Photographs

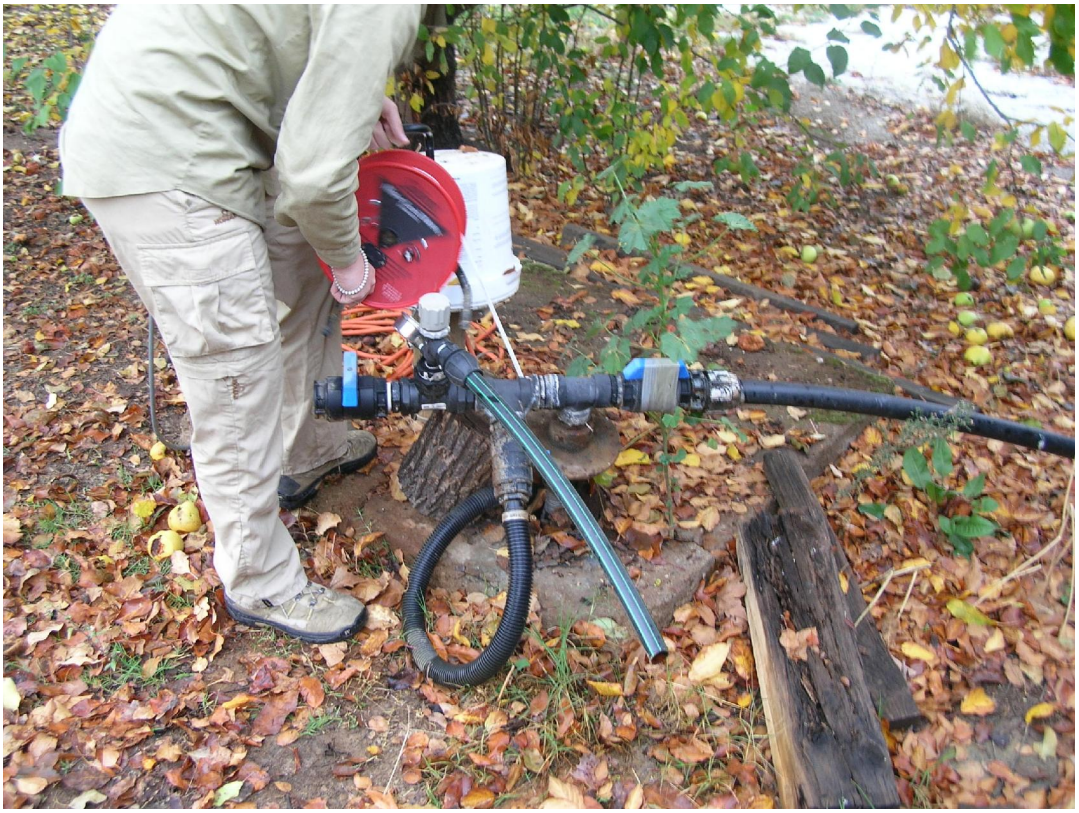

Photo 1 Bore GW064591

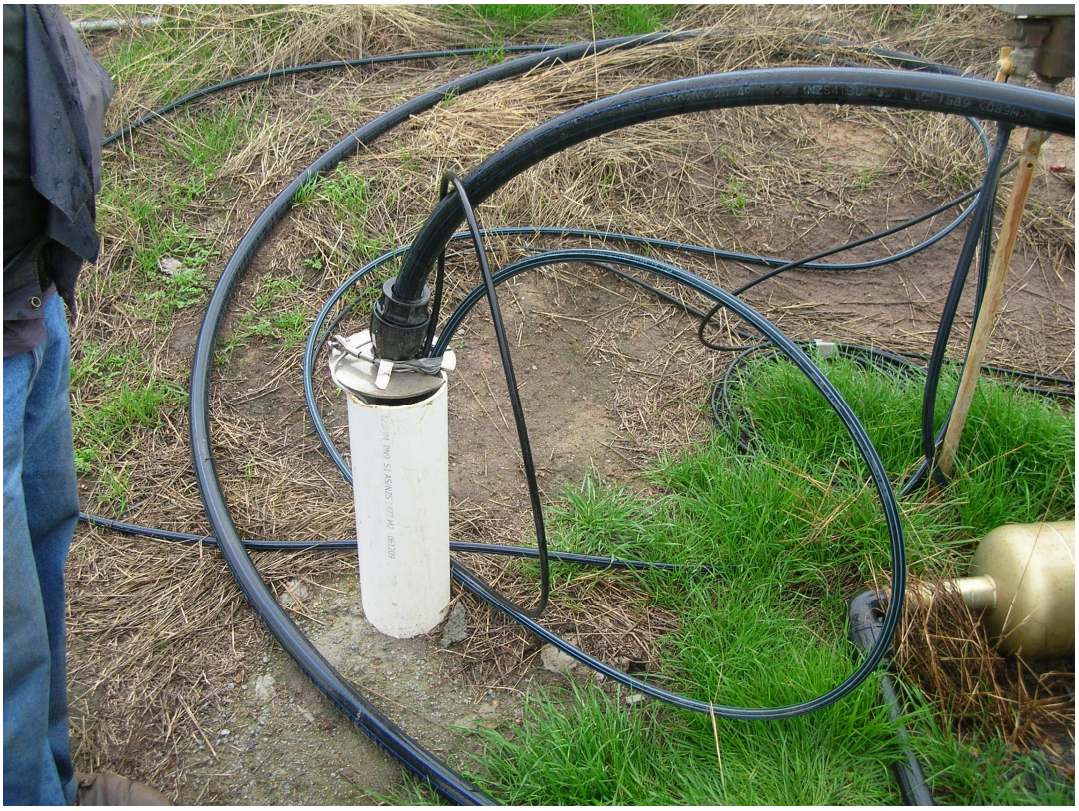

Photo 2 Bore W3

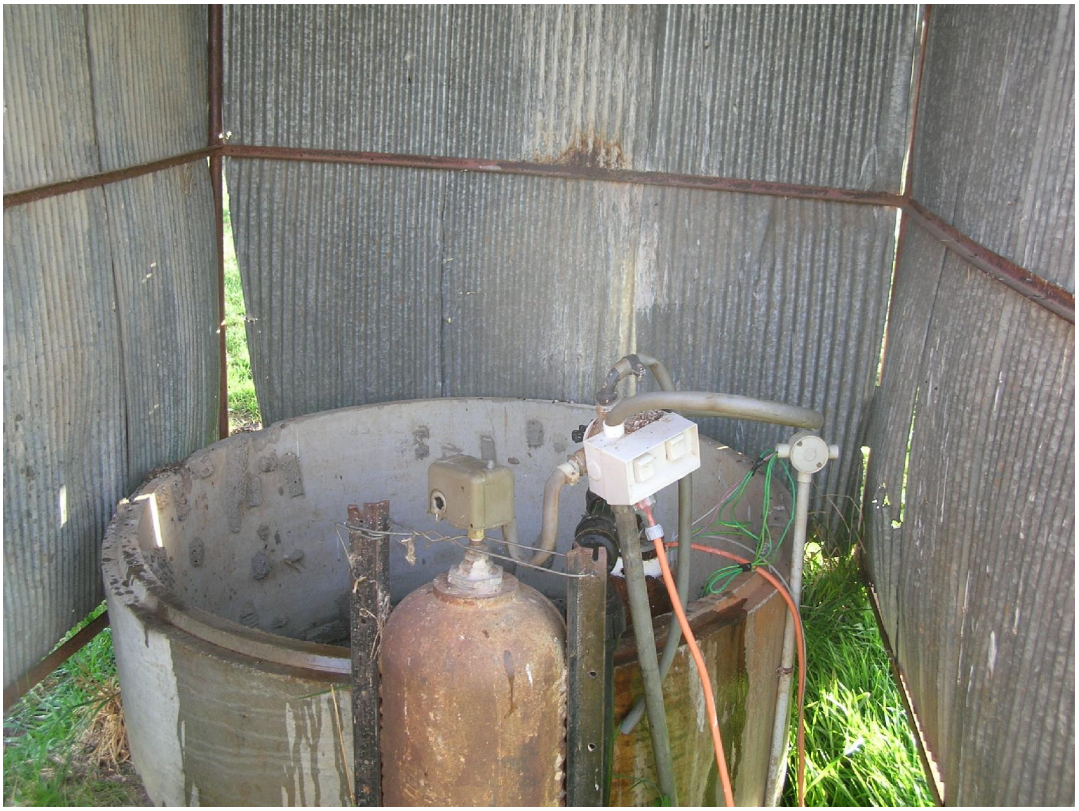

Photo 3 Bore GW027869

Photo 4 Bore GW024660

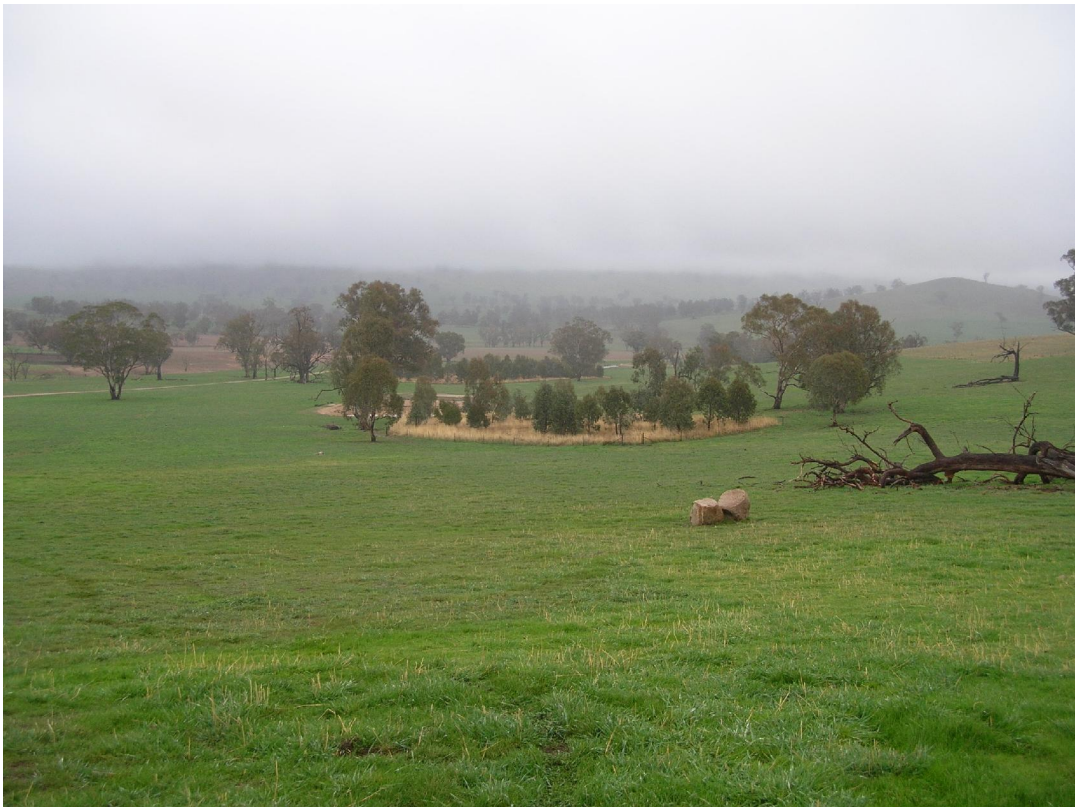

Photo 5 Spring Valley – springs

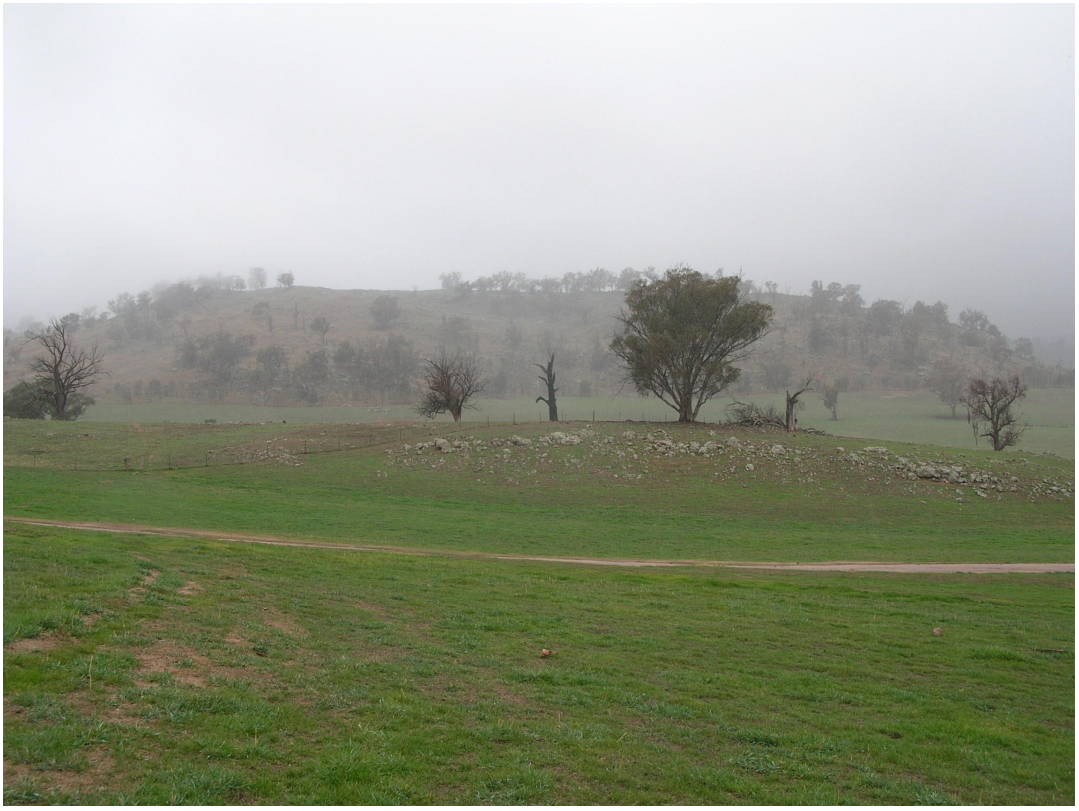

Photo 6 Spring Valley – weathered granites

Appendix A

Chain of custody documents

CHAIN-OF-CUSTODY

48-hr turnaround

Laboratory Name:	ALS Environmental
Address:	277-289 Woodpark Road SMITHFIELD NSW 2164
Fax Number:	02 8784 8500
Phone Number:	02 8784 8555
Contact Name:	

PB Job No.

2 1 1 7 0 2 7 A

Results Expected By/On:	
Fax Results To:	Ellen Kwantes
Fax Number:	02 9272 5101
Phone Number:	92725078
Email Results to:	ekwantes@pb.com.au
Quotation Number:	SY-286-06
Invoice To: Ellen Kwantes	Head Office, Sydney

URGENT

Date Sampled	Time	Sample I.D	Container Size	Sample Location	Medium *	Preservative Type	Filtered (x)	Containers	Analysis Required: NT-1 Cations	NT-2 Anions	W-4 (TPH/BTEX)	NT-11 Total P + Total N	Turbidity	Suspended Solids	Oil and grease	Dissolved metals - Fe, Mn
26/5/09	1	GW064591			W				X	X						X
26/5/09	2	Locke-1			W				X	X						X
26/5/09	3	Locke-2			W				X	X						X
26/5/09	4	GW064587			W				X	X						X
26/5/09	5	Capelli 2			W				X	X						X
26/5/09	6	GW027989			W				X	X						X
26/5/09	7	TW3			W				X	X						X
27/5/09	8	GW057333			W				X	X						X
27/5/09	9	GW025660			W				X	X						X
27/5/09	10	GW503248			W				X	X						X
27/5/09	11	GW057375			W				X	X						X

Relinquished By (Name):	Ellen Kwantes	Received By (Name):	Frank
Date:	29/5/09	Date:	29-5-9
Company:	PB	Company:	ALS
Time:		Time:	3:40
Signature:		Signature:	

Relinquished By (Name):	
Date:	
Company:	
Time:	
Signature:	

Sampled By	Company	Signature	Remarks

Received By (Name):	
Date:	
Company:	
Time:	
Signature:	

PARSONS BRINCKERHOFF
Environmental and Geo

Parsons Brinckerhoff
Ernst & Young Centre, L27
680 George Street
SYDNEY. NSW. 2000

Comments:

Environmental Division
Sydney
Work Order
ES0907858

Telephone : +61-2-8784 8555

* Legend: S = Soil, W = Water, F = Filter
T = Tube

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES0907858**	Page	: 1 of 5
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: ELLEN KWANTES	Contact	: Charlie Pierce
Address	: LEVEL 27, ERNST & YOUNG CENTRE, 680 GEORGE STREET. GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: ekwantes@pb.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 02 92725100	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2117027A	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 29-MAY-2009
Sampler	: ----	Issue Date	: 02-JUN-2009
Site	: ----		
		No. of samples received	: 11
Quote number	: SY/286/06	No. of samples analysed	: 11

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics
Sarah Millington	Senior Inorganic Chemist	Inorganics

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 insuffient sample for analysis.

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

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **ED-093F:LCS recovery for some elements falls outside ALS Dynamic Control Limit. However, they are within the acceptance criteria based on ALS DQO. No further action is required.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW064591	LOCKE-1	LOCKE-2	GW064587	CAPELLS -2
				Client sampling date / time: 26-MAY-2009 15:00	26-MAY-2009 15:00	26-MAY-2009 15:00	26-MAY-2009 15:00	26-MAY-2009 15:00
				ES0907858-001	ES0907858-002	ES0907858-003	ES0907858-004	ES0907858-005
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**364**	**230**	**36**	**95**	**220**
Total Alkalinity as CaCO3	----	1	mg/L	**364**	**230**	**36**	**95**	**220**
ED041: Sulfate (Turbidimetric) as SO4 2-								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**377**	**32**	**229**	**15**	**8**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**384**	**400**	**2190**	**90**	**41**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**118**	**181**	**108**	**14**	**28**
Magnesium	7439-95-4	1	mg/L	**148**	**42**	**225**	**17**	**23**
Sodium	7440-23-5	1	mg/L	**184**	**75**	**1070**	**56**	**54**
Potassium	7440-09-7	1	mg/L	**6**	**3**	**1**	**2**	**1**
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.347**	**1.32**	**0.012**	**0.012**	**0.138**
Iron	7439-89-6	0.05	mg/L	**22.6**	<0.05	<0.05	**0.07**	**2.71**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**25.9**	**16.5**	**67.4**	**4.75**	**5.72**
^ Total Cations	----	0.01	meq/L	**26.2**	**15.8**	**70.6**	**4.57**	**5.72**
^ Ionic Balance	----	0.01	%	**0.52**	**2.16**	**2.33**	**1.94**	<0.01

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW027869	TWS	GW057333	GW025660	GW503248
				Client sampling date / time: 26-MAY-2009 15:00	26-MAY-2009 15:00	27-MAY-2009 15:00	27-MAY-2009 15:00	27-MAY-2009 15:00
				ES0907858-006	ES0907858-007	ES0907858-008	ES0907858-009	ES0907858-010
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**245**	**95**	**131**	**223**	**241**
Total Alkalinity as CaCO3	----	1	mg/L	**245**	**95**	**131**	**223**	**241**
ED041: Sulfate (Turbidimetric) as SO4 2-								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**14**	**10**	**1**	**12**	**1**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**94**	**89**	**21**	**91**	**46**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**67**	**12**	**22**	**36**	**36**
Magnesium	7439-95-4	1	mg/L	**22**	**17**	**9**	**38**	**24**
Sodium	7440-23-5	1	mg/L	**60**	**56**	**23**	**47**	**44**
Potassium	7440-09-7	1	mg/L	**2**	**2**	**9**	**2**	**2**
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.049**	**0.108**	**0.036**	**0.198**	**0.023**
Iron	7439-89-6	0.05	mg/L	<0.05	**0.70**	**1.19**	**3.89**	**0.22**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**7.82**	**4.62**	**3.23**	**7.26**	**6.14**
^ Total Cations	----	0.01	meq/L	**7.83**	**4.48**	----	**7.04**	----
Total Cations	----	0.01	meq/L	----	----	**3.12**	----	**5.92**
^ Ionic Balance	----	0.01	%	**0.02**	**1.53**	----	**1.57**	----
Ionic Balance	----	0.01	%	----	----	**1.74**	----	**1.85**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: GW057375	----	----	----	----
				Client sampling date / time: 27-MAY-2009 15:00	----	----	----	----
				ES0907858-011	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**118**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**118**	----	----	----	----
ED041: Sulfate (Turbidimetric) as SO4 2-								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**1**	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**24**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**24**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**9**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**22**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**2**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.063**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	**0.58**	----	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**3.06**	----	----	----	----
Total Cations	----	0.01	meq/L	**2.95**	----	----	----	----
Ionic Balance	----	0.01	%	**1.86**	----	----	----	----

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **ES0907858**	Page	: 1 of 6
Client	: **PARSONS BRINCKERHOFF AUST P/L**	Laboratory	: Environmental Division Sydney
Contact	: ELLEN KWANTES	Contact	: Charlie Pierce
Address	: LEVEL 27, ERNST & YOUNG CENTRE, 680 GEORGE STREET. GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: ekwantes@pb.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 02 92725100	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2117027A	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 29-MAY-2009
Sampler	: ----	Issue Date	: 02-JUN-2009
Order number	: ----		
		No. of samples received	: 11
Quote number	: SY/286/06	No. of samples analysed	: 11

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

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Spectroscopist	Inorganics
Hoa Nguyen	Inorganic Chemist	Inorganics
Sarah Millington	Senior Inorganic Chemist	Inorganics

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 insuffient 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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 994889)									
ES0907662-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ES0907791-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ED037P: Alkalinity by PC Titrator (QC Lot: 994892)									
ES0907858-007	TWS	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	95	94	1.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	95	94	1.1	0% - 20%
ES0907859-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ED041: Sulfate (Turbidimetric) as SO4 2- (QC Lot: 995214)									
ES0907842-018	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ES0907858-009	GW025660	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	12	13	12.3	0% - 50%
ED045G: Chloride Discrete analyser (QC Lot: 994831)									
ES0907842-041	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ES0907858-002	LOCKE-1	ED045G: Chloride	16887-00-6	1	mg/L	400	413	3.2	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 994832)									
ES0907851-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Magnesium	7439-95-4	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Sodium	7440-23-5	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Potassium	7440-09-7	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ES0907858-007	TWS	ED093F: Calcium	7440-70-2	1	mg/L	12	12	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	17	17	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	56	55	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 994335)									
ES0907858-001	GW064591	EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.347	0.358	3.1	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	22.6	23.1	2.0	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 994335) - continued									
ES0907858-011	GW057375	EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.063	0.066	5.4	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.58	0.59	2.2	0% - 50%

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: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 994889)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	103	80.2	108
ED037P: Alkalinity by PC Titrator (QCLot: 994892)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	104	80.2	108
ED041: Sulfate (Turbidimetric) as SO4 2- (QCLot: 995214)								
ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	30 mg/L	91.3	76.1	126
ED045G: Chloride Discrete analyser (QCLot: 994831)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	99.0	83.7	124
ED093F: Dissolved Major Cations (QCLot: 994832)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	# 118	88	110
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	# 120	90	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	81	107
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	# 118	89	109
EG020F: Dissolved Metals by ICP-MS (QCLot: 994335)								
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	84	114

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.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride Discrete analyser (QCLot: 994831)							
ES0907842-041	Anonymous	ED045G: Chloride	16887-00-6	Anonymous	Anonymous	Anonymous	Anonymous
EG020F: Dissolved Metals by ICP-MS (QCLot: 994335)							
ES0907858-001	GW064591	EG020A-F: Manganese	7439-96-5	0.2 mg/L	102	70	130

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES0907858**	Page	: 1 of 6
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: ELLEN KWANTES	Contact	: Charlie Pierce
Address	: LEVEL 27, ERNST & YOUNG CENTRE, 680 GEORGE STREET. GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: ekwantes@pb.com.au	E-mail	: charlie.pierce@alsenviro.com
Telephone	: +61 02 92725100	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 92725101	Facsimile	: +61-2-8784 8500
Project	: 2117027A	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 29-MAY-2009
Sampler	: ----	Issue Date	: 02-JUN-2009
Order number	: ----		
		No. of samples received	: 11
Quote number	: SY/286/06	No. of samples analysed	: 11

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

Analysis Holding Time Compliance

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

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

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
GW064591, LOCKE-1, LOCKE-2, GW064587, CAPELLS -2, GW027869, TWS	**26-MAY-2009**	**---**	---	----	**01-JUN-2009**	09-JUN-2009	✓
Clear Plastic Bottle - Natural							
GW057333, GW025660, GW503248, GW057375	**27-MAY-2009**	**---**	---	----	**01-JUN-2009**	10-JUN-2009	✓
ED041: Sulfate (Turbidimetric) as SO4 2-							
Clear Plastic Bottle - Natural							
GW064591, LOCKE-1, LOCKE-2, GW064587, CAPELLS -2, GW027869, TWS	**26-MAY-2009**	**----**	----	----	**01-JUN-2009**	23-JUN-2009	✓
Clear Plastic Bottle - Natural							
GW057333, GW025660, GW503248, GW057375	**27-MAY-2009**	**----**	----	----	**01-JUN-2009**	24-JUN-2009	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural							
GW064591, LOCKE-1, LOCKE-2, GW064587, CAPELLS -2, GW027869, TWS	**26-MAY-2009**	**---**	---	----	**01-JUN-2009**	23-JUN-2009	✓
Clear Plastic Bottle - Natural							
GW057333, GW025660, GW503248, GW057375	**27-MAY-2009**	**---**	---	----	**01-JUN-2009**	24-JUN-2009	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
GW064591, LOCKE-1, LOCKE-2, GW064587, CAPELLS -2, GW027869, TWS	**26-MAY-2009**	**---**	---	----	**01-JUN-2009**	23-JUN-2009	✓
Clear Plastic Bottle - Natural							
GW057333, GW025660, GW503248, GW057375	**27-MAY-2009**	**---**	---	----	**01-JUN-2009**	24-JUN-2009	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered							
GW064591, LOCKE-1, LOCKE-2, GW064587, CAPELLS -2, GW027869, TWS	**26-MAY-2009**	**---**	---	----	**01-JUN-2009**	22-NOV-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered							
GW057333, GW025660, GW503248, GW057375	**27-MAY-2009**	**---**	---	----	**01-JUN-2009**	23-NOV-2009	✓

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: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	33	**12.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	33	**6.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.3**	**5.0**	✓	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
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Sulfate (Turbidimetric) as SO4 2-	ED041	WATER	APHA 21st ed., 4500-SO4 E Sulfate ions are precipitated in an acetic acid medium with barium chloride to form barium sulfate crystals. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Chloride by Discrete Analyser	ED045G	WATER	APHA 21st ed., 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Filtered	ED093F	WATER	APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Ionic Balance by PCT DA Turbidimetric and ICPAES	EN055 - TS	WATER	APHA 21st Ed. 1030F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

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 SW 846 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

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
ED093F: Dissolved Major Cations	1140152-011	----	**Calcium**	7440-70-2	118 %	88-110%	**Recovery greater than upper control limit**
ED093F: Dissolved Major Cations	1140152-011	----	**Magnesium**	7439-95-4	120 %	90-110%	**Recovery greater than upper control limit**
ED093F: Dissolved Major Cations	1140152-011	----	**Potassium**	7440-09-7	118 %	89-109%	**Recovery greater than upper control limit**

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

- **No Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

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

- **No Quality Control Sample Frequency Outliers exist.**

Appendix B

Analytical result summary table

Table B-1
Woomargama
May 2009 Sampling
Groundwater Analytical Results

	Units	LOR	Assessment Criteria	GW064591	TWS	Fire station (GW064587)	Locke 1	Locke 2	GW027869	Capells 2	GW024660	GW057333	GW057375	GW025660	GW503248
Date Sampled				26/05/2009	26/05/2009	26/05/2009	26/05/2009	26/05/2009	26/05/2009	26/05/2009	27/05/2009	27/05/2009	27/05/2009	27/05/2009	27/05/2009
Easting				520025	522953	522344	521711	524826	524316	522286	524804	524067	523974	524213	523840
Northing				6034291	6034620	6034518	6041029	6040779	6038803	6038826	6034312	6035044	6035055	6036013	6036003
Water source type				Bore	Bore	Bore	Bore	Bore	Bore	Bore	Bore	Bore	Bore	Bore	
Depth of Bore (m)	meters			NA	NA	NA	102	14.34	51.41	NA	13.08	14	11.81	10.2	27.63
Geology				Ordovician metasediments	Alluvium (MC)	Alluvium (MC)	Silurian granite	Alluvium (SC)	Silurian granite	Silurian granite	Quaternary alluvium/granite	Quaternary alluvium	Quaternary alluvium/granite	Quaternary alluvium	Silurian granite
Water Type				Mg-Na-Ca-Cl-SO4	Na-Mg-Cl-HCO3	Na-Mg-Cl-HCO3	Ca-Mg-Na-Cl	Na-Mg-Cl	Ca-Na-Mg-Cl-HCO3	Na-Mg-Ca-HCO3-Cl		Ca-Na-Mg-HCO3-Cl	Ca-Na-Mg-HCO3-Cl	Mg-Na-Ca-Cl-HCO3	Mg-Na-Ca-HCO3-Cl
Field Parameters															
Water Level	mBGL		-	21.86			22.69	12.34	15.91		3.93	2.9	3	flowing	9.28
Temperature	°C	0.1	-	16.26	15.19	15.29	17.45	17.34	17.25	17.48		13.63	16.27	16.07	16.07
Electrical Conductivity	mS/cm	1	0.125-2.2[a]	2.68	0.517	0.515	1.82	7.14	0.838	0.599		0.299	0.326	0.755	0.6
Dissolved Oxygen	mg/L	0.01	-	2.12	11.96	14.61	10.74	11.93	7.45	15.83		6.95	9.93	9.34	3.95
pH		0.01	6.5-8.5[b]	6.62	7.23	7.33	6.91	6.72	7.61	7.67		7.16	7.08	6.74	6.7
Total Dissolved Solids	g/L	0.1	0.5[b]	1.7	0.3	0.3	1.2	4.6	0.5	0.4		0.2	0.2	0.5	0.4
Dissolved Oxygen	% saturation		>85%	21.4	109.6	141.1	101	117.4	70.9	106		66	74.2	66.5	39.6
Redox Potential	mV	1	-	25	14	113	119	NA	109	-11		197	227	220	263
Alkalinity															
Hydroxide Alkalinity as $CaCO_3$	mg/L	1	-	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	<1
Carbonate Alkalinity as $CaCO_3$	mg/L	1	-	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	<1
Bicarbonate Alkalinity as $CaCO_3$	mg/L	1	-	364	95	95	230	36	245	220		131	118	223	241
Total Alkalinity as $CaCO_3$	mg/L	1	-	364	95	95	230	36	245	220		131	118	223	241
Dissolved Major Anions															
Sulfate as SO_4	mg/L	1	500[a] 250[b]	377	10	15	32	229	14	8		1	1	12	1
Chloride	mg/L	1	250[b]	384	89	90	400	2190	94	41		21	24	91	46
Dissolved Major Cations															
Calcium	mg/L	1	-	118	12	14	181	108	67	28		22	24	36	36
Magnesium	mg/L	1	-	148	17	17	42	225	22	23		9	9	38	24
Sodium	mg/L	1	180[b]	184	56	56	75	1070	60	54		23	22	47	44
Potassium	mg/L	1	-	6	2	2	3	1	2	1		9	2	2	2
Dissolved Metals															
Manganese	mg/L	0.001	0.5[a] 0.1[b]	0.347	0.108	0.012	1.32	0.012	0.049	0.138		0.036	0.063	0.198	0.023
Iron	mg/L	0.05	1.9[c] 0.3[b]	22.6	0.7	0.07	<0.05	<0.05	<0.05	2.71		1.19	0.58	3.89	0.22

Notes:
[a]Drinking water Guidelines (2004) - Health,
[b]Drinking water Guidelines (2004) - Aesthetic,
[c]ANZECC Guidelines (2000)
Concentration exceeds Drinking Water Guidelines (2004)
Concentration exceeds ANZECC Guidelines (2000),
Bold - concentration exceeds all of the following guidelines: Drinking Water Guidelines (2004), ANZECC (2000)