

ESSO AUSTRALIA PTY LTD LONGFORD LIQUIDS PIPELINE REPLACEMENT PROJECT ACID SULFATE SOIL CHARACTERISATION REPORT

Appendix 4 - Laboratory COC and QA/QC

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QUALITY CONTROL REPORT

Work Order	: EB1330241	Page	: 1 of 11
Client Contact Address	: WORLEY PARSONS - INFRASTRUCTURE MWE : LUCIE MISSEN : LEVEL 12, 333 COLLINS STREET MELBOURNE VIC, AUSTRALIA 3000	Laboratory Contact Address	: Environmental Division Brisbane : Steven McGrath : 2 Byth Street Stafford QLD Australia 4053
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Project Site	: 401010-01002 LOLIPIP :	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
C-O-C number	:	Date Samples Received	: 04-DEC-2013
Sampler	:	Issue Date	: 16-DEC-2013
Order number	: 401010-01002 WBS 3G2003A		
		No. of samples received	: 48
Quote number	: ME/507/13	No. of samples analysed	: 48

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 Signatories

Laboratory 825 This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out ir compliance with procedures specified in 21 CFR Part 11.

Accredited for	Signatories	Position	Accreditation Category
compliance with	SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
ISO/IEC 17025.			

Address 2 Byth 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 An ALS Limited Company



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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



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory 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 I	Duplicate (DUP) Report	•	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-A: pH Measu	urements (QC Lot: 3203871)							
EB1330241-001	BH48 0.1-0.2	EA029: pH KCI (23A)		0.1	pH Unit	4.3	4.3	0.0	0% - 20%
		EA029: pH OX (23B)		0.1	pH Unit	4.1	4.2	2.4	0% - 20%
EB1330241-011	BH47 0.1-0.2	EA029: pH KCI (23A)		0.1	pH Unit	4.2	4.2	0.0	0% - 20%
		EA029: pH OX (23B)		0.1	pH Unit	4.2	4.2	0.0	0% - 20%
EA029-A: pH Meası	rements (QC Lot: 3203872)							
EB1330241-021	BH64 0.1-0.2	EA029: pH KCI (23A)		0.1	pH Unit	4.8	4.8	0.0	0% - 20%
		EA029: pH OX (23B)		0.1	pH Unit	4.9	4.8	2.1	0% - 20%
EB1330241-031	BH7 0.1-0.2	EA029: pH KCI (23A)		0.1	pH Unit	4.8	4.8	0.0	0% - 20%
		EA029: pH OX (23B)		0.1	pH Unit	4.9	5.1	4.0	0% - 20%
EA029-A: pH Measu	rements (QC Lot: 3203873)							
EB1330241-041	BH26 0.4-0.6	EA029: pH KCI (23A)		0.1	pH Unit	4.7	4.7	0.0	0% - 20%
		EA029: pH OX (23B)		0.1	pH Unit	4.2	4.1	2.4	0% - 20%
EA029-B: Acidity Tr	rail (QC Lot: 3203871)								
EB1330241-001	BH48 0.1-0.2	EA029: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	0.05	0.06	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity		0.02	% pyrite S	0.08	0.09	0.0	No Limit
		(s-23G)			.,				
		EA029: sulfidic - Titratable Sulfidic Acidity		0.02	% pyrite S	0.03	0.04	0.0	No Limit
		(s-23H)							
		EA029: Titratable Actual Acidity (23F)		2	mole H+ / t	34	36	7.4	0% - 50%
		EA029: Titratable Peroxide Acidity (23G)		2	mole H+ / t	54	59	9.9	0% - 20%
		EA029: Titratable Sulfidic Acidity (23H)		2	mole H+ / t	20	23	14.2	0% - 50%
EB1330241-011	BH47 0.1-0.2	EA029: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	0.10	0.10	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity		0.02	% pyrite S	0.21	0.21	0.0	0% - 50%
		(s-23G)							
		EA029: sulfidic - Titratable Sulfidic Acidity		0.02	% pyrite S	0.11	0.12	0.0	No Limit
		(s-23H)							
		EA029: Titratable Actual Acidity (23F)		2	mole H+ / t	64	60	6.4	0% - 20%
		EA029: Titratable Peroxide Acidity (23G)		2	mole H+ / t	132	132	0.0	0% - 20%
		EA029: Titratable Sulfidic Acidity (23H)		2	mole H+ / t	68	72	5.7	0% - 20%
EA029-B: Acidity Tr	rail (QC Lot: 3203872)								
EB1330241-021	BH64 0.1-0.2	EA029: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	0.03	0.03	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity		0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		(s-23G)							
		EA029: sulfidic - Titratable Sulfidic Acidity		0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		(s-23H)							
		EA029: Titratable Actual Acidity (23F)		2	mole H+ / t	19	20	0.0	No Limit

Page : 4 of 11 Work Order : EB1330241 Client : WORLEY PARSONS - INFRASTRUCTURE MWE Project : 401010-01002 LOLIPIP



Sub-Matrix: SOIL						Laboratory L	Duplicate (DUP) Report	t	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-B: Acidity Tr	ail (QC Lot: 3203872)	- continued							
EB1330241-021	BH64 0.1-0.2	EA029: Titratable Peroxide Acidity (23G)		2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)		2	mole H+ / t	<2	<2	0.0	No Limit
EB1330241-031	BH7 0.1-0.2	EA029: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	0.03	0.03	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)		0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)		0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)		2	mole H+ / t	21	20	5.2	0% - 50%
		EA029: Titratable Peroxide Acidity (23G)		2	mole H+ / t	<2	<2	0.0	No Limit
		EA029: Titratable Sulfidic Acidity (23H)		2	mole H+ / t	<2	<2	0.0	No Limit
EA029-B: Acidity Tr	ail (QC Lot: 3203873)								
EB1330241-041	BH26 0.4-0.6	EA029: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	0.04	0.04	0.0	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)		0.02	% pyrite S	0.15	0.16	0.0	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)		0.02	% pyrite S	0.11	0.12	0.0	No Limit
		EA029: Titratable Actual Acidity (23F)		2	mole H+ / t	26	27	0.0	0% - 50%
		EA029: Titratable Peroxide Acidity (23G)		2	mole H+ / t	96	100	4.8	0% - 20%
		EA029: Titratable Sulfidic Acidity (23H)		2	mole H+ / t	69	73	5.2	0% - 20%
EA029-C: Sulfur Tra	nil (QC Lot: 3203871)								
EB1330241-001	BH48 0.1-0.2	EA029: KCI Extractable Sulfur (23Ce)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Peroxide Sulfur (23De)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)		10	mole H+ / t	<10	<10	0.0	No Limit
EB1330241-011	BH47 0.1-0.2	EA029: KCI Extractable Sulfur (23Ce)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Peroxide Sulfur (23De)		0.02	% S	0.04	0.03	0.0	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)		0.02	% S	0.04	0.03	0.0	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)		10	mole H+ / t	23	20	12.2	No Limit
EA029-C: Sulfur Tra	nil (QC Lot: 3203872)								
EB1330241-021	BH64 0.1-0.2	EA029: KCI Extractable Sulfur (23Ce)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Peroxide Sulfur (23De)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)		10	mole H+ / t	<10	<10	0.0	No Limit
EB1330241-031	BH7 0.1-0.2	EA029: KCI Extractable Sulfur (23Ce)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Peroxide Sulfur (23De)		0.02	% S	0.03	0.02	0.0	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)		0.02	% S	0.03	0.02	0.0	No Limit

Page	: 5 of 11
Work Order	: EB1330241
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE
Project	: 401010-01002 LOLIPIP



Sub-Matrix: SOIL						Laboratory	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-C: Sulfur Tra	il (QC Lot: 3203872) - c	ontinued							
EB1330241-031	BH7 0.1-0.2	EA029: acidity - Peroxide Oxidisable Sulfur		10	mole H+ / t	17	16	7.0	No Limit
		(a-23E)							
EA029-C: Sulfur Tra	il (QC Lot: 3203873)								
EB1330241-041	BH26 0.4-0.6	EA029: KCI Extractable Sulfur (23Ce)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Peroxide Sulfur (23De)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur		10	mole H+ / t	<10	<10	0.0	No Limit
		(a-23E)							
EA029-D: Calcium V	alues (QC Lot: 3203871)							
EB1330241-001	BH48 0.1-0.2	EA029: KCI Extractable Calcium (23Vh)		0.02	% Ca	0.09	0.09	0.0	No Limit
		EA029: Peroxide Calcium (23Wh)		0.02	% Ca	0.08	0.08	0.0	No Limit
		EA029: Acid Reacted Calcium (23X)		0.02	% Ca	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)		10	mole H+ / t	<10	<10	0.0	No Limit
EB1330241-011	BH47 0.1-0.2	EA029: KCI Extractable Calcium (23Vh)		0.02	% Ca	0.12	0.13	0.0	No Limit
		EA029: Peroxide Calcium (23Wh)		0.02	% Ca	0.13	0.12	0.0	No Limit
		EA029: Acid Reacted Calcium (23X)		0.02	% Ca	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)		10	mole H+ / t	<10	<10	0.0	No Limit
EA029-D: Calcium V	alues (QC Lot: 3203872)							
EB1330241-021	BH64 0.1-0.2	EA029: KCI Extractable Calcium (23Vh)		0.02	% Ca	0.06	0.06	0.0	No Limit
		EA029: Peroxide Calcium (23Wh)		0.02	% Ca	0.06	0.06	0.0	No Limit
		EA029: Acid Reacted Calcium (23X)		0.02	% Ca	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)		10	mole H+ / t	<10	<10	0.0	No Limit
EB1330241-031	BH7 0.1-0.2	EA029: KCI Extractable Calcium (23Vh)		0.02	% Ca	0.13	0.13	0.0	No Limit
		EA029: Peroxide Calcium (23Wh)		0.02	% Ca	0.13	0.13	0.0	No Limit
		EA029: Acid Reacted Calcium (23X)		0.02	% Ca	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)		10	mole H+ / t	<10	<10	0.0	No Limit
EA029-D: Calcium V	alues (QC Lot: 3203873)							
EB1330241-041	BH26 0.4-0.6	EA029: KCI Extractable Calcium (23Vh)		0.02	% Ca	0.04	0.04	0.0	No Limit
		EA029: Peroxide Calcium (23Wh)		0.02	% Ca	0.04	0.04	0.0	No Limit
		EA029: Acid Reacted Calcium (23X)		0.02	% Ca	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)		10	mole H+ / t	<10	<10	0.0	No Limit
EA029-E: Magnesiu	m Values (QC Lot: 3203	871)							
EB1330241-001	BH48 0.1-0.2	EA029: KCI Extractable Magnesium (23Sm)		0.02	% Mg	0.06	0.06	0.0	No Limit
		EA029: Peroxide Magnesium (23Tm)		0.02	% Mg	0.06	0.06	0.0	No Limit
		EA029: Acid Reacted Magnesium (23U)		0.02	% Mg	<0.02	<0.02	0.0	No Limit

Page	: 6 of 11
Work Order	: EB1330241
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE
Project	: 401010-01002 LOLIPIP



Sub-Matrix: SOIL					Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-E: Magnesiu	m Values (QC Lot: 3203871)	- continued							
EB1330241-001	BH48 0.1-0.2	EA029: sulfidic - Acid Reacted Magnesium		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Acidity - Acid Reacted Magnesium		10	mole H+ / t	<10	<10	0.0	No Limit
EB1330241-011	BH47 0.1-0.2	EA029: KCI Extractable Magnesium (23Sm)		0.02	% Mg	0.04	0.04	0.0	No Limit
		EA029: Peroxide Magnesium (23Tm)		0.02	% Mg	0.04	0.04	0.0	No Limit
		EA029: Acid Reacted Magnesium (23U)		0.02	% Mg	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t	<10	<10	0.0	No Limit
EA029-E: Magnesiu	m Values (QC Lot: 3203872)								
EB1330241-021	BH64 0.1-0.2	EA029: KCI Extractable Magnesium (23Sm)		0.02	% Ma	0.04	0.04	0.0	No Limit
		EA029: Peroxide Magnesium (23Tm)		0.02	% Mg	0.04	0.04	0.0	No Limit
		EA029: Acid Reacted Magnesium (23U)		0.02	% Mg	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t	<10	<10	0.0	No Limit
EB1330241-031	BH7 0.1-0.2	EA029: KCI Extractable Magnesium (23Sm)		0.02	% Mg	0.08	0.08	0.0	No Limit
		EA029: Peroxide Magnesium (23Tm)		0.02	% Mg	0.07	0.07	0.0	No Limit
		EA029: Acid Reacted Magnesium (23U)		0.02	% Mg	<0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t	<10	<10	0.0	No Limit
EA029-E: Magnesiu	m Values (QC Lot: 3203873)							1	
EB1330241-041	BH26 0.4-0.6	EA029: KCI Extractable Magnesium (23Sm)		0.02	% Ma	<0.02	<0.02	0.0	No Limit
		EA029: Peroxide Magnesium (23Tm)		0.02	% Mg	< 0.02	< 0.02	0.0	No Limit
		EA029: Acid Reacted Magnesium (23U)		0.02	% Mg	< 0.02	<0.02	0.0	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t	<10	<10	0.0	No Limit
EA029-G: Retained	Acidity (QC Lot: 3203871)							1	
EB1330241-001	BH48 0.1-0.2	EA029: sulfidic - Net Acid Soluble Sulfur (s-20J)		0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: Net Acid Soluble Sulfur (20Je)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: HCI Extractable Sulfur (20Be)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Net Acid Soluble Sulfur (a-20J)		10	mole H+ / t	<10	<10	0.0	No Limit
EB1330241-011	BH47 0.1-0.2	EA029: sulfidic - Net Acid Soluble Sulfur (s-20J)		0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA029: Net Acid Soluble Sulfur (20Je)		0.02	% S	<0.02	<0.02	0.0	No Limit

Page	: 7 of 11
Work Order	: EB1330241
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE
Project	: 401010-01002 LOLIPIP



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-G: Retained	Acidity (QC Lot: 32038	871) - continued							
EB1330241-011	BH47 0.1-0.2	EA029: HCI Extractable Sulfur (20Be)		0.02	% S	<0.02	<0.02	0.0	No Limit
		EA029: acidity - Net Acid Soluble Sulfur (a-20J)		10	mole H+ / t	<10	<10	0.0	No Limit
EA029-H: Acid Base	Accounting (QC Lot:	3203871)							
EB1330241-001	BH48 0.1-0.2	EA029: ANC Fineness Factor		0.5	-	1.5	1.5	0.0	No Limit
		EA029: Net Acidity (sulfur units)		0.02	% S	0.05	0.06	0.0	No Limit
		EA029: Liming Rate		1	kg CaCO3/t	2	3	0.0	No Limit
		EA029: Net Acidity (acidity units)		10	mole H+ / t	34	36	7.4	No Limit
EB1330241-011	BH47 0.1-0.2	EA029: ANC Fineness Factor		0.5	-	1.5	1.5	0.0	No Limit
		EA029: Net Acidity (sulfur units)		0.02	% S	0.14	0.13	7.9	No Limit
		EA029: Liming Rate		1	kg CaCO3/t	6	6	0.0	No Limit
		EA029: Net Acidity (acidity units)		10	mole H+ / t	87	80	7.9	No Limit
EA029-H: Acid Base	Accounting (QC Lot:	3203872)							
EB1330241-021	BH64 0.1-0.2	EA029: ANC Fineness Factor		0.5	-	1.5	1.5	0.0	No Limit
		EA029: Net Acidity (sulfur units)		0.02	% S	0.03	0.03	0.0	No Limit
		EA029: Liming Rate		1	kg CaCO3/t	1	1	0.0	No Limit
		EA029: Net Acidity (acidity units)		10	mole H+ / t	19	20	0.0	No Limit
EB1330241-031	BH7 0.1-0.2	EA029: ANC Fineness Factor		0.5	-	1.5	1.5	0.0	No Limit
		EA029: Net Acidity (sulfur units)		0.02	% S	0.06	0.06	0.0	No Limit
		EA029: Liming Rate		1	kg CaCO3/t	3	3	0.0	No Limit
		EA029: Net Acidity (acidity units)		10	mole H+ / t	38	36	6.0	No Limit
EA029-H: Acid Base	Accounting (QC Lot:	3203873)							
EB1330241-041	BH26 0.4-0.6	EA029: ANC Fineness Factor		0.5	-	1.5	1.5	0.0	No Limit
		EA029: Net Acidity (sulfur units)		0.02	% S	0.04	0.04	0.0	No Limit
		EA029: Liming Rate		1	kg CaCO3/t	2	2	0.0	No Limit
		FA029. Net Acidity (acidity units)		10	mole H+ / t	26	27	0.0	No Limit



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 Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	Recovery I	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA029-A: pH Measurements (QCLot: 3203871)								
EA029: pH KCI (23A)		0.1	pH Unit	<0.1	4.50 pH Unit	95.6	70	130
EA029: pH OX (23B)		0.1	pH Unit	<0.1	3.45 pH Unit	98.6	70	130
EA029-A: pH Measurements (QCLot: 3203872)								
EA029: pH KCI (23A)		0.1	pH Unit	<0.1	4.50 pH Unit	95.6	70	130
EA029: pH OX (23B)		0.1	pH Unit	<0.1	3.45 pH Unit	104	70	130
EA029-A: pH Measurements (QCLot: 3203873)								
EA029: pH KCI (23A)		0.1	pH Unit	<0.1	4.50 pH Unit	95.6	70	130
EA029: pH OX (23B)		0.1	pH Unit	<0.1	3.45 pH Unit	95.6	70	130
EA029-B: Acidity Trail (QCLot: 3203871)								
EA029: Titratable Actual Acidity (23F)		2	mole H+ / t	<2	25.2 mole H+ / t	106	70	130
EA029: Titratable Peroxide Acidity (23G)		2	mole H+ / t	<2	79.3 mole H+ / t	113	70	130
EA029: Titratable Sulfidic Acidity (23H)		2	mole H+ / t	<2				
EA029: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02				
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)		0.02	% pyrite S	<0.02				
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)		0.02	% pyrite S	<0.02				
EA029-B: Acidity Trail (QCLot: 3203872)								
EA029: Titratable Actual Acidity (23F)		2	mole H+ / t	<2	25.2 mole H+ / t	100	70	130
EA029: Titratable Peroxide Acidity (23G)		2	mole H+ / t	<2	79.3 mole H+ / t	106	70	130
EA029: Titratable Sulfidic Acidity (23H)		2	mole H+ / t	<2				
EA029: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02				
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)		0.02	% pyrite S	<0.02				
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)		0.02	% pyrite S	<0.02				
EA029-B: Acidity Trail (QCLot: 3203873)								
EA029: Titratable Actual Acidity (23F)		2	mole H+ / t	<2	25.2 mole H+ / t	104	70	130
EA029: Titratable Peroxide Acidity (23G)		2	mole H+ / t	<2	79.3 mole H+ / t	112	70	130
EA029: Titratable Sulfidic Acidity (23H)		2	mole H+ / t	<2				
EA029: sulfidic - Titratable Actual Acidity (s-23F)		0.02	% pyrite S	<0.02				
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)		0.02	% pyrite S	<0.02				
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)		0.02	% pyrite S	<0.02				
EA029-C: Sulfur Trail (QCLot: 3203871)								
EA029: KCI Extractable Sulfur (23Ce)		0.02	% S	<0.02	0.055 % S	93.1	70	130
EA029: Peroxide Sulfur (23De)		0.02	% S	<0.02	0.196 % S	95.7	70	130
EA029: Peroxide Oxidisable Sulfur (23E)		0.02	% S	<0.02				
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)		10	mole H+ / t	<10				

Page	: 9 of 11
Work Order	: EB1330241
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE
Project	: 401010-01002 LOLIPIP



Sub-Matrix: SOIL				Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
EA029-C: Sulfur Trail (QCLot: 3203872)									
EA029: KCI Extractable Sulfur (23Ce)		0.02	% S	<0.02	0.055 % S	91.6	70	130	
EA029: Peroxide Sulfur (23De)		0.02	% S	<0.02	0.196 % S	100	70	130	
EA029: Peroxide Oxidisable Sulfur (23E)		0.02	% S	<0.02					
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)		10	mole H+ / t	<10					
EA029-C: Sulfur Trail (QCLot: 3203873)									
EA029: KCI Extractable Sulfur (23Ce)		0.02	% S	<0.02	0.055 % S	98.9	70	130	
EA029: Peroxide Sulfur (23De)		0.02	% S	<0.02	0.196 % S	95.1	70	130	
EA029: Peroxide Oxidisable Sulfur (23E)		0.02	% S	<0.02					
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)		10	mole H+ / t	<10					
EA029-D: Calcium Values (QCLot: 3203871)									
EA029: KCI Extractable Calcium (23Vh)		0.02	% Ca	<0.02	0.121 % Ca	94.5	70	130	
EA029: Peroxide Calcium (23Wh)		0.02	% Ca	<0.02	0.280 % Ca	95.2	70	130	
EA029: Acid Reacted Calcium (23X)		0.02	% Ca	<0.02					
EA029: acidity - Acid Reacted Calcium (a-23X)		10	mole H+ / t	<10					
EA029: sulfidic - Acid Reacted Calcium (s-23X)		0.02	% S	<0.02					
EA029-D: Calcium Values (QCLot: 3203872)									
EA029: KCI Extractable Calcium (23Vh)		0.02	% Ca	<0.02	0.121 % Ca	95.7	70	130	
EA029: Peroxide Calcium (23Wh)		0.02	% Ca	<0.02	0.280 % Ca	92.5	70	130	
EA029: Acid Reacted Calcium (23X)		0.02	% Ca	<0.02					
EA029: acidity - Acid Reacted Calcium (a-23X)		10	mole H+ / t	<10					
EA029: sulfidic - Acid Reacted Calcium (s-23X)		0.02	% S	<0.02					
EA029-D: Calcium Values (QCLot: 3203873)									
EA029: KCI Extractable Calcium (23Vh)		0.02	% Ca	<0.02	0.121 % Ca	98.4	70	130	
EA029: Peroxide Calcium (23Wh)		0.02	% Ca	<0.02	0.280 % Ca	94.3	70	130	
EA029: Acid Reacted Calcium (23X)		0.02	% Ca	<0.02					
EA029: acidity - Acid Reacted Calcium (a-23X)		10	mole H+ / t	<10					
EA029: sulfidic - Acid Reacted Calcium (s-23X)		0.02	% S	<0.02					
EA029-E: Magnesium Values (QCLot: 3203871)									
EA029: KCI Extractable Magnesium (23Sm)		0.02	% Mg	<0.02	0.293 % Mg	94.1	70	130	
EA029: Peroxide Magnesium (23Tm)		0.02	% Mg	<0.02	0.259 % Mg	97.9	70	130	
EA029: Acid Reacted Magnesium (23U)		0.02	% Mg	<0.02					
EA029: Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t	<10					
EA029: sulfidic - Acid Reacted Magnesium (s-23U)		0.02	% S	<0.02					
EA029-E: Magnesium Values (QCLot: 3203872)									
EA029: KCI Extractable Magnesium (23Sm)		0.02	% Mg	<0.02	0.293 % Mg	92.6	70	130	
EA029: Peroxide Magnesium (23Tm)		0.02	% Mg	<0.02	0.259 % Mg	90.5	70	130	
EA029: Acid Reacted Magnesium (23U)		0.02	% Mg	<0.02					
EA029: Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t	<10					

Page	: 10 of 11
Work Order	: EB1330241
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE
Project	: 401010-01002 LOLIPIP



Sub-Matrix: SOIL				Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
EA029-E: Magnesium Values (QCLot: 3203872) - cor	ntinued								
EA029: sulfidic - Acid Reacted Magnesium (s-23U)		0.02	% S	<0.02					
EA029-E: Magnesium Values (QCLot: 3203873)									
EA029: KCI Extractable Magnesium (23Sm)		0.02	% Mg	<0.02	0.293 % Mg	95.8	70	130	
EA029: Peroxide Magnesium (23Tm)		0.02	% Mg	<0.02	0.259 % Mg	91.7	70	130	
EA029: Acid Reacted Magnesium (23U)		0.02	% Mg	<0.02					
EA029: Acidity - Acid Reacted Magnesium (a-23U)		10	mole H+ / t	<10					
EA029: sulfidic - Acid Reacted Magnesium (s-23U)		0.02	% S	<0.02					
EA029-G: Retained Acidity (QCLot: 3203871)									
EA029: Net Acid Soluble Sulfur (20Je)		0.02	% S	<0.02					
EA029: acidity - Net Acid Soluble Sulfur (a-20J)		10	mole H+ / t	<10					
EA029: sulfidic - Net Acid Soluble Sulfur (s-20J)		0.02	% pyrite S	<0.02					
EA029: HCI Extractable Sulfur (20Be)		0.02	% S	<0.02	0.0692 % S	99.7	70	130	
EA029-G: Retained Acidity (QCLot: 3203872)									
EA029: Net Acid Soluble Sulfur (20Je)		0.02	% S	<0.02					
EA029: acidity - Net Acid Soluble Sulfur (a-20J)		10	mole H+ / t	<10					
EA029: sulfidic - Net Acid Soluble Sulfur (s-20J)		0.02	% pyrite S	<0.02					
EA029: HCI Extractable Sulfur (20Be)		0.02	% S	<0.02	0.0692 % S	103	70	130	
EA029-H: Acid Base Accounting (QCLot: 3203871)									
EA029: ANC Fineness Factor		0.5	-	<0.5					
EA029: Net Acidity (sulfur units)		0.02	% S	<0.02					
EA029: Net Acidity (acidity units)		10	mole H+ / t	<10					
EA029: Liming Rate		1	kg CaCO3/t	<1					
EA029-H: Acid Base Accounting (QCLot: 3203872)									
EA029: ANC Fineness Factor		0.5	-	<0.5					
EA029: Net Acidity (sulfur units)		0.02	% S	<0.02					
EA029: Net Acidity (acidity units)		10	mole H+ / t	<10					
EA029: Liming Rate		1	kg CaCO3/t	<1					
EA029-H: Acid Base Accounting (QCLot: 3203873)									
EA029: ANC Fineness Factor		0.5	-	<0.5					
EA029: Net Acidity (sulfur units)		0.02	% S	<0.02					
EA029: Net Acidity (acidity units)		10	mole H+ / t	<10					
EA029: Liming Rate		1	kg CaCO3/t	<1					

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.



:EB1330241

INTERPRETIVE QUALITY CONTROL REPORT Page : 1 of 12

Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: LUCIE MISSEN	Contact	: Steven McGrath
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Telephone	: +61 03 8676 3500	Telephone	: +61-3-8549 9600
Facsimile	: +61 03 86763770	Facsimile	: +61-3-8549 9601
Project	: 401010-01002 LOLIPIP	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	:		
C-O-C number	:	Date Samples Received	: 04-DEC-2013
Sampler	:	Issue Date	: 16-DEC-2013
Order number	: 401010-01002 WBS 3G2003A		
		No. of samples received	: 48
Quote number	: ME/507/13	No. of samples analysed	: 48

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

Work Order

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Analysis Holding Time Compliance

Matrix: SOII

This report summarizes extraction / preparation and analysis times and compares each with recommended holding times (USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for <u>VOC in soils</u> vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: * = Holding time breach ; \checkmark = Within holding time.

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Method Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-H: Acid Base Accounting								
80* dried soil (EA029)								
BH12 0.1-0.2,	BH12 0.4-0.6,	23-OCT-2013	10-DEC-2013	23-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH14 0.1-0.2,	BH14 0.8-1.2,							
BH11 0.1-0.2,	BH11 0.4-0.6,							
BH7 0.1-0.2,	BH7 0.4-0.6,							
BH16 0.1-0.2,	BH16 0.4-0.6,							
BH23 0.1-0.2,	BH23 0.4-0.6,							
BH24 0.1-0.2,	BH24 0.4-0.6,							
BH25 0.1-0.2,	BH25 0.4-0.6,							
BH26 0.4-0.6,	BH26 0.8-1.2,							
BH27 0.1-0.2,	BH27 0.4-0.6							
80* dried soil (EA029)								
BH48 0.1-0.2,	BH48 0.4-0.6,	24-OCT-2013	10-DEC-2013	24-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH49 0.1-0.2,	BH49 0.4-0.6,							
BH45 0.1-0.2,	BH49 0.8-1.2,							
BH44 0.1-0.2,	BH44 0.8-1.2,							
BH46 0.1-0.2,	BH46 0.8-1.2,							
BH47 0.1-0.2,	BH47 0.4-0.6							
80* dried soil (EA029)								
BH50 0.1-0.2,	BH50 0.4-0.6,	25-OCT-2013	10-DEC-2013	25-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH53 0.1-0.2,	BH53 0.4-0.6,							
BH66 0.1-0.2,	BH66 0.8-1.2,							
BH69 0.1-0.2,	BH69 0.8-1.2,							
BH64 0.1-0.2,	BH64 0.4-0.6,							
BH65 0.1-0.2,	BH65 0.4-0.6							
Pulp Bag (EA029)								
BH62 0.2-0.3,	BH62 0.7-0.8,	20-NOV-2013	10-DEC-2013	20-NOV-2014	1	12-DEC-2013	10-MAR-2014	✓
BH67 0.05-0.3,	BH67 0.6-0.9							

Page	: 3 of 12
Work Order	: EB1330241
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE
Project	: 401010-01002 LOLIPIP



Matrix: SOIL Evaluation:			1: \star = Holding time breach ; \checkmark = Within holding time						
Method		Sample Date	Ex	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA029-B: Acidity Trail									
80* dried soil (EA029)									
BH12 0.1-0.2,	BH12 0.4-0.6,	23-OCT-2013	10-DEC-2013	23-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓	
BH14 0.1-0.2,	BH14 0.8-1.2,								
BH11 0.1-0.2,	BH11 0.4-0.6,								
BH7 0.1-0.2,	BH7 0.4-0.6,								
BH16 0.1-0.2,	BH16 0.4-0.6,								
BH23 0.1-0.2,	BH23 0.4-0.6,								
BH24 0.1-0.2,	BH24 0.4-0.6,								
BH25 0.1-0.2,	BH25 0.4-0.6,								
BH26 0.4-0.6,	BH26 0.8-1.2,								
BH27 0.1-0.2,	BH27 0.4-0.6								
80* dried soil (EA029)									
BH48 0.1-0.2,	BH48 0.4-0.6,	24-OCT-2013	10-DEC-2013	24-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓	
BH49 0.1-0.2,	BH49 0.4-0.6,								
BH45 0.1-0.2,	BH49 0.8-1.2,								
BH44 0.1-0.2,	BH44 0.8-1.2,								
BH46 0.1-0.2,	BH46 0.8-1.2,								
BH47 0.1-0.2,	BH47 0.4-0.6								
80* dried soil (EA029)									
BH50 0.1-0.2,	BH50 0.4-0.6,	25-OCT-2013	10-DEC-2013	25-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓	
BH53 0.1-0.2,	BH53 0.4-0.6,								
BH66 0.1-0.2,	BH66 0.8-1.2,								
BH69 0.1-0.2,	BH69 0.8-1.2,								
BH64 0.1-0.2,	BH64 0.4-0.6,								
BH65 0.1-0.2,	BH65 0.4-0.6								
Pulp Bag (EA029)									
BH62 0.2-0.3,	BH62 0.7-0.8,	20-NOV-2013	10-DEC-2013	20-NOV-2014	1	12-DEC-2013	10-MAR-2014	✓	
BH67 0.05-0.3,	BH67 0.6-0.9								

Page	: 4 of 12
Work Order	: EB1330241
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE
Project	: 401010-01002 LOLIPIP



Matrix: SOIL Evaluation: × = Holding time br			breach ; 🗸 = Withir	n holding time				
Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-D: Calcium Values								
80* dried soil (EA029)								
BH12 0.1-0.2,	BH12 0.4-0.6,	23-OCT-2013	10-DEC-2013	23-OCT-2014	1	12-DEC-2013	10-MAR-2014	 ✓
BH14 0.1-0.2,	BH14 0.8-1.2,							
BH11 0.1-0.2,	BH11 0.4-0.6,							
BH7 0.1-0.2,	BH7 0.4-0.6,							
BH16 0.1-0.2,	BH16 0.4-0.6,							
BH23 0.1-0.2,	BH23 0.4-0.6,							
BH24 0.1-0.2,	BH24 0.4-0.6,							
BH25 0.1-0.2,	BH25 0.4-0.6,							
BH26 0.4-0.6,	BH26 0.8-1.2,							
BH27 0.1-0.2,	BH27 0.4-0.6							
80* dried soil (EA029)								
BH48 0.1-0.2,	BH48 0.4-0.6,	24-OCT-2013	10-DEC-2013	24-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH49 0.1-0.2,	BH49 0.4-0.6,							
BH45 0.1-0.2,	BH49 0.8-1.2,							
BH44 0.1-0.2,	BH44 0.8-1.2,							
BH46 0.1-0.2,	BH46 0.8-1.2,							
BH47 0.1-0.2,	BH47 0.4-0.6							
80* dried soil (EA029)								
BH50 0.1-0.2,	BH50 0.4-0.6,	25-OCT-2013	10-DEC-2013	25-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH53 0.1-0.2,	BH53 0.4-0.6,							
BH66 0.1-0.2,	BH66 0.8-1.2,							
BH69 0.1-0.2,	BH69 0.8-1.2,							
BH64 0.1-0.2,	BH64 0.4-0.6,							
BH65 0.1-0.2,	BH65 0.4-0.6							
Pulp Bag (EA029)								
BH62 0.2-0.3,	BH62 0.7-0.8,	20-NOV-2013	10-DEC-2013	20-NOV-2014	1	12-DEC-2013	10-MAR-2014	✓
BH67 0.05-0.3,	BH67 0.6-0.9							

Page	5 of 12
Work Order	: EB1330241
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE
Project	: 401010-01002 LOLIPIP



Matrix: SOIL Evaluation: × = Holding time breac			breach ; ✓ = Withir	n holding time				
Method		Sample Date	Ex	traction / Preparation		Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-F: Excess Acid Neutralising Capaci	ty							
80* dried soil (EA029)								
BH12 0.1-0.2,	BH12 0.4-0.6,	23-OCT-2013	10-DEC-2013	23-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH14 0.1-0.2,	BH14 0.8-1.2,							
BH11 0.1-0.2,	BH11 0.4-0.6,							
BH7 0.1-0.2,	BH7 0.4-0.6,							
BH16 0.1-0.2,	BH16 0.4-0.6,							
BH23 0.1-0.2,	BH23 0.4-0.6,							
BH24 0.1-0.2,	BH24 0.4-0.6,							
BH25 0.1-0.2,	BH25 0.4-0.6,							
BH26 0.4-0.6,	BH26 0.8-1.2,							
BH27 0.1-0.2,	BH27 0.4-0.6							
80* dried soil (EA029)								
BH48 0.1-0.2,	BH48 0.4-0.6,	24-OCT-2013	10-DEC-2013	24-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH49 0.1-0.2,	BH49 0.4-0.6,							
BH45 0.1-0.2,	BH49 0.8-1.2,							
BH44 0.1-0.2,	BH44 0.8-1.2,							
BH46 0.1-0.2,	BH46 0.8-1.2,							
BH47 0.1-0.2,	BH47 0.4-0.6							
80* dried soil (EA029)								
BH50 0.1-0.2,	BH50 0.4-0.6,	25-OCT-2013	10-DEC-2013	25-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH53 0.1-0.2,	BH53 0.4-0.6,							
BH66 0.1-0.2,	BH66 0.8-1.2,							
BH69 0.1-0.2,	BH69 0.8-1.2,							
BH64 0.1-0.2,	BH64 0.4-0.6,							
BH65 0.1-0.2,	BH65 0.4-0.6							
Pulp Bag (EA029)								
BH62 0.2-0.3,	BH62 0.7-0.8,	20-NOV-2013	10-DEC-2013	20-NOV-2014	1	12-DEC-2013	10-MAR-2014	✓
BH67 0.05-0.3,	BH67 0.6-0.9							

Page	: 6 of 12
Work Order	: EB1330241
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE
Project	: 401010-01002 LOLIPIP



Matrix: SOIL					Evaluation	Holding time	breach ; 🗸 = Withir	n holding time
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-E: Magnesium Values								
80* dried soil (EA029)								
BH12 0.1-0.2,	BH12 0.4-0.6,	23-OCT-2013	10-DEC-2013	23-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH14 0.1-0.2,	BH14 0.8-1.2,							
BH11 0.1-0.2,	BH11 0.4-0.6,							
BH7 0.1-0.2,	BH7 0.4-0.6,							
BH16 0.1-0.2,	BH16 0.4-0.6,							
BH23 0.1-0.2,	BH23 0.4-0.6,							
BH24 0.1-0.2,	BH24 0.4-0.6,							
BH25 0.1-0.2,	BH25 0.4-0.6,							
BH26 0.4-0.6,	BH26 0.8-1.2,							
BH27 0.1-0.2,	BH27 0.4-0.6							
80* dried soil (EA029)								
BH48 0.1-0.2,	BH48 0.4-0.6,	24-OCT-2013	10-DEC-2013	24-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH49 0.1-0.2,	BH49 0.4-0.6,							
BH45 0.1-0.2,	BH49 0.8-1.2,							
BH44 0.1-0.2,	BH44 0.8-1.2,							
BH46 0.1-0.2,	BH46 0.8-1.2,							
BH47 0.1-0.2,	BH47 0.4-0.6							
80* dried soil (EA029)								
BH50 0.1-0.2,	BH50 0.4-0.6,	25-OCT-2013	10-DEC-2013	25-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH53 0.1-0.2,	BH53 0.4-0.6,							
BH66 0.1-0.2,	BH66 0.8-1.2,							
BH69 0.1-0.2,	BH69 0.8-1.2,							
BH64 0.1-0.2,	BH64 0.4-0.6,							
BH65 0.1-0.2,	BH65 0.4-0.6							
Pulp Bag (EA029)								
BH62 0.2-0.3,	BH62 0.7-0.8,	20-NOV-2013	10-DEC-2013	20-NOV-2014	1	12-DEC-2013	10-MAR-2014	✓
BH67 0.05-0.3,	BH67 0.6-0.9							

Page	: 7 of 12
Work Order	: EB1330241
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE
Project	: 401010-01002 LOLIPIP



Matrix: SOIL					Evaluation	: × = Holding time	breach ; 🗸 = Withir	n holding time
Method		Sample Date	E>	ktraction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-A: pH Measurements								
80* dried soil (EA029)								
BH12 0.1-0.2,	BH12 0.4-0.6,	23-OCT-2013	10-DEC-2013	23-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH14 0.1-0.2,	BH14 0.8-1.2,							
BH11 0.1-0.2,	BH11 0.4-0.6,							
BH7 0.1-0.2,	BH7 0.4-0.6,							
BH16 0.1-0.2,	BH16 0.4-0.6,							
BH23 0.1-0.2,	BH23 0.4-0.6,							
BH24 0.1-0.2,	BH24 0.4-0.6,							
BH25 0.1-0.2,	BH25 0.4-0.6,							
BH26 0.4-0.6,	BH26 0.8-1.2,							
BH27 0.1-0.2,	BH27 0.4-0.6							
80* dried soil (EA029)								
BH48 0.1-0.2,	BH48 0.4-0.6,	24-OCT-2013	10-DEC-2013	24-OCT-2014	1	12-DEC-2013	10-MAR-2014	 ✓
BH49 0.1-0.2,	BH49 0.4-0.6,							
BH45 0.1-0.2,	BH49 0.8-1.2,							
BH44 0.1-0.2,	BH44 0.8-1.2,							
BH46 0.1-0.2,	BH46 0.8-1.2,							
BH47 0.1-0.2,	BH47 0.4-0.6							
80* dried soil (EA029)								
BH50 0.1-0.2,	BH50 0.4-0.6,	25-OCT-2013	10-DEC-2013	25-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH53 0.1-0.2,	BH53 0.4-0.6,							
BH66 0.1-0.2,	BH66 0.8-1.2,							
BH69 0.1-0.2,	BH69 0.8-1.2,							
BH64 0.1-0.2,	BH64 0.4-0.6,							
BH65 0.1-0.2,	BH65 0.4-0.6							
Pulp Bag (EA029)								
BH62 0.2-0.3,	BH62 0.7-0.8,	20-NOV-2013	10-DEC-2013	20-NOV-2014	1	12-DEC-2013	10-MAR-2014	✓
BH67 0.05-0.3.	BH67 0.6-0.9							

Page	: 8 of 12
Work Order	: EB1330241
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE
Project	: 401010-01002 LOLIPIP



Matrix: SOIL					Evaluation:	× = Holding time	breach ; 🗸 = Withir	holding time.
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-G: Retained Acidity								
80* dried soil (EA029)								
BH12 0.1-0.2,	BH12 0.4-0.6,	23-OCT-2013	10-DEC-2013	23-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH14 0.1-0.2,	BH14 0.8-1.2,							
BH11 0.1-0.2,	BH11 0.4-0.6,							
BH7 0.1-0.2,	BH7 0.4-0.6,							
BH16 0.1-0.2,	BH16 0.4-0.6,							
BH23 0.1-0.2,	BH23 0.4-0.6,							
BH24 0.1-0.2,	BH24 0.4-0.6,							
BH25 0.1-0.2,	BH25 0.4-0.6,							
BH26 0.4-0.6,	BH26 0.8-1.2,							
BH27 0.1-0.2,	BH27 0.4-0.6							
80* dried soil (EA029)								
BH48 0.1-0.2,	BH48 0.4-0.6,	24-OCT-2013	10-DEC-2013	24-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH49 0.1-0.2,	BH49 0.4-0.6,							
BH45 0.1-0.2,	BH49 0.8-1.2,							
BH44 0.1-0.2,	BH44 0.8-1.2,							
BH46 0.1-0.2,	BH46 0.8-1.2,							
BH47 0.1-0.2,	BH47 0.4-0.6							
80* dried soil (EA029)								
BH50 0.1-0.2,	BH50 0.4-0.6,	25-OCT-2013	10-DEC-2013	25-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH53 0.1-0.2,	BH53 0.4-0.6,							
BH66 0.1-0.2,	BH66 0.8-1.2,							
BH69 0.1-0.2,	BH69 0.8-1.2,							
BH64 0.1-0.2,	BH64 0.4-0.6,							
BH65 0.1-0.2,	BH65 0.4-0.6							
Pulp Bag (EA029)								
BH62 0.2-0.3,	BH62 0.7-0.8,	20-NOV-2013	10-DEC-2013	20-NOV-2014	1	12-DEC-2013	10-MAR-2014	✓
BH67 0.05-0.3,	BH67 0.6-0.9							

Page	: 9 of 12
Work Order	: EB1330241
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE
Project	: 401010-01002 LOLIPIP



Matrix: SOIL					Evaluation:	× = Holding time	breach ; 🗸 = Withir	n holding time
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-C: Sulfur Trail								
80* dried soil (EA029)								
BH12 0.1-0.2,	BH12 0.4-0.6,	23-OCT-2013	10-DEC-2013	23-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH14 0.1-0.2,	BH14 0.8-1.2,							
BH11 0.1-0.2,	BH11 0.4-0.6,							
BH7 0.1-0.2,	BH7 0.4-0.6,							
BH16 0.1-0.2,	BH16 0.4-0.6,							
BH23 0.1-0.2,	BH23 0.4-0.6,							
BH24 0.1-0.2,	BH24 0.4-0.6,							
BH25 0.1-0.2,	BH25 0.4-0.6,							
BH26 0.4-0.6,	BH26 0.8-1.2,							
BH27 0.1-0.2,	BH27 0.4-0.6							
80* dried soil (EA029)								
BH48 0.1-0.2,	BH48 0.4-0.6,	24-OCT-2013	10-DEC-2013	24-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH49 0.1-0.2,	BH49 0.4-0.6,							
BH45 0.1-0.2,	BH49 0.8-1.2,							
BH44 0.1-0.2,	BH44 0.8-1.2,							
BH46 0.1-0.2,	BH46 0.8-1.2,							
BH47 0.1-0.2,	BH47 0.4-0.6							
80* dried soil (EA029)								
BH50 0.1-0.2,	BH50 0.4-0.6,	25-OCT-2013	10-DEC-2013	25-OCT-2014	1	12-DEC-2013	10-MAR-2014	✓
BH53 0.1-0.2,	BH53 0.4-0.6,							
BH66 0.1-0.2,	BH66 0.8-1.2,							
BH69 0.1-0.2,	BH69 0.8-1.2,							
BH64 0.1-0.2,	BH64 0.4-0.6,							
BH65 0.1-0.2,	BH65 0.4-0.6							
Pulp Bag (EA029)								
BH62 0.2-0.3,	BH62 0.7-0.8,	20-NOV-2013	10-DEC-2013	20-NOV-2014	1	12-DEC-2013	10-MAR-2014	✓
BH67 0.05-0.3,	BH67 0.6-0.9							



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(where) 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 Cor	ntrol frequency no	ot within specification ; \checkmark = Quality Control frequency within specification.
Quality Control Sample Type		С	ount		Rate (%)		Quality Control Specification
Analytical Methods	Method	OC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Suspension Peroxide Oxidation-Combined Acidity and	EA029	5	48	10.4	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulphate							
Laboratory Control Samples (LCS)							
Suspension Peroxide Oxidation-Combined Acidity and	EA029	3	48	6.3	5.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulphate							
Method Blanks (MB)							
Suspension Peroxide Oxidation-Combined Acidity and	EA029	3	48	6.3	5.0	~	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulphate							



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
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house



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-QWI/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.



1

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QUALITY CONTROL REPORT

Work Order	EM1311266	Page	: 1 of 4
Client Contact Address	: WORLEY PARSONS - INFRASTRUCTURE MWE : LUCIE MISSEN : LEVEL 12, 333 COLLINS STREET MELBOURNE VIC, AUSTRALIA 3000	Laboratory Contact Address	: Environmental Division Melbourne : Steven McGrath : 4 Westall Rd Springvale VIC Australia 3171
E-mail Telephone Facsimile	: lucie.missen@worleyparsons.com : +61 03 86763700 : +61 03 86763770	E-mail Telephone Facsimile	: steven.mcgrath@alsenviro.com : +61-3-8549 9600 : +61-3-8549 9601
Project Site	: 401010-01002 LOLIPIP	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
C-O-C number		Date Samples Received	: 24-OCT-2013
Order number	: 401010-01002 WBS 3G2003A	No. of complex received	
Quote number	: ME/507/13	No. of samples received	: 18 : 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



ited Signatories

Laboratory 825 This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out ir compliance with procedures specified in 21 CFR Part 11.

ccredited for	Signatories	Position	Accreditation Category
mpliance with O/IEC 17025.	SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils

Address 4 Westall Rd Springvale VIC Australia 3171 PHONE +61-3-8549 9600 Facsimile +61-3-8549 9601 Environmental Division Melbourne ABN 84 009 936 029 Part of the ALS Group An ALS Limited Company



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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



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory 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 Duplicate (DUP) Report									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)	
EA003 :pH (field/fox)	(QC Lot: 3133273)									
EM1311266-001	BH48 0.1-0.2	EA003: Reaction Rate		1		3	3	0.0	No Limit	
		EA003: pH (F)		0.1	pH Unit	5.6	5.6	0.0	0% - 20%	
		EA003: pH (Fox)		0.1	pH Unit	2.5	2.6	3.9	0% - 20%	
EM1311266-015	BH46 0.8-1.2	EA003: Reaction Rate		1		2	2	0.0	No Limit	
		EA003: pH (F)		0.1	pH Unit	5.4	5.2	3.8	0% - 20%	
		EA003: pH (Fox)		0.1	pH Unit	2.8	2.9	3.5	0% - 20%	


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.

• No Method Blank (MB) or Laboratory Control Spike (SCS) Results are required to be reported.

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.



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Work Order	: EM1311266	Page	: 1 of 5
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Melbourne
Contact	: LUCIE MISSEN	Contact	: Steven McGrath
Address	LEVEL 12, 333 COLLINS STREET	Address	: 4 Westall Rd Springvale VIC Australia 3171
	MELBOURNE VIC, AUSTRALIA 3000		
E-mail	: lucie.missen@worleyparsons.com	E-mail	: steven.mcgrath@alsenviro.com
Telephone	: +61 03 86763700	Telephone	: +61-3-8549 9600
Facsimile	: +61 03 86763770	Facsimile	: +61-3-8549 9601
Project	: 401010-01002 LOLIPIP	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	:		
C-O-C number	:	Date Samples Received	: 24-OCT-2013
Sampler	: LM	Issue Date	: 04-NOV-2013
Order number	: 401010-01002 WBS 3G2003A		
		No. of samples received	: 18
Quote number	: ME/507/13	No. of samples analysed	: 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

Address 4 Westall Rd Springvale VIC Australia 3171 PHONE +61-3-8549 9600 Facsimile +61-3-8549 9601 Environmental Division Melbourne ABN 84 009 936 029 Part of the ALS Group An ALS Limited Company



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Analysis Holding Time Compliance

Matrix: SOIL

This report summarizes extraction / preparation and analysis times and compares each with recommended holding times (USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for <u>VOC in soils</u> vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: * = Holding time breach ; \checkmark = Within holding time.

						J =		<u> </u>
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA003 :pH (field/fox)								
Snap Lock Bag - frozen on receipt at ALS (EA003)								
BH48 0.1-0.2,	BH48 0.4-0.6,	24-OCT-2013	30-OCT-2013	24-OCT-2014	1	01-NOV-2013	28-JAN-2014	\checkmark
BH49 0.1-0.2,	BH49 0.4-0.6,							
BH45 0.1-0.2,	BH45 0.8-1.2,							
BH44 0.1-0.2,	BH44 0.8-1.2,							
BH46 0.1-0.2,	BH46 0.8-1.2,							
BH47 0.1-0.2,	BH47 0.4-0.6							
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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(where) 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 w						
Quality Control Sample Type	Co	unt		Rate (%)		Quality Control Specification			
Analytical Methods	Method	OC Reaular		Actual	Expected	Evaluation			
Laboratory Duplicates (DUP)									
pH field/fox	EA003	2	20	10.0	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement		



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
pH field/fox	EA003	SOIL	Ahern et al 1998 - determined on a 1:5 soil/water extract designed to simulate field measured pH and pH after
			the extract has been oxidised with peroxide.



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-QWI/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.

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Level 12, 333 Collins St Melbourne VIC 3000 Australia Telephone: +61 3 8676 3500 Facsimile: +61 3 8676 3505 Web: www.worley.com.au Worley Infrastructure Pty Ltd ABN 30 009 265 927

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QUALITY CONTROL REPORT

Work Order	: EM1311275	Page	: 1 of 4
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Melbourne
Contact	: LUCIE MISSEN	Contact	: Steven McGrath
Address	: LEVEL 12, 333 COLLINS STREET	Address	: 4 Westall Rd Springvale VIC Australia 3171
	MELBOURNE VIC, AUSTRALIA 3000		
E-mail	: lucie.missen@worleyparsons.com	E-mail	: steven.mcgrath@alsenviro.com
Telephone	: +61 03 86763700	Telephone	: +61-3-8549 9600
Facsimile	: +61 03 86763770	Facsimile	: +61-3-8549 9601
Project	: 401010-01002 LOLIPIP	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	:		
C-O-C number	:	Date Samples Received	: 25-OCT-2013
Sampler	: LM	Issue Date	: 04-NOV-2013
Order number	: 401010-01002 WBS 3G2003A		
		No. of samples received	: 30
Quote number	: ME/507/13	No. of samples analysed	: 20

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



Signatories

Laboratory 825 This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out ir compliance with procedures specified in 21 CFR Part 11.

ccredited for	Signatories	Position	Accreditation Category
mpliance with O/IEC 17025.	SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils

Address 4 Westall Rd Springvale VIC Australia 3171 PHONE +61-3-8549 9600 Facsimile +61-3-8549 9601 Environmental Division Melbourne ABN 84 009 936 029 Part of the ALS Group An ALS Limited Company



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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



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory 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 Duplicate (DUP) Report									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)			
EA003 :pH (field/fox)	(QC Lot: 3133273)											
EM1311266-001	Anonymous	EA003: Reaction Rate		1		3	3	0.0	No Limit			
		EA003: pH (F)		0.1	pH Unit	5.6	5.6	0.0	0% - 20%			
		EA003: pH (Fox)		0.1	pH Unit	2.5	2.6	3.9	0% - 20%			
EM1311266-015	Anonymous	EA003: Reaction Rate		1		2	2	0.0	No Limit			
		EA003: pH (F)		0.1	pH Unit	5.4	5.2	3.8	0% - 20%			
		EA003: pH (Fox)		0.1	pH Unit	2.8	2.9	3.5	0% - 20%			
EA003 :pH (field/fox)	(QC Lot: 3133274)											
EM1311275-013	BH16 0.1-0.2	EA003: Reaction Rate		1		3	3	0.0	No Limit			
		EA003: pH (F)		0.1	pH Unit	6.4	6.4	0.0	0% - 20%			
		EA003: pH (Fox)		0.1	pH Unit	2.6	2.6	0.0	0% - 20%			
EM1311275-027	BH26 0.8-1.2	EA003: Reaction Rate		1		2	2	0.0	No Limit			
		EA003: pH (F)		0.1	pH Unit	5.6	5.7	1.8	0% - 20%			
		EA003: pH (Fox)		0.1	pH Unit	2.5	2.3	8.3	0% - 20%			



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.

• No Method Blank (MB) or Laboratory Control Spike (SCS) Results are required to be reported.

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 G	UALITY CONTROL I	REPORT
Work Order	: EM1311275	Page	: 1 of 5
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Melbourne
Contact	: LUCIE MISSEN	Contact	: Steven McGrath
Address	LEVEL 12, 333 COLLINS STREET	Address	: 4 Westall Rd Springvale VIC Australia 3171
	MELBOURNE VIC, AUSTRALIA 3000		
E-mail	: lucie.missen@worleyparsons.com	E-mail	: steven.mcgrath@alsenviro.com
Telephone	: +61 03 86763700	Telephone	: +61-3-8549 9600
Facsimile	: +61 03 86763770	Facsimile	: +61-3-8549 9601
Project	: 401010-01002 LOLIPIP	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	:		
C-O-C number	:	Date Samples Received	: 25-OCT-2013
Sampler	: LM	Issue Date	: 04-NOV-2013
Order number	: 401010-01002 WBS 3G2003A		
		No. of samples received	: 30
Quote number	: ME/507/13	No. of samples analysed	: 20

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

Matrix: SOIL

This report summarizes extraction / preparation and analysis times and compares each with recommended holding times (USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for <u>VOC in soils</u> vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: * = Holding time breach ; \checkmark = Within holding time.

			-			· · · · · ·		
Method		Sample Date	E>	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA003 :pH (field/fox)								
Snap Lock Bag - frozen (EA003)								
BH12 0.1-0.2,	BH12 0.4-0.6,	22-OCT-2013	30-OCT-2013	22-OCT-2014	1	01-NOV-2013	28-JAN-2014	✓
BH14 0.1-0.2,	BH14 0.8-1.2,							
BH11 0.1-0.2,	BH11 0.4-0.6,							
BH7 0.1-0.2,	BH7 0.4-0.6,							
BH16 0.1-0.2,	BH16 0.4-0.6,							
BH23 0.1-0.2,	BH23 0.4-0.6							
Snap Lock Bag - frozen (EA003)								
BH24 0.1-0.2,	BH24 0.4-0.6,	23-OCT-2013	30-OCT-2013	23-OCT-2014	1	01-NOV-2013	28-JAN-2014	✓
BH25 0.1-0.2,	BH25 0.4-0.6,							
BH26 0.4-0.6,	BH26 0.8-1.2,							
BH27 0.1-0.2,	BH27 0.4-0.6							



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(where) 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								
Quality Control Sample Type		Co	ount		Rate (%)		Quality Control Specification				
Analytical Methods	Methods Method		Reaular	Actual	Expected	Evaluation					
Laboratory Duplicates (DUP)						Y.					
pH field/fox	EA003	4	40	10.0	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement				



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
pH field/fox	EA003	SOIL	Ahern et al 1998 - determined on a 1:5 soil/water extract designed to simulate field measured pH and pH after
			the extract has been oxidised with peroxide.



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-QWI/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.

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Worley	Parso	ons			CH/ A)	AIN NAL	OF CI .YSIS	USTO REQU	DY ai JEST	nd p	Level 12, 333 Collins St Melbourne VIC 3000 Australia Telephone: +61 3 8876 3500 Facsimile: +61 3 8876 3505 Web: www.worley.com.au Worley Infrastructure Pty Ltd ABN 30 009 265 927
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Worley Pty Ltd

Version 1/1

Worley	Parson	IS CHAIN O ANALY	F CUSTODY and SIS REQUEST	Melbourne VIC 3000 Australia Telephone: +61 3 8676 3500 Facsimile: +61 3 8676 3505 Web: www.worley.com.au Worley infrastructure Pty Ltd ABN 30 009 265 927
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Version 1/1

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Raymond Thai	
From: Sent:	Steven McGrath Friday, 25 October 2013 9:44 AM
Subject: Attachments:	FW: Worley Parsons SPOCAS samples sharpscanner@ecowise.com.au_20131025_075339.pdf
Importance:	High
COC for samples t	that arrived this morning. Please place in Freezer as these are for ASS.
Steven McGrath	
Technical Manager - Cl ALS Environmental D	vision
4 Westall Road Springvale, Victoria 317	
How was your custo	mer experience? Please send us your feedback
EnviroMail 68 - Samplir	ng and Analysis Implications of the new NEPM - July 2013
EnviroMail 69 - Testing	Requirements of the new NEPM - July 2013
EnviroMail 70 - Variatic	on of Naphthalene by SVOC and VOC Methods in Water - July 2013
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www.alsglobal.com	
Winner of the inaugural (Reduction in Sample Volur	CARE Award 2011 - Sustainable Technology & Innovation: nes - Improving quality, safety, efficiency and sustainability in environmental practices
WREAWARD	
From: Paul Whiffen Sent: Friday, 25 Octob To: Steven McGrath Subject: RE: Worley P	ver 2013 9:32 AM arsons SPOCAS samples
Hi Steven,	
Apologies, please see a you first thing this mor Do you need the origin	ittached. I remembered last night that I didn't tape to the lid and that I would email them to ning but I forgot. als sent to you?
Regards,	
Paul Whiffen	
Manager, Traralgon ALS Life Sciences D Water Resources Gr	Laboratory Ivision Environmental oup

Tel: +61 3 5176 4170 **Fax:** +61 3 5176 4473 **Mobile:** +61 (0) 427 070 932

Please consider the environment before printing this email.

From: Steven McGrath Sent: Friday, 25 October 2013 9:25 AM To: Paul Whiffen Subject: RE: Worley Parsons SPOCAS samples Importance: High

Hi Paul - also | couldn't locate the COC in the eskies we received? that she handed over the COC to you with the samples. I confirmed with Luci

Have you got a copy of this? Are you able to scan and e-mail me ىم t copy?

Regards,

Steven McGrath

Technical Manager - Client Services ALS | Environmental Division

4 Westall Road Springvale, Victoria 3171

How was your customer experience? Please send us your feedback

EnviroMail 68 - Sampling and Analysis Implications of the new NEPM - July 2013

EnviroMail 69 -Testing Requirements of the new NEPM - July 2013

EnviroMail 70 - Variation of Naphthalene by SVOC and VOC Methods in Water - July 2013

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Winner of the inaugural CARE Award 2011 - Sustainable Technology & Innovation: Reduction in Sample Volumes - Improving quality, safety, efficiency and sustainability in environmental practices



From: Steven McGrath Sent: Friday, 25 October 2013 9:22 AM To: Paul Whiffen Subject: FW: Worley Parsons SPOCAS samples

Ξ believe they finished sampling yesterday and dropped off these samples in person here understanding is that there should not be any more samples being handed over to you. Hi Paul - we received the samples this morning - thanks for your assistance. Springvale Ň -

Thanks again for your assistance

Regards,

Steven McGrath

Technical Manager - Client Services ALS | Environmental Division

4 Westall Road Springvale, Victoria 3171

How was your customer experience? Please send us your feedback

EnviroMail 68 - Sampling and Analysis Implications of the new NEPM - July 2013

EnviroMail 69 - Testing Requirements of the new NEPM - July 2013

EnviroMail 70 - Variation of Naphthalene by SVOC and VOC Methods in Water - July 2013

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Winner of the inaugural CARE Award 2011 - Sustainable Technology & Innovation: Réduction in Sample Volumes - Improving quality, safety, efficiency and sustainability in environmental practices



From: Steven McGrath Sent: Tuesday, 22 October 2013 11:21 AM To: Paul Whiffen Subject: RE: Worley Parsons SPOCAS samples

Thanks Paul.

Tuesday's on the Wednesday. Every second day should be sufficient - so you could send today's and tomorrow's on Thursday, and then Thursday's and Friday's on Monday, and then Monday's and

Regards,

Steven McGrath

Technical Manager - Client Services ALS | Environmental Division

4 Westall Road Springvale, Victoria 3171

How was your customer experience? Please send us your feedback

EnviroMail 68 - Sampling and Analysis Implications of the new NEPM - July 2013

EnviroMail 69 - Testing Requirements of the new NEPM - July 2013

EnviroMail 70 - Variation of Naphthalene by SVOC and VOC Methods in Water - July 2013

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Winner of the inaugural CARE Award 2011 - Sustainable Technology & Innovation: Reduction in Sample Volumes - Improving quality, safety, efficiency and sustainability in environmental practices



From: Paul Whiffen Sent: Tuesday, 22 October 2013 11:18 AM To: Steven McGrath Subject: RE: Worley Parsons SPOCAS samples

Hi Steven,

Will keep in touch. We have a big freezer room so space is not an issue. I am happy to send them on whenever you or the client needs.

Regards,

Paul Whiffen

Manager, Traralgon Laboratory ALS Life Sciences Division | Environmental Water Resources Group

Tel: +61 3 5176 4170 **Fax:** +61 3 5176 4473 **Mobile:** +61 (0) 427 070 932

Please consider the environment before printing this email.

From: Steven McGrath Sent: Tuesday, 22 October 2013 11:06 AM To: Paul Whiffen Subject: Worley Parsons SPOCAS samples

Hi Paul,

Thanks for offering to assist us with sample logistics

day, starting today until next Tuesday (not including the weekend). Luci from Worley Parsons plans to drop off one small esky of sample (~8 samples) per

Road, Springvale 3171. freeze the samples and send them off to ALS Springvale the following day: 4 Westall It is unlikely that Luci will be able to get these to you before 3pm so we would ask you to

to you. second day (assuming you have the capacity to store these frozen for two days) - it's up As freezing the samples extends the holding time indefinitely, you could send off every

If at any time you need to contact myself or the client directly, please use the following numbers:

Me (direct) - 03 8549 9644 Client (Luci) - 0414 568 510

Regards,

Steven McGrath

Technical Manager - Client Services ALS | Environmental Division

4 Westall Road Springvale, Victoria 3171

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QUALITY CONTROL REPORT

Work Order	: EM1311321	Page	: 1 of 4
Client Contact Address	: WORLEY PARSONS - INFRASTRUCTURE MWE : LUCIE MISSEN : LEVEL 12, 333 COLLINS STREET MELBOURNE VIC, AUSTRALIA 3000	Laboratory Contact Address	: Environmental Division Melbourne : Steven McGrath : 4 Westall Rd Springvale VIC Australia 3171
E-mail Telephone Facsimile	: lucie.missen@worleyparsons.com : +61 03 86763700 : +61 03 86763770	E-mail Telephone Facsimile	: steven.mcgrath@alsenviro.com : +61-3-8549 9600 : +61-3-8549 9601
Project Site	: 401010-01002 LOLIPIP :	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
C-O-C number	:	Date Samples Received	: 25-OCT-2013
Order number	: LM : 401010-01002 WBS 3G2003A	Issue Date	: U4-NOV-2013
Quote number	: ME/507/13	No. of samples received No. of samples analysed	: 18 : 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



ited Signatories

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

ccredited for	Signatories	Position	Accreditation Category
mpliance with O/IEC 17025.	SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils

Address 4 Westall Rd Springvale VIC Australia 3171 PHONE +61-3-8549 9600 Facsimile +61-3-8549 9601 Environmental Division Melbourne ABN 84 009 936 029 Part of the ALS Group An ALS Limited Company



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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



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory 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 D	Duplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA003 :pH (field/fox)	(QC Lot: 3133274)								
EM1311275-013	Anonymous	EA003: Reaction Rate		1		3	3	0.0	No Limit
		EA003: pH (F)		0.1	pH Unit	6.4	6.4	0.0	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	2.6	2.6	0.0	0% - 20%
EM1311275-027	Anonymous	EA003: Reaction Rate		1		2	2	0.0	No Limit
		EA003: pH (F)		0.1	pH Unit	5.6	5.7	1.8	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	2.5	2.3	8.3	0% - 20%
EA003 :pH (field/fox)	(QC Lot: 3133275)								
EM1311321-013	BH64 0.1-0.2	EA003: Reaction Rate		1		3	3	0.0	No Limit
		EA003: pH (F)		0.1	pH Unit	6.5	6.4	1.6	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	2.6	2.6	0.0	0% - 20%



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.

• No Method Blank (MB) or Laboratory Control Spike (SCS) Results are required to be reported.

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 Q	UALITY CONTROL I	REPORT
Work Order	: EM1311321	Page	: 1 of 5
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Melbourne
Contact	: LUCIE MISSEN	Contact	: Steven McGrath
Address	LEVEL 12, 333 COLLINS STREET	Address	: 4 Westall Rd Springvale VIC Australia 3171
	MELBOURNE VIC, AUSTRALIA 3000		
E-mail	: lucie.missen@worleyparsons.com	E-mail	: steven.mcgrath@alsenviro.com
Telephone	: +61 03 86763700	Telephone	: +61-3-8549 9600
Facsimile	: +61 03 86763770	Facsimile	: +61-3-8549 9601
Project	: 401010-01002 LOLIPIP	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	:		
C-O-C number	:	Date Samples Received	: 25-OCT-2013
Sampler	: LM	Issue Date	: 04-NOV-2013
Order number	: 401010-01002 WBS 3G2003A		
		No. of samples received	: 18
Quote number	: ME/507/13	No. of samples analysed	: 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

Address 4 Westall Rd Springvale VIC Australia 3171 PHONE +61-3-8549 9600 Facsimile +61-3-8549 9601 Environmental Division Melbourne ABN 84 009 936 029 Part of the ALS Group An ALS Limited Company



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Analysis Holding Time Compliance

Matrix: SOIL

This report summarizes extraction / preparation and analysis times and compares each with recommended holding times (USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for <u>VOC in soils</u> vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive <u>or</u> Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: * = Holding time breach ; \checkmark = Within holding time.

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Method		Sample Date	Ex	traction / Preparation		Analysis			
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA003 :pH (field/fox)									
Snap Lock Bag - frozen on receipt at ALS (EA003)									
BH50 0.1-0.2,	BH50 0.4-0.6,	25-OCT-2013	30-OCT-2013	25-OCT-2014	1	01-NOV-2013	28-JAN-2014	✓	
BH53 0.1-0.2,	BH53 0.4-0.6,								
BH66 0.1-0.2,	BH66 0.8-1.2,								
BH69 0.1-0.2,	BH69 0.8-1.2,								
BH64 0.1-0.2,	BH64 0.4-0.6,								
BH65 0.1-0.2,	BH65 0.4-0.6								
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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(where) 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								
Quality Control Sample Type		Co	ount		Rate (%)		Quality Control Specification					
Analytical Methods	Method	00	Reaular	Actual	Expected	Evaluation						
Laboratory Duplicates (DUP)												
pH field/fox	EA003	3	24	12.5	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement					



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
pH field/fox	EA003	SOIL	Ahern et al 1998 - determined on a 1:5 soil/water extract designed to simulate field measured pH and pH after
			the extract has been oxidised with peroxide.



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-QWI/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.

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Level 12, 333 Collins St Melbourne VIC 3000 Australia Telephone: +61 3 8676 3500 Facsimile: +61 3 8676 3505 Web: www.worley.com.au Worley Infrastructure Pty Ltd ABN 30 009 265 927

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QUALITY CONTROL REPORT

Work Order	: EM1312266	Page	: 1 of 4
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Melbourne
Contact	: LUCIE MISSEN	Contact	: Steven McGrath
Address	ELEVEL 12, 333 COLLINS STREET MELBOURNE VIC, AUSTRALIA 3000	Address	: 4 Westall Rd Springvale VIC Australia 3171
E-mail	: lucie.missen@worleyparsons.com	E-mail	: steven.mcgrath@alsenviro.com
Telephone	: +61 03 86763700	Telephone	: +61-3-8549 9600
Facsimile	: +61 03 86763770	Facsimile	: +61-3-8549 9601
Project	: 401010-01002 LOLIPIP	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: GIPPSLAND		
C-O-C number	:	Date Samples Received	: 20-NOV-2013
Sampler	:	Issue Date	: 28-NOV-2013
Order number	: 401010-01002 WBS 3G2003A		
		No. of samples received	: 6
Quote number	: ME/507/13	No. of samples analysed	: 4

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



Signatories

Laboratory 825 This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out ir compliance with procedures specified in 21 CFR Part 11.

ccredited for	Signatories	Position	Accreditation Category				
mpliance with O/IEC 17025.	SATISH.TRIVEDI	2 IC Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils				

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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



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory 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 D	ouplicate (DUP) Report		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA003 :pH (field/fox)	(QC Lot: 3179331)								
EM1312266-001	BH62 0.2-0.3	EA003: Reaction Rate		1		3	3	0.0	No Limit
		EA003: pH (F)		0.1	pH Unit	5.1	5.1	0.0	0% - 20%
		EA003: pH (Fox)		0.1	pH Unit	2.3	2.2	4.4	0% - 20%



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.

• No Method Blank (MB) or Laboratory Control Spike (SCS) Results are required to be reported.

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 Q	UALITY CONTROL I	REPORT
Work Order	EM1312266	Page	: 1 of 5
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Melbourne
Contact	: LUCIE MISSEN	Contact	: Steven McGrath
Address	LEVEL 12, 333 COLLINS STREET	Address	: 4 Westall Rd Springvale VIC Australia 3171
	MELBOURNE VIC, AUSTRALIA 3000		
E-mail	: lucie.missen@worleyparsons.com	E-mail	: steven.mcgrath@alsenviro.com
Telephone	: +61 03 86763700	Telephone	: +61-3-8549 9600
Facsimile	: +61 03 86763770	Facsimile	: +61-3-8549 9601
Project	: 401010-01002 LOLIPIP	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: GIPPSLAND		
C-O-C number	:	Date Samples Received	: 20-NOV-2013
Sampler	:	Issue Date	: 28-NOV-2013
Order number	: 401010-01002 WBS 3G2003A		
		No. of samples received	: 6
Quote number	: ME/507/13	No. of samples analysed	: 4

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

Address 4 Westall Rd Springvale VIC Australia 3171 PHONE +61-3-8549 9600 Facsimile +61-3-8549 9601 Environmental Division Melbourne ABN 84 009 936 029 Part of the ALS Group An ALS Limited Company



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Analysis Holding Time Compliance

Matrix: SOII

This report summarizes extraction / preparation and analysis times and compares each with recommended holding times (USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for <u>VOC in soils</u> vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: * = Holding time breach ; \checkmark = Within holding time.

Method			Sample Date	Ex	traction / Preparation			Analysis	
Containe	r / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA003 :pl	H (field/fox)								
Snap Lock	Bag - frozen on receipt at ALS (EA003)								
BH62 (0.2-0.3,	BH62 0.7-0.8,	20-NOV-2013	26-NOV-2013	20-NOV-2014	1	28-NOV-2013	24-FEB-2014	✓
BH67 (0.050.3,	BH67 0.6-0.9							



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(where) 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 Co	ntrol frequency no	ot within specification ; \checkmark = Quality Control frequency within specification.
Quality Control Sample Type		Co	unt		Rate (%)		Quality Control Specification
Analytical Methods	Method	00	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
pH field/fox	EA003	1	4	25.0	10.0	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement



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
pH field/fox	EA003	SOIL	Ahern et al 1998 - determined on a 1:5 soil/water extract designed to simulate field measured pH and pH after
			the extract has been oxidised with peroxide.



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-QWI/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.



Lab Test Request Form

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