Photographs

Photo 1 **Site T13**

Photo 2 **Site T16-T21**

Appendix A

Chain of custody documents

CHAIN-OF-CUSTODY

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 6 7 8 4 E

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

Analysis Required

Date Sampled	Time	Sample I.D -	Container Size	Sample Location	Medium *	Preservative Type	Filtered (x)	Containers	NT-1 Cations	NT-2 Anions	W-4 (TPH/BTEX)	NT-11 Total P + Total N, TKN	Turbidity	Suspended Solids	Oil and grease	Dissolved metals - (Fe, Mn)	Sampled By	Company	Signature	Remarks
23/10/2008	1	H-Bayliss-1			W				X	X						X				
23/10/2008	2	H-Emerson-2			W				X	X						X				
23/10/2008	3	H-Hulme-3			W				X	X						X				
23/10/2008	4	H-Hunt-4			W				X	X						X				
23/10/2008	5	H-McPherson-7			W				X	X						X				
23/10/2008	6	H-Thistle-8			W				X	X						X				
23/10/2008	7	H-Condon-9			W				X	X						X				
24/10/2008	8	T-Council-1			W				X	X						X				
23/10/2008	9	T-Castine-2			W				X	X						X				
23/10/2008	10	T-Naseby-3			W				X	X						X				
~~30/10/2008~~					~~W~~				~~X~~	~~X~~						~~X~~				
30/10/2008	11	T-Ingold-10			W				X	X						X				
30/10/2008	12	T-Ingold-11			W				X	X						X				

Environmental Division
Sydney
Work Order
ES0816065

Telephone : +61-2-8784 8555

Relinquished By (Name):	Ellen Kwantes	Received By (Name):	Frank	Relinquished By (Name):	Received By (Name):
Date:	31/10/2008	Date:	31/10/08	Date:	Date:
Company:	PB	Company:	1245 PB ALS	Company:	Company:
Time:		Time:		Time:	Time:
Signature:	EKwantes	Signature:		Signature:	Signature:

PARSONS BRINCKERHOFF
Environmental and Geot

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

Comments: _____

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

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES0816065**	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	: 2116784E	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 31-OCT-2008
Sampler	: ----	Issue Date	: 10-NOV-2008
Site	: ----		
		No. of samples received	: 12
Quote number	: SY/286/06	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 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

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 = Chemistry Abstract Services number
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **EGO20A-F: Natural bottle was used for some samples as no filtered bottle was supplied.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: H-BAYLISS-1	H-EMERSON-2	H-HULME-3	H-HUNT-4	H-MCPKERSON-7
				Client sampling date / time: 27-OCT-2008 15:00	27-OCT-2008 15:00	27-OCT-2008 15:00	27-OCT-2008 15:00	27-OCT-2008 15:00
				ES0816065-001	ES0816065-002	ES0816065-003	ES0816065-004	ES0816065-005
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	**115**	**131**	**304**	**131**	**147**
Total Alkalinity as CaCO3	----	1	mg/L	**115**	**131**	**304**	**131**	**147**
ED041: Sulfate (Turbidimetric) as SO4 2-								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**23**	**26**	**65**	**32**	**43**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**98**	**94**	**428**	**279**	**281**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**14**	**15**	**27**	**18**	**25**
Magnesium	7439-95-4	1	mg/L	**10**	**12**	**29**	**21**	**23**
Sodium	7440-23-5	1	mg/L	**90**	**94**	**416**	**218**	**223**
Potassium	7440-09-7	1	mg/L	**2**	**2**	**1**	**2**	**2**
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.004**	**0.034**	**0.134**	**0.079**	**0.061**
Iron	7439-89-6	0.05	mg/L	<0.05	**0.12**	<0.05	<0.05	<0.05
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**5.56**	**5.82**	**19.5**	**11.2**	**11.8**
^ Total Cations	----	0.01	meq/L	**5.51**	**5.97**	**21.8**	**12.2**	**12.9**
^ Ionic Balance	----	0.01	%	**0.45**	**1.25**	**5.68**	**4.27**	**4.58**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: H-TM50185-8	H-CANDAN-9	T-COUNCIL-1	T-CASTINE-2	T-MASELEY-8
				Client sampling date / time: 28-OCT-2008 15:00	28-OCT-2008 15:00	29-OCT-2008 15:00	29-OCT-2008 15:00	29-OCT-2008 15:00
				ES0816065-006	ES0816065-007	ES0816065-008	ES0816065-009	ES0816065-010
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	**300**	**120**	**410**	**310**	**225**
Total Alkalinity as CaCO3	----	1	mg/L	**300**	**120**	**410**	**310**	**225**
ED041: Sulfate (Turbidimetric) as SO4 2-								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**183**	**36**	**13**	**92**	**32**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**1220**	**158**	**258**	**163**	**111**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**116**	**17**	**42**	**30**	**35**
Magnesium	7439-95-4	1	mg/L	**139**	**14**	**43**	**52**	**37**
Sodium	7440-23-5	1	mg/L	**566**	**131**	**234**	**180**	**74**
Potassium	7440-09-7	1	mg/L	**1**	**2**	**3**	**2**	**3**
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.006**	**0.004**	**0.260**	**0.014**	**0.002**
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**44.2**	**7.61**	**15.7**	**12.7**	**8.28**
^ Total Cations	----	0.01	meq/L	**41.9**	**7.76**	**15.9**	**13.7**	**8.12**
^ Ionic Balance	----	0.01	%	**2.67**	**0.92**	**0.48**	**3.75**	**1.04**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: T-INGOLD-10	T-INGOLD-11	----	----	----
				Client sampling date / time: 30-OCT-2008 15:00	30-OCT-2008 15:00	----	----	----
				ES0816065-011	ES0816065-012	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**100**	**70**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**100**	**70**	----	----	----
ED041: Sulfate (Turbidimetric) as SO4 2-								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	**1**	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**7**	**7**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**10**	**7**	----	----	----
Magnesium	7439-95-4	1	mg/L	**9**	**7**	----	----	----
Sodium	7440-23-5	1	mg/L	**16**	**15**	----	----	----
Potassium	7440-09-7	1	mg/L	**1**	**1**	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Manganese	7439-96-5	0.001	mg/L	**0.582**	**0.331**	----	----	----
Iron	7439-89-6	0.05	mg/L	**26.4**	**15.1**	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**2.20**	**1.63**	----	----	----
^ Total Cations	----	0.01	meq/L	**2.00**	**1.58**	----	----	----

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **ES0816065**	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	: 2116784E	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 31-OCT-2008
Sampler	: ----	Issue Date	: 10-NOV-2008
Order number	: ----		
		No. of samples received	: 12
Quote number	: SY/286/06	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 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

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 = Chemistry Abstract Services number
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: 805103)									
ES0816065-001	H-BAYLISS-1	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1		0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1		0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	115		0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	115		0.0	0% - 20%
ES0816065-010	T-MASELEY-8	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1		0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1		0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	225	225	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	225	225	0.0	0% - 20%
ED041: Sulfate (Turbidimetric) as SO4 2- (QC Lot: 804101)									
ES0816063-001	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ES0816063-010	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ED041: Sulfate (Turbidimetric) as SO4 2- (QC Lot: 804102)									
ES0816065-009	T-CASTINE-2	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	92	91	0.0	0% - 20%
ES0816068-006	Anonymous	ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ED045G: Chloride Discrete analyser (QC Lot: 802078)									
ES0816016-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ES0816065-005	H-MCPKERSON-7	ED045G: Chloride	16887-00-6	1	mg/L	281		1.7	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 803140)									
ES0816063-005	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
ES0816080-001	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
ED093F: Dissolved Major Cations (QC Lot: 803857)									
ES0816065-003	H-HULME-3	ED093F: Calcium	7440-70-2	1	mg/L	27		0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	29	29	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	416	401	3.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1		0.0	No Limit
ES0816096-001	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

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: 802982)									
ES0816063-008	Anonymous	EG020A-F: Manganese	7439-96-5	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Iron	7439-89-6	0.05	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ES0816065-010	T-MASELEY-8	EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.05	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: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 805103)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	100	80.2	108
ED041: Sulfate (Turbidimetric) as SO4 2- (QCLot: 804101)								
ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	20 mg/L	104	76.1	126
ED041: Sulfate (Turbidimetric) as SO4 2- (QCLot: 804102)								
ED041: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	20 mg/L	110	76.1	126
ED045G: Chloride Discrete analyser (QCLot: 802078)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	99.0	83.7	124
ED093F: Dissolved Major Cations (QCLot: 803140)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.7	82.9	121
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	82.7	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	90.7	77.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	84.3	118
ED093F: Dissolved Major Cations (QCLot: 803857)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.4	82.9	121
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.4	82.7	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.6	77.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.9	84.3	118
EG020F: Dissolved Metals by ICP-MS (QCLot: 802982)								
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.3	84	116
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.3	79.2	116

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: 802078)							
ES0816016-001	Anonymous	ED045G: Chloride	16887-00-6	Anonymous	Anonymous	Anonymous	Anonymous
EG020F: Dissolved Metals by ICP-MS (QCLot: 802982)							
ES0816063-008	Anonymous	EG020A-F: Manganese	7439-96-5	Anonymous	Anonymous	Anonymous	Anonymous

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES0816065**	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
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Telephone	: +61 02 92725100	Telephone	: +61-2-8784 8555
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Project	: 2116784E	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 31-OCT-2008
Sampler	: ----	Issue Date	: 10-NOV-2008
Order number	: ----		
		No. of samples received	: 12
Quote number	: SY/286/06	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

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								
H-BAYLISS-1, H-HULME-3, H-MCPKERSON-7	H-EMERSON-2, H-HUNT-4,	**27-OCT-2008**	**---**	---	----	**07-NOV-2008**	10-NOV-2008	✓
Clear Plastic Bottle - Natural								
H-TM50185-8,	H-CANDAN-9	**28-OCT-2008**	**---**	---	----	**07-NOV-2008**	11-NOV-2008	✓
Clear Plastic Bottle - Natural								
T-COUNCIL-1, T-MASELEY-8	T-CASTINE-2,	**29-OCT-2008**	**---**	---	----	**07-NOV-2008**	12-NOV-2008	✓
Clear Plastic Bottle - Natural								
T-INGOLD-10,	T-INGOLD-11	**30-OCT-2008**	**---**	---	----	**07-NOV-2008**	13-NOV-2008	✓
ED041: Sulfate (Turbidimetric) as SO4 2-								
Clear Plastic Bottle - Natural								
H-BAYLISS-1, H-HULME-3, H-MCPKERSON-7	H-EMERSON-2, H-HUNT-4,	**27-OCT-2008**	**----**	----	----	**05-NOV-2008**	24-NOV-2008	✓
Clear Plastic Bottle - Natural								
H-TM50185-8,	H-CANDAN-9	**28-OCT-2008**	**----**	----	----	**05-NOV-2008**	25-NOV-2008	✓
Clear Plastic Bottle - Natural								
T-COUNCIL-1, T-MASELEY-8	T-CASTINE-2,	**29-OCT-2008**	**----**	----	----	**05-NOV-2008**	26-NOV-2008	✓
Clear Plastic Bottle - Natural								
T-INGOLD-10,	T-INGOLD-11	**30-OCT-2008**	**----**	----	----	**05-NOV-2008**	27-NOV-2008	✓

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
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural H-BAYLISS-1, H-EMERSON-2, H-HULME-3, H-HUNT-4, H-MCPKERSON-7	**27-OCT-2008**	**----**	----	----	**03-NOV-2008**	24-NOV-2008	✓
Clear Plastic Bottle - Natural H-TM50185-8, H-CANDAN-9	**28-OCT-2008**	**----**	----	----	**03-NOV-2008**	25-NOV-2008	✓
Clear Plastic Bottle - Natural T-COUNCIL-1, T-CASTINE-2, T-MASELEY-8	**29-OCT-2008**	**----**	----	----	**03-NOV-2008**	26-NOV-2008	✓
Clear Plastic Bottle - Natural T-INGOLD-10, T-INGOLD-11	**30-OCT-2008**	**----**	----	----	**03-NOV-2008**	27-NOV-2008	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural H-BAYLISS-1, H-EMERSON-2	**27-OCT-2008**	**---**	---	----	**04-NOV-2008**	24-NOV-2008	✓
Clear Plastic Bottle - Natural H-HULME-3, H-HUNT-4, H-MCPKERSON-7	**27-OCT-2008**	**---**	---	----	**05-NOV-2008**	24-NOV-2008	✓
Clear Plastic Bottle - Natural H-TM50185-8, H-CANDAN-9	**28-OCT-2008**	**---**	---	----	**05-NOV-2008**	25-NOV-2008	✓
Clear Plastic Bottle - Natural T-COUNCIL-1, T-CASTINE-2, T-MASELEY-8	**29-OCT-2008**	**---**	---	----	**05-NOV-2008**	26-NOV-2008	✓
Clear Plastic Bottle - Natural T-INGOLD-10, T-INGOLD-11	**30-OCT-2008**	**---**	---	----	**05-NOV-2008**	27-NOV-2008	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Natural H-MCPKERSON-7	**27-OCT-2008**	**---**	---	----	**04-NOV-2008**	25-APR-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered H-BAYLISS-1, H-EMERSON-2, H-HULME-3, H-HUNT-4	**27-OCT-2008**	**---**	---	----	**04-NOV-2008**	25-APR-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered H-TM50185-8, H-CANDAN-9	**28-OCT-2008**	**---**	---	----	**04-NOV-2008**	26-APR-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered T-CASTINE-2, T-MASELEY-8	**29-OCT-2008**	**---**	---	----	**04-NOV-2008**	27-APR-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered T-INGOLD-10, T-INGOLD-11	**30-OCT-2008**	**---**	---	----	**04-NOV-2008**	28-APR-2009	✓
Clear Plastic Bottle - Nitric Acid; Unspecified T-COUNCIL-1	**29-OCT-2008**	**---**	---	----	**04-NOV-2008**	27-APR-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 Method	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.0**	**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	14	**14.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	4	31	**12.9**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	4	33	**12.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	20	**5.0**	**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	14	**7.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	31	**6.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	2	33	**6.1**	**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	14	**7.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	31	**6.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2-	ED041	2	33	**6.1**	**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	14	**7.1**	**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 Method	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by both manual measurement and 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 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	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

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

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

Outliers : Frequency of Quality Control Samples

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

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

Appendix B

Analytical result summary table

Table B-1
Tarcutta
October 2008 Sampling
Groundwater Analytical Results

	Units	LOR	Assessment Criteria	T1	T2	T3	T4	T5	T6	T9	T13	T16	T17	T18	T19	T20	T21	T22
Date Sampled				29/10/2008	29/10/2008	29/10/2008	29/10/2008	29/10/2008	29/10/2008	29/10/2008	29/10/2008	30/10/2008	30/10/2008	30/10/2008	30/10/2008	30/10/2008	30/10/2008	30/10/2008
Easting				567242	567116	567086	566854	568316	568128	569172	565653	566895	566887	566883	566879	566994	567076	565919
Northing				6095784	6095953	6095995	6096017	6098061	6098134	6098425	6094635	6097284	6097306	6097329	6097355	6097305	6097254	6095841
Water source type				Bore	Bore	Bore	Bore	Bore	Bore	Bore	Bore	Bore	Bore	Bore	Bore	Bore	Bore	Bore
Depth of Bore (m)	meters				5.75		4.15	approx 40		approx 20	12.2	25		12		16.76	9.1	
Geology				Alluvium	Alluvium	Alluvium	Alluvium	Ordovician metasediments	Alluvium	Alluvium	Alluvium	Alluvium	Alluvium	Alluvium	Alluvium	Alluvium	Alluvium	Alluvium
Water Type				Na-Mg-Cl-HCO3				Na-Mg-HCO3-Cl			Na-Mg-Ca-HCO3-Cl	Mg-Na-Ca-HCO3					Na-Mg-Ca-HCO3	
Field Parameters																		
Water Level	mBGL		-	11.93		9.26	3.8	14.25	3.08	Dry	8.63	3	3.01	1.67	2.9	2.71	7.65	3.25
Temperature	°C	0.1	-	18.32		19.53	18.42	20.13	16.78		24.51	18.17					19.51	
Electrical Conductivity	mS/cm	1	0.125 - 2.2	1.64		1.59	1.133	1.312	0.755		0.84	0.312					0.12	
Dissolved Oxygen	mg/L	0.01	-	3.26		2.02	6.23	3.38	4.25		3.57	1.2					2.43	
pH		0.01	6.5 - 8.5	6.85		6.79	7.02	6.87	7.52		6.75	6.83					6.59	
Total Dissolved Solids	g/L	0.1	-	1		1	0.75	0.8	0.5		0.5	0.2					0.1	
Dissolved Oxygen	% saturation		>85%	34.4		**18.2**	**65.7**	**35.5**	**34.7**		**45.3**	**11.5**					**24**	
Redox Potential	mV	1	-	-11		-88	5	115	-35		130	-69					-18	
Alkalinity																		
Hydroxide Alkalinity as	mg/L	1	-	<1				<1			<1	<1					<1	
Carbonate Alkalinity as	mg/L	1	-	<1				<1			<1	<1					<1	
Bicarbonate Alkalinity as	mg/L	1	-	410				310			225	100					70	
Total Alkalinity as $CaCO_3$	mg/L	1	-	410				310			225	100					70	
Dissolved Major Anions																		
Sulfate as SO_4	mg/L	1	500[a] 250[b]	13				92			32	<1					1	
Chloride	mg/L	1	250[b]	258				163			111	7					7	
Dissolved Major Cations																		
Calcium	mg/L	1	-	42				30			35	10					7	
Magnesium	mg/L	1	-	43				52			37	9					7	
Sodium	mg/L	1	180[b]	234				180			74	16					15	
Potassium	mg/L	1	-	3				2			3	1					1	
Dissolved Metals																		
Manganese	mg/L	0.001	0.5[a] 0.1[b]	0.26				0.014			0.002	0.582[a]					0.331	
Iron	mg/L	0.05	1.9[c] 0.3[b]	<0.05				<0.05			<0.05	**26.4**					**15.1**	

Notes:
[a]Drinking water Guidelines (2004) - Health,
[b]Drinking water Guidelines (2004) - Aesthetic,
[c]ANZECC Guidelines (2000)
LOR - Laboratory Level of Reporting
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)