BH13 0.25-0.5m	✓
EB1223943-014	31-AUG-2012 15:00	ASS BH13 1.25-1.5m	✓
EB1223943-015	31-AUG-2012 15:00	ASS BH14 0.1-0.25m	✓

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 Work Order : EB1223943
 Client : GOLDER ASSOCIATES



SOIL - EA033
 Chromium Suite for Acid Sulphate Soils

EB1223943-016	31-AUG-2012 15:00	ASS BH14 1.75-2.0m	✓
EB1223943-017	31-AUG-2012 15:00	ASS BH15 0.0-0.1m	✓
EB1223943-018	31-AUG-2012 15:00	ASS BH15 1.0-1.25m	✓
EB1223943-019	31-AUG-2012 15:00	ASS BH16 0.1-0.25m	✓
EB1223943-020	31-AUG-2012 15:00	ASS BH16 1.0-1.25m	✓
EB1223943-021	30-AUG-2012 15:00	ASS BH18 0.5-0.75m	✓
EB1223943-022	30-AUG-2012 15:00	ASS BH18 1.5-1.75m	✓
EB1223943-023	27-AUG-2012 15:00	ASS BH19 0.5-0.75m	✓
EB1223943-024	27-AUG-2012 15:00	ASS BH19 1.5-1.75m	✓
EB1223943-025	30-AUG-2012 15:00	ASS BH20 0.0-0.1m	✓
EB1223943-026	30-AUG-2012 15:00	ASS BH20 1.5-1.75m	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

MR JOSH MITCHELL

- *AU Certificate of Analysis - NATA (COA)	Email	jmitchell@golder.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jmitchell@golder.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jmitchell@golder.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jmitchell@golder.com.au
- Chain of Custody (CoC) (COC)	Email	jmitchell@golder.com.au
- EDI Format - ENMRG (ENMRG)	Email	jmitchell@golder.com.au
- EDI Format - EQUIS V5 Generic (EQUIS_V5)	Email	jmitchell@golder.com.au
- EDI Format - ESDAT (ESDAT)	Email	jmitchell@golder.com.au
- EDI Format - GOLDER_EXCEL (GOLDER_EXCEL)	Email	jmitchell@golder.com.au

MR LYNDON GORDON

- *AU Certificate of Analysis - NATA (COA)	Email	lgordon@golder.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	lgordon@golder.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	lgordon@golder.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	lgordon@golder.com.au
- A4 - AU Tax Invoice (INV)	Email	lgordon@golder.com.au
- Chain of Custody (CoC) (COC)	Email	lgordon@golder.com.au
- EDI Format - ENMRG (ENMRG)	Email	lgordon@golder.com.au
- EDI Format - EQUIS V5 Generic (EQUIS_V5)	Email	lgordon@golder.com.au
- EDI Format - ESDAT (ESDAT)	Email	lgordon@golder.com.au
- EDI Format - GOLDER_EXCEL (GOLDER_EXCEL)	Email	lgordon@golder.com.au

TESTING REQUEST FORM

GOLDER ASSOCIATES PTY LTD
55 Kingsford Smith Parade
Maroochydore Qld 4558

Phone : (07) 54755900
Fax : (07) 54755901

Forward to: ALS Environmental
32 SHAND STREET STAFFORD QLD 4053



Order No.: MA 7474 Project No.: 127683017
 Project: SCA Expansion - ASS Investigation
 C.O.C. No.: SCA-01 Quotation No.: B0
 Sampled By: Golder Contact Name: Lynden Gorder / Josh Mitchell
 Email Report to: lynden.gorder@golder.com.au
 Prior Storage: ESKY/FREEZER

SAMPLE ID	Sample Depth (m)	Media	No. of Bags	SAMPLE DATE	Hold	Full Chromium Suite
1	ASS BH07	0.1-0.25m	1	31/08/2012		
2	ASS BH07	1.5-1.75m	1	31/08/2012		
3	ASS BH08	0.1-0.25m	1	31/08/2012		
4	ASS BH08	1.5-1.75m	1	31/08/2012		
5	ASS BH09	0.1-0.25m	1	31/08/2012		
6	ASS BH09	1.25-1.5m	1	31/08/2012		
7	ASS BH10	0.0-0.1m	1	31/08/2012		
8	ASS BH10	1.5-1.75m	1	31/08/2012		
9	ASS BH11	0.1-0.25m	1	31/08/2012		
10	ASS BH11	1.25-1.5m	1	31/08/2012		
11	ASS BH12	0.1-0.25m	1	31/08/2012		
12	ASS BH12	1.25-1.5m	1	31/08/2012		
13	ASS BH13	0.1-0.25m	1	31/08/2012		
14	ASS BH13	1.25-1.5m	1	31/08/2012		
15	ASS BH14	0.0-0.1m	1	31/08/2012		
16	ASS BH14	1.25-1.5m	1	31/08/2012		
17	ASS BH15	0.0-0.1m	1	31/08/2012		
18	ASS BH15	1.0-1.25m	1	31/08/2012		
19	ASS BH16	0.1-0.25m	1	31/08/2012		
20	ASS BH16	1.0-1.25m	1	31/08/2012		
21	ASS BH18	0.5-0.75m	1	30/08/12		
22	ASS BH18	1.5-1.75m	1	30/08/12		
23	ASS BH19	0.5-0.75m	1	30/08/2012		
24	ASS BH19	1.5-1.75m	1	30/08/2012		
25	ASS BH20	0.0-0.1m	1	30/08/2012		
26	ASS BH20	1.5-1.75m	1	30/08/2012		

Environmental Division
Brisbane
JLP Work Order JP
EB1223943



Telephone : + 61-7-3243 7222

Signature: *[Signature]*
ALS
Date Received By ALS: 10/19/12
15:00

Please Return Signed Copy By Facsimile:
Date Received By ALS:

Checked By: *[Signature]*
Date Sent from Maroochydore Lab: *[Signature]*
Relinquished By:



Environmental Division



CERTIFICATE OF ANALYSIS

Work Order	: EB1223953	Page	: 1 of 8
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR LYNDON GORDON	Contact	: Carsten Emrich
Address	: P O BOX 5569 55 KINGSFORD SMITH PARADE MAROOCHYDORE QLD, AUSTRALIA 4558	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: lgordon@golder.com.au	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 07 5475 5900	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 5475 5901	Facsimile	: +61 7 3243 7218
Project	: SCA Expansion - ASS Investigation 127683017	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: MQ7974	Date Samples Received	: 10-SEP-2012
C-O-C number	: SCA-01	Issue Date	: 17-SEP-2012
Sampler	: Golder	No. of samples received	: 30
Site	: -----	No. of samples analysed	: 30
Quote number	: EN/002/12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825
Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
SATISH TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils

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Page : 2 of 8
Work Order : EB1223953
Client : GOLDER ASSOCIATES
Project : SCA Expansion - ASS Investigation 127683017

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- **ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m³ in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m³'.**



Page : 3 of 8
 Work Order : EB1223953
 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID				
				BH01 0.25-0.5m 30-AUG-2012 15:00 EB1223953-001	BH01 1.5-1.75m 30-AUG-2012 15:00 EB1223953-002	BH03 0.0-0.25m 27-AUG-2012 15:00 EB1223953-003	BH03 1.75-2.0m 27-AUG-2012 15:00 EB1223953-004	BH04 0.25-0.5m 27-AUG-2012 15:00 EB1223953-005
EA033-A: Actual Acidity								
pH KCl (23A)	-----	0.1	pH Unit	5.8	4.8	5.2	4.5	4.9
Titratable Actual Acidity (23F)	-----	2	mole H+ / t	<2	53	15	71	30
sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	0.08	0.02	0.11	0.05
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	-----	0.005	% S	<0.005	0.009	<0.005	0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	<10	<10	<10	<10	<10
EA033-E: Acid Base Accounting								
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	-----	0.02	% S	<0.02	0.09	0.02	0.12	0.05
Net Acidity (acidity units)	-----	10	mole H+ / t	<10	58	15	74	30
Liming Rate	-----	1	kg CaCO3/t	<1	4	1	6	2



Page : 4 of 8
 Work Order : EB1223953
 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID				
				BH04 1.5-1.75m 27-AUG-2012 15:00 EB1223953-006	BH05 0.25-0.5m 28-AUG-2012 15:00 EB1223953-007	BH05 1.25-1.5m 28-AUG-2012 15:00 EB1223953-008	BH06 0.0-0.25m 27-AUG-2012 15:00 EB1223953-009	BH06 1.75-2.0m 27-AUG-2012 15:00 EB1223953-010
EA033-A: Actual Acidity								
pH KCl (23A)	-----	0.1	pH Unit	5.6	5.1	5.1	4.5	5.7
Titratable Actual Acidity (23F)	-----	2	mole H+ / t	6	13	20	86	3
sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	<0.02	0.02	0.03	0.14	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (a-22B)	-----	0.005	% S	0.036	<0.005	1.02	<0.005	0.057
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	22	<10	638	<10	36
EA033-E: Acid Base Accounting								
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	-----	0.02	% S	0.04	0.02	1.05	0.14	0.06
Net Acidity (acidity units)	-----	10	mole H+ / t	28	13	658	86	38
Liming Rate	-----	1	kg CaCO3/t	2	<1	49	6	3



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 Work Order : EB1223953
 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID					
				BH07 0.5-0.75m 28-AUG-2012 15:00 EB1223953-011	BH07 1.5-1.75m 28-AUG-2012 15:00 EB1223953-012	BH09 0.25-0.5m 27-AUG-2012 15:00 EB1223953-013	BH09 1.25-1.5m 27-AUG-2012 15:00 EB1223953-014	BH10 0.5-0.75m 29-AUG-2012 15:00 EB1223953-015	
EA033-A: Actual Acidity									
pH KCl (23A)	-----	0.1	pH Unit	5.2	7.8	4.6	5.0	4.8	
Titratable Actual Acidity (23F)	-----	2	mole H+ / t	16	<2	39	24	25	
sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	0.02	<0.02	0.06	0.04	0.04	
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	-----	0.005	% S	0.865	1.42	0.047	0.820	0.015	
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	539	887	29	512	<10	
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	-----	0.01	% CaCO3	-----	1.09	-----	-----	-----	
acidity - Acid Neutralising Capacity (a-19A2)	-----	10	mole H+ / t	-----	217	-----	-----	-----	
sulfidic - Acid Neutralising Capacity (s-19A2)	-----	0.01	% pyrite S	-----	0.35	-----	-----	-----	
EA033-E: Acid Base Accounting									
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5	1.5	
Net Acidity (sulfur units)	-----	0.02	% S	0.89	1.19	0.11	0.86	0.06	
Net Acidity (acidity units)	-----	10	mole H+ / t	555	742	68	535	35	
Liming Rate	-----	1	kg CaCO3/t	42	56	5	40	3	



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 Work Order : EB1223953
 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Client sampling date / time	Client sample ID			
				BH10	BH11	BH11	BH12
EA033-A: Actual Acidity				29-AUG-2012 15:00	27-AUG-2012 15:00	27-AUG-2012 15:00	27-AUG-2012 15:00
pH KCl (23A)	-----	0.1		1.75-2.0m	0.0-0.25m	1.25-1.5m	1.75-2.0m
Titratable Actual Acidity (23F)	-----	2	pH Unit	5.3	4.8	4.3	5.1
sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	mole H+ / t	10	32	94	18
EA033-B: Potential Acidity				<0.02	0.05	0.15	0.03
Chromium Reducible Sulfur (22B)	-----	0.005	% S	0.179	0.007	0.077	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	111	<10	48	<10
EA033-D: Retained Acidity							
KCl Extractable Sulfur (23Ce)	-----	0.02	% S	-----	-----	<0.02	-----
HCl Extractable Sulfur (20Be)	-----	0.02	% S	-----	-----	<0.02	-----
Net Acid Soluble Sulfur (20Je)	-----	0.02	% S	-----	-----	<0.02	-----
acidity - Net Acid Soluble Sulfur (a-20J)	-----	10	mole H+ / t	-----	-----	<10	-----
sulfidic - Net Acid Soluble Sulfur (s-20J)	-----	0.02	% pyrite S	-----	-----	<0.02	-----
EA033-E: Acid Base Accounting							
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	-----	0.02	% S	0.19	0.06	0.24	0.03
Net Acidity (acidity units)	-----	10	mole H+ / t	122	37	149	18
Liming Rate	-----	1	kg CaCO3/t	9	3	11	1



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 Work Order : EB1223953
 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID				
				BH13 0.0-0.25m 29-AUG-2012 15:00 EB1223953-021	BH13 1.25-1.5m 29-AUG-2012 15:00 EB1223953-022	BH14 0.0-0.25m 29-AUG-2012 15:00 EB1223953-023	BH14 1.25-1.5m 29-AUG-2012 15:00 EB1223953-024	BH15 0.5-0.75m 29-AUG-2012 15:00 EB1223953-025
EA033-A: Actual Acidity								
pH KCl (23A)	-----	0.1	pH Unit	5.2	4.7	5.1	4.4	5.3
Titratable Actual Acidity (23F)	-----	2	mole H+ / t	16	56	22	61	6
sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02	% pyrite S	0.02	0.09	0.04	0.10	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	-----	0.005	% S	0.044	0.006	0.005	<0.005	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	27	<10	<10	<10	<10
EA033-D: Retained Acidity								
KCl Extractable Sulfur (23Ce)	-----	0.02	% S	-----	-----	-----	<0.02	-----
HCl Extractable Sulfur (20Be)	-----	0.02	% S	-----	-----	-----	<0.02	-----
Net Acid Soluble Sulfur (20Je)	-----	0.02	% S	-----	-----	-----	<0.02	-----
acidity - Net Acid Soluble Sulfur (a-20J)	-----	10	mole H+ / t	-----	-----	-----	<10	-----
sulfidic - Net Acid Soluble Sulfur (s-20J)	-----	0.02	% pyrite S	-----	-----	-----	<0.02	-----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	-----	0.02	% S	0.07	0.10	0.04	0.10	<0.02
Net Acidity (acidity units)	-----	10	mole H+ / t	43	60	25	63	<10
Liming Rate	-----	1	kg CaCO3/t	3	4	2	5	<1



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 Work Order : EB1223953
 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Client sampling date / time	Client sample ID				
				BH15 1.75-2.0m 29-AUG-2012 15:00 EB1223953-026	BH16 0.5-0.75m 29-AUG-2012 15:00 EB1223953-027	BH16 1.75-2.0m 29-AUG-2012 15:00 EB1223953-028	BH17 0.0-0.25m 29-AUG-2012 15:00 EB1223953-029	BH17 1.25-1.5m 29-AUG-2012 15:00 EB1223953-030
EA033-A: Actual Acidity								
pH KCl (23A)	-----	0.1		4.8	4.5	4.4	4.5	4.9
Titratable Actual Acidity (23F)	-----	2		43	64	71	85	29
sulfidic - Titratable Actual Acidity (s-23F)	-----	0.02		0.07	0.10	0.11	0.14	0.05
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	-----	0.005	% S	0.015	0.005	0.031	0.006	<0.005
acidity - Chromium Reducible Sulfur (a-22B)	-----	10	mole H+ / t	<10	<10	20	<10	<10
EA033-D: Retained Acidity								
KCl Extractable Sulfur (23Ce)	-----	0.02	% S	-----	-----	<0.02	-----	-----
HCl Extractable Sulfur (20Be)	-----	0.02	% S	-----	-----	<0.02	-----	-----
Net Acid Soluble Sulfur (20Je)	-----	0.02	% S	-----	-----	<0.02	-----	-----
acidity - Net Acid Soluble Sulfur (a-20J)	-----	10	mole H+ / t	-----	-----	<10	-----	-----
sulfidic - Net Acid Soluble Sulfur (s-20J)	-----	0.02	% pyrite S	-----	-----	<0.02	-----	-----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	-----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	-----	0.02	% S	0.08	0.11	0.15	0.14	0.05
Net Acidity (acidity units)	-----	10	mole H+ / t	52	67	91	89	29
Liming Rate	-----	1	kg CaCO3/t	4	5	7	7	2



ALS Group
Environmental Division



Environmental Division
Phytotoxicity Testing

QUALITY CONTROL REPORT

Work Order : **EB1223953**

Client : **GOLDER ASSOCIATES**

Contact : **MR LYNDON GORDON**

Address : **P O BOX 5569**
55 KINGSFORD SMITH PARADE
MAROOCHYDORE QLD, AUSTRALIA 4558

E-mail : **lgordon@golder.com.au**

Telephone : **+61 07 5475 5900**

Facsimile : **+61 07 5475 5901**

Project : **SCA Expansion - ASS Investigation 127683017**

Site : **-----**

C-O-C number : **SCA-01**

Sampler : **Golder**

Order number : **MQ7974**

Quote number : **EN/002/12**

Page : **1 of 5**

Laboratory : **Environmental Division Brisbane**

Contact : **Carsten Ernich**

Address : **32 Shand Street Stafford QLD Australia 4053**

E-mail : **carsten.ernich@alsenviro.com**

Telephone : **+61 7 3243 7123**

Facsimile : **+61 7 3243 7218**

QC Level : **NEPM 1999 Schedule B(3) and ALS QCS3 requirement**

Date Samples Received : **10-SEP-2012**

Issue Date : **17-SEP-2012**

No. of samples received : **30**

No. of samples analysed : **30**

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.



WORLD RECOGNISED ACCREDITATION

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
SATISH TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils

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Page : 2 of 5
Work Order : EB1223953
Client : GOLDER ASSOCIATES
Project : SCA Expansion - ASS Investigation 127683017

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :

Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC



Page : 3 of 5
 Work Order : EB1223953
 Client : GOLDBER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intra-laboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method, Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
EA033-A: Actual Acidity (QC Lot: 2497393)									
EB1223943-015	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.08	0.08	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	51	53	5.1	0% - 20%
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.5	4.6	2.2	0% - 20%
EB1223943-025	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.03	0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	18	16	10.7	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.9	4.9	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 2497394)									
EB1223953-009	BH06 0.0-0.25m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.14	0.14	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	86	89	3.5	0% - 20%
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.5	4.5	0.0	0% - 20%
EB1223953-019	BH12 0.25-0.5m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.03	0.03	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	18	18	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.1	5.2	1.9	0% - 20%
EA033-A: Actual Acidity (QC Lot: 2497395)									
EB1223953-029	BH17 0.0-0.25m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.14	0.13	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	85	83	2.5	0% - 20%
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.5	4.5	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 2497393)									
EB1223943-015	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EB1223943-025	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 2497394)									
EB1223953-009	BH06 0.0-0.25m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EB1223953-019	BH12 0.25-0.5m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	<0.005	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 2497395)									
EB1223953-029	BH17 0.0-0.25m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.006	0.006	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit



Page : 4 of 5
 Work Order : EB1223953
 Client : GOLDER ASSOCIATES
 Project : SCA Expansion - ASS Investigation 127683017

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: SOIL

Method/Compound	CAS Number	LOR	Unit	Result	Laboratory Control Spike (LCS) Report		
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)
EA033-A: Actual Acidity (QC Lot: 2497393)							
EA033: pH KCl (23A)		0.1	pH Unit	---	4.5 pH Unit	102	94
EA033: Titratable Actual Acidity (23F)		2	mole H+ / t	<2	30 mole H+ / t	101	93
EA033: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	---	---	---
EA033-A: Actual Acidity (QC Lot: 2497394)							
EA033: pH KCl (23A)		0.1	pH Unit	---	4.5 pH Unit	102	94
EA033: Titratable Actual Acidity (23F)		2	mole H+ / t	<2	30 mole H+ / t	104	93
EA033: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	---	---	---
EA033-A: Actual Acidity (QC Lot: 2497395)							
EA033: pH KCl (23A)		0.1	pH Unit	---	4.5 pH Unit	102	94
EA033: Titratable Actual Acidity (23F)		2	mole H+ / t	<2	30 mole H+ / t	96.9	93
EA033: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02	---	---	---
EA033-B: Potential Acidity (QC Lot: 2497393)							
EA033: Chromium Reducible Sulfur (22B)		0.005	% S	<0.005	.28 % S	87.4	80
EA033: acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	---	---	---
EA033-B: Potential Acidity (QC Lot: 2497394)							
EA033: Chromium Reducible Sulfur (22B)		0.005	% S	<0.005	.28 % S	91.2	80
EA033: acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	---	---	---
EA033-B: Potential Acidity (QC Lot: 2497395)							
EA033: Chromium Reducible Sulfur (22B)		0.005	% S	<0.005	.28 % S	90.4	80
EA033: acidity - Chromium Reducible Sulfur (a-22B)		10	mole H+ / t	<10	---	---	---
EA033-C: Acid Neutralising Capacity (QC Lot: 2497394)							
EA033: Acid Neutralising Capacity (19A2)		0.01	% CaCO3	<0.01	10 % CaCO3	101	90
EA033: acidity - Acid Neutralising Capacity (a-19A2)		10	mole H+ / t	<10	---	---	---
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)		0.01	% pyrite S	<0.01	---	---	---
EA033-D: Retained Acidity (QC Lot: 2497394)							
EA033: Net Acid Soluble Sulfur (20Je)		0.02	% S	<0.02	---	---	---
EA033: acidity - Net Acid Soluble Sulfur (a-20J)		10	mole H+ / t	<10	---	---	---
EA033: sulfidic - Net Acid Soluble Sulfur (s-20J)		0.02	% pyrite S	<0.02	---	---	---
EA033: KCl Extractable Sulfur (23Ce)		0.02	% S	<0.02	0.036110 % S	96.9	90
EA033: HCl Extractable Sulfur (20Be)		0.02	% S	<0.02	.06 % S	100	90

Matrix Spike (MS) Report



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The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) Results are required to be reported.**

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**



INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: EB1223953	Page	: 1 of 7
Client	: GOLDR ASSOCIATES	Laboratory	: Environmental Division Brisbane
Contact	: MR LYNDON GORDON	Contact	: Carsten Emrich
Address	: P O BOX 5569 55 KINGSFORD SMITH PARADE MAROOCHYDORE QLD, AUSTRALIA 4558	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: lgordon@golder.com.au	E-mail	: carsten.emrich@alsenviro.com
Telephone	: +61 07 5475 5900	Telephone	: +61 7 3243 7123
Facsimile	: +61 07 5475 5901	Facsimile	: +61 7 3243 7218
Project	: SCA Expansion - ASS Investigation	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: -----	Date Samples Received	: 10-SEP-2012
C-O-C number	: SCA-01	Issue Date	: 17-SEP-2012
Sampler	: Golder	No. of samples received	: 30
Order number	: MQ7974	No. of samples analysed	: 30
Quote number	: EN/002/12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

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Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Analysis		
			Date extracted	Due for extraction	Date analysed	Due for analysis	Evaluation
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen (EA033)							
BH03 - 0.0-0.25m,	BH03 - 1.75-2.0m,	27-AUG-2012	13-SEP-2012	27-AUG-2013	17-SEP-2012	12-DEC-2012	✓
BH04 - 0.25-0.5m,	BH04 - 1.5-1.75m,						
BH06 - 0.0-0.25m,	BH06 - 1.75-2.0m,						
BH09 - 0.25-0.5m,	BH09 - 1.25-1.5m,						
BH11 - 0.0-0.25m,	BH11 - 1.25-1.5m,						
BH12 - 0.25-0.5m,	BH12 - 1.75-2.0m,						
Snap Lock Bag - frozen (EA033)							
BH05 - 0.25-0.5m,	BH05 - 1.25-1.5m,	28-AUG-2012	13-SEP-2012	28-AUG-2013	17-SEP-2012	12-DEC-2012	✓
BH07 - 0.5-0.75m,	BH07 - 1.5-1.75m,						
Snap Lock Bag - frozen (EA033)							
BH10 - 0.5-0.75m,	BH10 - 1.75-2.0m,	29-AUG-2012	13-SEP-2012	29-AUG-2013	17-SEP-2012	12-DEC-2012	✓
BH13 - 0.0-0.25m,	BH13 - 1.25-1.5m,						
BH14 - 0.0-0.25m,	BH14 - 1.25-1.5m,						
BH15 - 0.5-0.75m,	BH15 - 1.75-2.0m,						
BH16 - 0.5-0.75m,	BH16 - 1.75-2.0m,						
BH17 - 0.0-0.25m,	BH17 - 1.25-1.5m,						
Snap Lock Bag - frozen (EA033)							
BH01 - 0.25-0.5m,	BH01 - 1.5-1.75m,	30-AUG-2012	13-SEP-2012	30-AUG-2013	17-SEP-2012	12-DEC-2012	✓

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Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Date analysed	Due for analysis
EA033-C: Acid Neutralising Capacity					
Snap Lock Bag - frozen (EA033)					
BH03 - 0.0-0.25m, BH04 - 1.5-1.75m, BH06 - 1.75-2.0m, BH09 - 1.25-1.5m, BH11 - 0.0-0.25m, BH12 - 0.25-0.5m,	27-AUG-2012	13-SEP-2012	27-AUG-2013	17-SEP-2012	12-DEC-2012
BH03 - 1.75-2.0m, BH04 - 1.5-1.75m, BH06 - 1.75-2.0m, BH09 - 1.25-1.5m, BH11 - 0.0-0.25m, BH12 - 0.25-0.5m,	28-AUG-2012	13-SEP-2012	28-AUG-2013	17-SEP-2012	12-DEC-2012
BH05 - 1.25-1.5m, BH07 - 1.5-1.75m,	29-AUG-2012	13-SEP-2012	29-AUG-2013	17-SEP-2012	12-DEC-2012
BH10 - 1.75-2.0m, BH13 - 1.25-1.5m, BH14 - 1.25-1.5m, BH15 - 1.75-2.0m, BH16 - 1.75-2.0m, BH17 - 0.0-0.25m,	30-AUG-2012	13-SEP-2012	30-AUG-2013	17-SEP-2012	12-DEC-2012
BH01 - 1.5-1.75m					
EA033-A: Actual Acidity					
Snap Lock Bag - frozen (EA033)					
BH03 - 0.0-0.25m, BH04 - 0.25-0.5m, BH06 - 0.0-0.25m, BH09 - 0.25-0.5m, BH11 - 0.0-0.25m, BH12 - 0.25-0.5m,	27-AUG-2012	13-SEP-2012	27-AUG-2013	17-SEP-2012	12-DEC-2012
BH03 - 1.75-2.0m, BH04 - 1.5-1.75m, BH06 - 1.75-2.0m, BH09 - 1.25-1.5m, BH11 - 1.25-1.5m, BH12 - 1.75-2.0m	28-AUG-2012	13-SEP-2012	28-AUG-2013	17-SEP-2012	12-DEC-2012
BH05 - 1.25-1.5m, BH07 - 1.5-1.75m	29-AUG-2012	13-SEP-2012	29-AUG-2013	17-SEP-2012	12-DEC-2012
BH10 - 1.75-2.0m, BH13 - 1.25-1.5m, BH14 - 1.25-1.5m, BH15 - 1.75-2.0m, BH16 - 1.75-2.0m, BH17 - 1.25-1.5m	30-AUG-2012	13-SEP-2012	30-AUG-2013	17-SEP-2012	12-DEC-2012
BH01 - 1.5-1.75m					
Snap Lock Bag - frozen (EA033)					
BH03 - 0.0-0.25m, BH04 - 0.25-0.5m, BH06 - 0.0-0.25m, BH09 - 0.25-0.5m, BH11 - 0.0-0.25m, BH12 - 0.25-0.5m,	27-AUG-2012	13-SEP-2012	27-AUG-2013	17-SEP-2012	12-DEC-2012
BH03 - 1.75-2.0m, BH04 - 1.5-1.75m, BH06 - 1.75-2.0m, BH09 - 1.25-1.5m, BH11 - 1.25-1.5m, BH12 - 1.75-2.0m	28-AUG-2012	13-SEP-2012	28-AUG-2013	17-SEP-2012	12-DEC-2012
BH05 - 1.25-1.5m, BH07 - 1.5-1.75m	29-AUG-2012	13-SEP-2012	29-AUG-2013	17-SEP-2012	12-DEC-2012
BH10 - 1.75-2.0m, BH13 - 1.25-1.5m, BH14 - 1.25-1.5m, BH15 - 1.75-2.0m, BH16 - 1.75-2.0m, BH17 - 1.25-1.5m	30-AUG-2012	13-SEP-2012	30-AUG-2013	17-SEP-2012	12-DEC-2012
BH01 - 1.5-1.75m					

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Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date		Extraction / Preparation		Analysis		
	Date extracted	Due for extraction	Date analysed	Due for analysis	Evaluation	Evaluation	
EA033-B: Potential Acidity							
Snap Lock Bag - frozen (EA033)							
BH03 - 0.0-0.25m, BH04 - 1.5-1.75m, BH06 - 0.0-0.25m, BH09 - 0.25-0.5m, BH11 - 0.0-0.25m, BH12 - 0.25-0.5m,	27-AUG-2012	27-AUG-2013	13-SEP-2012	27-AUG-2013	17-SEP-2012	12-DEC-2012	✓
Snap Lock Bag - frozen (EA033)							
BH05 - 1.25-1.5m, BH07 - 0.5-0.75m,	28-AUG-2012	28-AUG-2013	13-SEP-2012	28-AUG-2013	17-SEP-2012	12-DEC-2012	✓
Snap Lock Bag - frozen (EA033)							
BH10 - 0.5-0.75m, BH13 - 0.0-0.25m, BH14 - 0.0-0.25m, BH15 - 0.5-0.75m, BH16 - 0.5-0.75m, BH17 - 0.0-0.25m,	29-AUG-2012	29-AUG-2013	13-SEP-2012	29-AUG-2013	17-SEP-2012	12-DEC-2012	✓
Snap Lock Bag - frozen (EA033)							
BH01 - 1.5-1.75m	30-AUG-2012	30-AUG-2013	13-SEP-2012	30-AUG-2013	17-SEP-2012	12-DEC-2012	✓
EA033-D: Retained Acidity							
Snap Lock Bag - frozen (EA033)							
BH03 - 0.0-0.25m, BH04 - 0.25-0.5m, BH06 - 0.0-0.25m, BH09 - 0.25-0.5m, BH11 - 0.0-0.25m, BH12 - 0.25-0.5m,	27-AUG-2012	27-AUG-2013	13-SEP-2012	27-AUG-2013	17-SEP-2012	12-DEC-2012	✓
Snap Lock Bag - frozen (EA033)							
BH05 - 1.25-1.5m, BH07 - 0.5-0.75m,	28-AUG-2012	28-AUG-2013	13-SEP-2012	28-AUG-2013	17-SEP-2012	12-DEC-2012	✓
Snap Lock Bag - frozen (EA033)							
BH10 - 1.75-2.0m, BH13 - 1.25-1.5m, BH14 - 1.25-1.5m, BH15 - 1.75-2.0m, BH16 - 1.75-2.0m, BH17 - 1.25-1.5m	29-AUG-2012	29-AUG-2013	13-SEP-2012	29-AUG-2013	17-SEP-2012	12-DEC-2012	✓
Snap Lock Bag - frozen (EA033)							
BH01 - 1.5-1.75m	30-AUG-2012	30-AUG-2013	13-SEP-2012	30-AUG-2013	17-SEP-2012	12-DEC-2012	✓



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Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Analytical Methods	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	5	42	11.9	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCSS3 requirement
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	3	42	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCSS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	3	42	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCSS3 requirement



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Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Preparation Methods	EN020PR	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)			



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Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QW/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.
- For all matrices, no Matrix Spike outliers occur.

Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.

APPENDIX B3:B



Environmental Division

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **EB1223953**

Client : **GOLDER ASSOCIATES** **Laboratory** : Environmental Division Brisbane
Contact : **MR LYNDON GORDON** **Contact** : Carsten Emrich
Address : **P O BOX 5569** **Address** : **32 Shand Street Stafford QLD Australia 4053**
55 KINGSFORD SMITH PARADE
MAROOCHYDORE QLD, AUSTRALIA
4558

E-mail : **lgordon@golder.com.au** **E-mail** : **carsten.emrich@alsenviro.com**
Telephone : **+61 07 5475 5900** **Telephone** : **+61 7 3243 7123**
Facsimile : **+61 07 5475 5901** **Facsimile** : **+61 7 3243 7218**

Project : **SCA Expansion - ASS Investigation** **Page** : **1 of 3**
127683017

Order number : **MQ7974** **Quote number** : **EM2011GOLASS0405 (EN/002/11)**
C-O-C number : **SCA-01**
Site : **----**
Sampler : **Golder** **QC Level** : **NEPM 1999 Schedule B(3) and ALS QCS3 requirement**

Dates

Date Samples Received : **10-SEP-2012** **Issue Date** : **10-SEP-2012 21:19**
Client Requested Due Date : **17-SEP-2012** **Scheduled Reporting Date** : **17-SEP-2012**

Delivery Details

Mode of Delivery : **Carrier** **Temperature** : **0.6°C - Ice present**
No. of coolers/boxes : **1 MEDIUM** **No. of samples received** : **30**
Security Seal : **Intact.** **No. of samples analysed** : **30**

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Matt Goodwin.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.

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APPENDIX B3:B

Issue Date : 10-SEP-2012 21:19
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 Client : GOLDER ASSOCIATES



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exist.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default to 15:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory for processing purposes and will be shown bracketed without a time component.

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB1223953-001	30-AUG-2012 15:00	BH01 0.25-0.5m	✓
EB1223953-002	30-AUG-2012 15:00	BH01 1.5-1.75m	✓
EB1223953-003	27-AUG-2012 15:00	BH03 0.0-0.25m	✓
EB1223953-004	27-AUG-2012 15:00	BH03 1.75-2.0m	✓
EB1223953-005	27-AUG-2012 15:00	BH04 0.25-0.5m	✓
EB1223953-006	27-AUG-2012 15:00	BH04 1.5-1.75m	✓
EB1223953-007	28-AUG-2012 15:00	BH05 0.25-0.5m	✓
EB1223953-008	28-AUG-2012 15:00	BH05 1.25-1.5m	✓
EB1223953-009	27-AUG-2012 15:00	BH06 0.0-0.25m	✓
EB1223953-010	27-AUG-2012 15:00	BH06 1.75-2.0m	✓
EB1223953-011	28-AUG-2012 15:00	BH07 0.5-0.75m	✓
EB1223953-012	28-AUG-2012 15:00	BH07 1.5-1.75m	✓
EB1223953-013	27-AUG-2012 15:00	BH09 0.25-0.5m	✓
EB1223953-014	27-AUG-2012 15:00	BH09 1.25-1.5m	✓
EB1223953-015	29-AUG-2012 15:00	BH10 0.5-0.75m	✓
EB1223953-016	29-AUG-2012 15:00	BH10 1.75-2.0m	✓
EB1223953-017	27-AUG-2012 15:00	BH11 0.0-0.25m	✓
EB1223953-018	27-AUG-2012 15:00	BH11 1.25-1.5m	✓
EB1223953-019	27-AUG-2012 15:00	BH12 0.25-0.5m	✓
EB1223953-020	27-AUG-2012 15:00	BH12 1.75-2.0m	✓
EB1223953-021	29-AUG-2012 15:00	BH13 0.0-0.25m	✓
EB1223953-022	29-AUG-2012 15:00	BH13 1.25-1.5m	✓
EB1223953-023	29-AUG-2012 15:00	BH14 0.0-0.25m	✓
EB1223953-024	29-AUG-2012 15:00	BH14 1.25-1.5m	✓
EB1223953-025	29-AUG-2012 15:00	BH15 0.5-0.75m	✓
EB1223953-026	29-AUG-2012 15:00	BH15 1.75-2.0m	✓
EB1223953-027	29-AUG-2012 15:00	BH16 0.5-0.75m	✓
EB1223953-028	29-AUG-2012 15:00	BH16 1.75-2.0m	✓
EB1223953-029	29-AUG-2012 15:00	BH17 0.0-0.25m	✓
EB1223953-030	29-AUG-2012 15:00	BH17 1.25-1.5m	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

APPENDIX B3:B

Issue Date : 10-SEP-2012 21:19
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Work Order : EB1223953
Client : GOLDER ASSOCIATES



Requested Deliverables

MR JOSH MITCHELL

- *AU Certificate of Analysis - NATA (COA)	Email	jmitchell@golder.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jmitchell@golder.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jmitchell@golder.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jmitchell@golder.com.au
- Chain of Custody (CoC) (COC)	Email	jmitchell@golder.com.au
- EDI Format - ENMRG (ENMRG)	Email	jmitchell@golder.com.au
- EDI Format - EQUIS V5 Generic (EQUIS_V5)	Email	jmitchell@golder.com.au
- EDI Format - ESDAT (ESDAT)	Email	jmitchell@golder.com.au
- EDI Format - GOLDER_EXCEL (GOLDER_EXCEL)	Email	jmitchell@golder.com.au

MR LYNDON GORDON

- *AU Certificate of Analysis - NATA (COA)	Email	lgordon@golder.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	lgordon@golder.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	lgordon@golder.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	lgordon@golder.com.au
- A4 - AU Tax Invoice (INV)	Email	lgordon@golder.com.au
- Chain of Custody (CoC) (COC)	Email	lgordon@golder.com.au
- EDI Format - ENMRG (ENMRG)	Email	lgordon@golder.com.au
- EDI Format - EQUIS V5 Generic (EQUIS_V5)	Email	lgordon@golder.com.au
- EDI Format - ESDAT (ESDAT)	Email	lgordon@golder.com.au
- EDI Format - GOLDER_EXCEL (GOLDER_EXCEL)	Email	lgordon@golder.com.au

TESTING REQUEST FORM



ALS Environmental
32 SHAND STREET STAFFORD QLD 4053
GOLDER ASSOCIATES PTY LTD
55 Kingsford Smith Parade
Maroochydore Qld 4558
Phone : (07) 54755900
Fax : (07) 54755901

Forward to:
j.hook@golder.com.au and j.hook@golder.com.au

Order No: ms 74 74 Project No: 127683017
 Project: SCA Expansion - ASS Investigation
 C.O.C. No: SCA-01 Quotation No:
 Sampled By: Golder Contract Name: Lynden Gardens / Josh Mitchell
 Email Report to: j.hook@golder.com.au and j.hook@golder.com.au
 Prior Storage: ESKY/FREEZER

SAMPLE ID	Sample Depth (m)	Media	No. of Bgs.	SAMPLE DATE	Hold	Full Chromium Spike
BH01	0.25-0.5m	Soil	1	30/08/2012		
BH01	1.51-1.75m	Soil	1	30/08/2012		
BH03	0.00-0.25m	Soil	1	27/08/2012		
BH03	0.75-0.99m	Soil	1	27/08/2012		
BH04	0.25-0.5m	Soil	1	27/08/2012		
BH04	1.51-1.75m	Soil	1	27/08/2012		
BH05	0.00-0.25m	Soil	1	28/08/2012		
BH05	1.25-1.5m	Soil	1	28/08/2012		
BH06	0.00-0.25m	Soil	1	27/08/2012		
BH06	1.75-2.0m	Soil	1	27/08/2012		
BH07	0.50-0.75m	Soil	1	28/08/2012		
BH07	1.51-1.75m	Soil	1	28/08/2012		
BH09	0.25-0.5m	Soil	1	27/08/2012		
BH09	1.25-1.5m	Soil	1	27/08/2012		
BH10	0.50-0.75m	Soil	1	29/08/2012		
BH10	1.75-2.0m	Soil	1	29/08/2012		
BH11	0.00-0.25m	Soil	1	27/08/2012		
BH11	1.25-1.5m	Soil	1	27/08/2012		
BH12	0.25-0.5m	Soil	1	27/08/2012		
BH12	1.75-2.0m	Soil	1	27/08/2012		
BH13	0.00-0.25m	Soil	1	29/08/2012		
BH13	1.25-1.5m	Soil	1	29/08/2012		
BH14	0.00-0.25m	Soil	1	29/08/2012		
BH14	1.25-1.5m	Soil	1	29/08/2012		
BH15	0.5-0.75m	Soil	1	29/08/2012		
BH15	1.75-2.0m	Soil	1	29/08/2012		
BH16	0.50-0.75m	Soil	1	29/08/2012		
BH16	1.75-2.0m	Soil	1	29/08/2012		
BH17	0.00-0.25m	Soil	1	29/08/2012		
BH17	1.25-1.5m	Soil	1	29/08/2012		

Environmental Division
Brisbane
Work Order
EB1223953
Telephone : +61-7-3643 7222



Checked by: [Signature]
Date Sent from Macrochydore Lab:
Retransmitted By: [Signature]
Please Return Signed Copy By Facsimile:
Date Received By ALS:
Signature: [Signature]
ALS
10/9/12 15:00.