

Appendix A

Drilling details, bore logs and bore licence



A1.1 Drilling and installation of bores additional to the Phase 2 Groundwater Investigation

The Phase 2 Groundwater Investigation of the Stage 1 GFDA identified the possible surface trace of a steep easterly-dipping strike-slip fault evident in seismic surveys carried out by AGL in 2009 and 2010, and is the target fault for this investigation crossing the northern boundary of the Tiedman property, approximately 300 m east of the Stratford 4 gas well. The linear feature is approximately 1 km long and characterised by an elongated topographic depression with vegetation differing to the surrounding area.

Between 1 and 15 November 2011 one test production bore (TTPB) and two monitoring bores (TTMB01 and TTMB02) were drilled and constructed at the northern end of the AGL owned Tiedman property designed on the basis of the electromagnetic and seismic survey data to intersect the fault zone and provide monitoring of groundwater levels both inside and outside the fault zone. TTPB was located to intersect the inferred fault zone with TTMB01 located along strike within the fault zone and TTMB02 perpendicular to the strike of the fault zone within the assumed zone of enhanced permeability between the S4MB nested groundwater monitoring bores and TTPB.

With the exception of casing material and diameter all these bores were constructed identically, i.e. total depth of 90 mbgl, screened between 76 and 88 mbgl to target the assumed zone of enhanced permeability associated with the inferred fault zone. TTPB was re-drilled following collapse of the initial PVC cased test production bore during bore development. The re-drilled TTPB is cased with steel bore casing to ensure adequate collapse strength against the differential pressures that build up between the external formation and the bore during dewatering. The initial TTPB bore was backfilled with 10 mm diameter sub-angular gravel. The casing was cut off 1 m below the surface and a cement slab installed to cap the bore.

Between 24 April 2012 and 4 May 2012, following the completion of the pumping test, TTMB03 was constructed also at the northern end of the AGL Tiedman property. This groundwater monitoring bore was drilled off-strike of the fault zone before the commencement of the flow test. The bore has a total depth of 200 m with a screen between 187 and 199 mbgl and intersects the interburden below the fault zone. The primary purpose of this additional deep monitoring was to assess whether drawdown could be induced across the fault zone below the upper zone of enhanced permeability and slightly enhanced groundwater flow.

The drilling of all groundwater monitoring and test production bores was undertaken by Highland Drilling using a Longyear air rotary drilling rig. Drilling through the sedimentary rock geology, typically through weathered clay in the first 6 m, was undertaken with a 200 mm drill bit. This unstable section of the borehole was then lined with a 158 mm internal diameter steel riser pipe of various lengths depending on the geology. For the groundwater monitoring bores, drilling of the remaining borehole through the solid rock was undertaken using a 140 mm percussion hammer drill bit; the target geology and total depth (TD) was confirmed by the supervising Parsons Brinckerhoff hydrogeologist. The test production bore was drilled with a 200 mm bit for the entire length of the borehole.

Airlift development was continuous during drilling and the boreholes were further developed at termination until the discharge water was free of sediment and water quality field parameters stabilised.

A detailed log of the lithology recorded at one metre intervals was produced, and instantaneous water flow was recorded at the end of each drill rod (every 6 m) where applicable. Groundwater field parameters were also recorded using a calibrated YSI water quality meter. The field parameters measured included: temperature, electrical conductivity, pH, dissolved oxygen and oxidation reduction potential (redox).

Following the completion of the bores to TD, a Parsons Brinckerhoff hydrogeologist finalised the specifications and design of the groundwater monitoring bore installations. The monitoring bores: TTMB01 and TTMB02 were installed with 50 mm internal diameter, Class 18 uPVC screwed casing and screen (0.5 mm aperture machine slotted) with a 2 m sump and end plug. The monitoring bore TTMB03 was

installed with a 50 mm internal diameter, galvanized steel, screwed casing and stainless steel screen (1 mm aperture slots) with a 1 m galvanized steel sump and end cap. The test production bore was installed with 150 mm internal diameter, steel casing, welded together and a stainless steel (1 mm aperture slotted) screen with a 2 meter sump and welded end cap.

The screen length (12 meters for all bores) targeted the most productive water bearing zone. A washed and graded (3 - 5 mm) gravel filter pack was installed around the screen and extended 10 m above the screened section. A 6 meter thick plug of coated bentonite pellets was installed above the gravel pack and cement grout tremmied in a controlled manner to the surface. The bentonite seal and cement grout ensures hydraulic isolation of the screened section preventing any flow of groundwater through the annulus of the bore column. Following the construction of each bore, the site was reinstated and a lockable steel monument was welded over the bores and surrounded at its base by a concrete slab.

A1.2 Survey of monitoring bores

Registered surveyors CalCo surveyed the coordinates of the groundwater monitoring bores and the test production bore under the supervision of Parsons Brinckerhoff in December 2011 and June 2012 (TTMB03). All bores were surveyed to MGA, a grid coordinate system based on the Universal Transverse Mercator projection and the Geocentric Datum of Australia 1994. Bores were also surveyed for surface elevation to Australian height datum (AHD). Table A.1 details the survey coordinates.

Table A.1 Monitoring bore survey coordinates

Site	Easting	Northing	Ground level (m AHD)	Top of casing level (m AHD)
TTPB	402730	6449387	115.81	116.42
TTMB01	402760.4	6449325	115.78	116.3
TTMB02	402699	6449358	115.36	115.97
TTMB03	402804.38	6449358.92	117.29	117.96

Client:	AGL Energy Ltd	Date Commenced:	10/25/11
Project:	Tiedeman Fault Investigation	Date Completed:	10/26/11
Bore Location:	Tiedman Property	Recorded By:	NPH
Project Number:	2162406B	Log Checked By:	JD

Drilling Method:	Air Hammer - Longyea B55	Borehole Diameter:	140 mm	Surface RL:	123.21 mAHD
Drilling Company:	Highland Drilling	Co-ords:	E 402501.732 N 6448899.061		

Bore Information			Field Material Description				
WATER	WELL CONSTRUCTION	RL (mAHD)	DEPTH (mBGL)	GRAPHIC LOG	LITHOLOGY	FORMATION	HYDROGEOLOGY
	50 mm ID, class 18 uPVC & grout	123			DRILL PAD - Brown, drill pad / sandy topsoil	LELOMA FORMATION Jo Doth Tuff	
		122	1		SANDY CLAY - Cream, fine sand with sticky, brown / grey clay		
		121	2		TUFF - Cream / light green, very fine and fine grained tuff and (30-50%) clayey weathered tuff		
		120	3				
		119	4		light grey		
		118	5				
		117	6				
		116	7				
		115	8				
		114	9		WEATHERED TUFF - Cream, well weathered, clayey tuff (90%), with 10% tuff		
		113	10		WEATHERED COAL - Black, very well weathered coal (60%) with 40% very well weathered grey siltstone	LELOMA FORMATION	
		112	11		WEATHERED SILTSTONE - Grey, well weathered, clayey siltstone		
		111	12				
		110	13		WEATHERED SILTSTONE AND COAL - Dark grey, weathered, clayey siltstone and coal (60%) with 40% coal and grey claystone / siltstone		
		109	14				
		108	15				
		107	16		some black carbonaceous staining		
		106	17		WEATHERED COAL - Black, well weathered, clayey coal (60%) with 40% black, hard coal		
		105	18		WEATHERED SILTSTONE - Dark grey, weathered, clayey siltstone and coal (90%), with 10% black coal		
		104	19		WEATHERED SILTSTONE - Grey, weathered, clayey siltstone (60%) with 40% siltstone		
		103	20				
		102	21				
		101	22		some weathered coal		
		100	23				
		99	24		some very fine grey sandstone with black carbonaceous staining		
		98	25				
		97	26		SILTSTONE - Brown, fresh siltstone (80%) with 20% weathered, clayey siltstone		
		96	27		WEATHERED SILTSTONE - Grey, weathered siltstone with light grey clay (50%), 30% light grey, fine grained sandstone and 20% dark grey siltstone		
		95	28		SILTSTONE - Grey, fresh siltstone (60%) with 40% weathered, clayey siltstone		
		94	29				
		93	30				
		92	31		CLAY - Light grey, clay (90%) with 10% grey claystone		
		91	32		SILTSTONE - Dark grey, siltstone (70%) with 30% weathered, clayey siltstone		
		90	33				
		89	34				
		88	35		some fine grained sandstone		
		87	36				
		86	37		SHALE - Black, hard, shale (40%) with 30% dark grey siltstone and 30% weathered, clayey siltstone		
		85	38		SILTSTONE - Grey, siltstone (50%) with 20% light grey, very fine grained sandstone and 30% weathered, clayey siltstone		
		84	39				
		83	40		SANDSTONE - Light grey, fine grained sandstone (40%) with 20% grey siltstone and 20% weathered, clayey siltstone		
		82	41		SILTSTONE - Grey, siltstone with some grey, very fine grained sandstone (80%), 20% weathered, clayey siltstone		
		81	42				
		80	43				
		79	44		SANDSTONE - Grey, fine and very fine grained sandstone and minor siltstone, with some black carbonaceous staining		
		78	45				
		77	46				
		76	47		SILTSTONE - Grey, siltstone		
		75	48		SANDSTONE - Grey, fine and fine to medium grained sandstone (70%) with 30% grey siltstone. some black carbonaceous staining.		
	74	49					

END OF BOREHOLE AT 95.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

Client:	AGL Energy Ltd	Date Commenced:	10/25/11
Project:	Tiedeman Fault Investigation	Date Completed:	10/26/11
Bore Location:	Tiedman Property	Recorded By:	NPH
Project Number:	2162406B	Log Checked By:	JD

Drilling Method:	Air Hammer - Longyea B55	Borehole Diameter:	140 mm	Surface RL:	123.21 mAHD
Drilling Company:	Highland Drilling	Co-ords:	E 402501.732 N 6448899.061		

Bore Information		Field Material Description				
WATER	WELL CONSTRUCTION	RL (mAHD)	DEPTH (mBGL)	GRAPHIC LOG	LITHOLOGY	FORMATION
		73				LELOMA FORMATION
		72	51		SILTSTONE - Grey, siltstone	
		71	52			
		70	53		some coal	
		69	54			
		68	55			
		67	56		SANDSTONE - Light grey, fine grained sandstone (50%), with 40% grey siltstone and 10% black coal	
		66	57		SHALE - Black, hard, shale (50%) with 50% grey, very fine grained sandstone	
		65	58		SILTSTONE - Grey and light brown, siltstone, with some very fine grained sandstone	
		64	59			
		63	60		SANDSTONE - Grey, fine grained sandstone (70%) with 30% grey siltstone	
		62	61		SILTSTONE - Grey, siltstone, with some minor grey, very fine grained sandstone (90%), 10% black shale	
		61	62		SANDSTONE - Grey, fine and fine to medium grained sandstone (70%) with 30% grey siltstone. some black carbonaceous staining	
		60	63			
		59	64		SILTSTONE - Grey, siltstone, with some minor very fine grained sandstone. some black carbonaceous staining	
		58	65			
		57	66			
		56	67		some minor black shale	
		55	68			
		54	69			
		53	70			
		52	71			
		51	72			
		50	73			
		49	74			
		48	75		SANDSTONE - Light grey, fine grained sandstone, with some black carbonaceous staining	
		47	76			
		46	77		fine and fine to medium grained sandstone, with some black shale	
		45	78		SILTSTONE - Dark grey, siltstone, some black carbonaceous staining (80%) with 20% black shale	
		44	79		SANDSTONE - Grey, fine to medium grained, soft sandstone (70%) with 30% dark grey siltstone	
		43	80		SILTSTONE - Dark grey, siltstone (90%) with 10% black shale	
		42	81			
	Bentonite seal	41	82			
		40	83		some grey, very fine grained sandstone	
		39	84		SANDSTONE - Grey, very fine grained sandstone with some black carbonaceous staining	
	Gravel 5 mm graded	38	85		SILTSTONE - Dark grey, siltstone (70%) with 30% black, hard shale	
		37	86		SANDSTONE - Grey, fine grained sandstone, some black carbonaceous staining (90%) with 10% dark grey siltstone	
	50 mm ID, 0.5 mm aperture uPVC screen	36	87			
		35	88		fine and fine to medium grained sandstone	
		34	89			
		33	90		SILTSTONE - Dark grey, siltstone with some black carbonaceous staining	
		32	91		SANDSTONE - Grey, fine grained sandstone (90%) with 10% grey, black carbonaceous stained siltstone	
		31	92			
	Sump / 5 mm graded gravel	30	93		SILTSTONE - Grey, siltstone, some black carbonaceous staining (60%) with 20% black shale and 20% light grey, fine and fine to medium grained sandstone	
		29	94		SILTSTONE - Dark grey, siltstone, some black carbonaceous staining (80%) with 20% black shale	
		28	95			
		27	96			
		26	97			
		25	98			
		24	99			

END OF BOREHOLE AT 95.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

Client:	AGL Energy Ltd	Date Commenced:	11/1/11
Project:	Tiedeman Fault Investigation	Date Completed:	11/2/11
Bore Location:	Tiedman Property	Recorded By:	NPH
Project Number:	2162406B	Log Checked By:	JD

Drilling Method:	Air Hammer - Longyea B55	Borehole Diameter:	140 mm	Surface RL:	115.78 mAHD
Drilling Company:	Highland Drilling	Co-ords:	E 402760.431 N 6449325.297		

Bore Information		Field Material Description					
WATER	WELL CONSTRUCTION	RL (mAHD)	DEPTH (mBGL)	GRAPHIC LOG	LITHOLOGY	FORMATION	HYDROGEOLOGY
	50 mm ID, class 18 uPVC & grout	115	1		TOPSOIL - Brown, clayey topsoil		
		114	2		CLAY - Brown, clay		
		113	3		PEBBLES - Brown & red, alluvial, sub rounded chert pebbles (80%) with 20% clay		
		112	4		CLAY - Brown, high plasticity clay (60%) with 40% soft brown claystone		
		111	5		100% clay		
		110	6		40% dark grey siltstone		
		109	7		WEATHERED SILTSTONE - Grey, well weathered, clayey siltstone (60 - 90%) with 10 - 30% grey siltstone		
	Gravel backfill	106	10				
		105	11		SHALE - Black, hard shale (40%) with 30% grey siltstone and 30% dark grey clay		
		104	12		70% shale, with 20% clay and 10% siltstone		
		103	13		40% shale with 30% light brown, fine grained tuff and 30% clay		
		102	14		SILTSTONE - Grey, 50% grey siltstone with 40% black shale and 10% clay		
		101	15		80% siltstone, 10% shale and 10% clay		
		100	16		50% siltstone, 40% clay and 10% shale		
		99	17		SHALE - Black, shale (40%) with 30% grey siltstone and 30% clay		
		98	18		CLAY - Grey, clay (40%) with 30% shale and 30% grey siltstone		
		97	19		SILTSTONE - Grey, siltstone (50%) with 30% clay and 20% black shale		
		96	20		SANDSTONE - Light grey, fine grained, carbonaceous stained sandstone 60% with 20% grey siltstone and 20% clay		
		95	21		90% sandstone with 10% siltstone		
		94	22		SILTSTONE - Grey, siltstone (70%) with 20% light grey clay and 10% black shale		
		93	23		40% black shale		
		92	24		90% grey and brown siltstone with 10% grey, very fine grained sandstone		
		91	25		50% grey siltstone with 40% light grey, fine grained sandstone and 10% clay		
		90	26		100% dark grey siltstone		
		89	27		60% very dark grey siltstone with 40% black shale		
		88	28		SANDSTONE - Grey, fine grained sandstone (60%) with 30% grey siltstone and 10% shale		
		87	29		SHALE - Black, shale (60%) with 30% grey siltstone and 10% grey clay		
		86	30		SILTSTONE - Dark grey, siltstone (90%) with 10% black shale		
		85	31		SANDSTONE - Grey, fine and fine - medium grained sandstone (70%) with 40% grey siltstone		
		84	32				
		83	33				
		82	34				
		81	35				
		80	36				
		79	37				
		78	38				
		77	39				
		76	40				
		75	41				
		74	42				
		73	43				
		72	44				
		71	45				
		70	46				
		69	47				
		68	48				
		67	49				
		66					

pH: 6.43
 EC: 1387 µS/cm
 Temp: 23.83 °C
 Redox: -131.2 mV
 DO: 93.2 % Sat
 TDS: 0.901 g/L
 Cut: 0.1 L/s

END OF BOREHOLE AT 90.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

Client:	AGL Energy Ltd	Date Commenced:	11/1/11
Project:	Tiedeman Fault Investigation	Date Completed:	11/2/11
Bore Location:	Tiedman Property	Recorded By:	NPH
Project Number:	2162406B	Log Checked By:	JD

Drilling Method:	Air Hammer - Longyea B55	Borehole Diameter:	140 mm	Surface RL:	115.78 mAHD
Drilling Company:	Highland Drilling	Co-ords:	E 402760.431 N 6449325.297		

Bore Information		Field Material Description					
WATER	WELL CONSTRUCTION	RL (mAHD)	DEPTH (mBGL)	GRAPHIC LOG	LITHOLOGY	FORMATION	HYDROGEOLOGY
			65	.....	SANDSTONE - Grey, very fine grained sandstone (80%) with 20% black shale		
			64	.....	SILTSTONE - Grey, siltstone		
			63	.....	some minor brown siltstone		
			62	.....	20% black shale		
			61	.....	40% black shale		
			60	.....	20% black shale and 20% light grey, fine - medium grained sandstone		
			59	.....	SANDSTONE - Light grey, fine grained sandstone (60%) with 40% grey siltstone		
			58	.....	SILTSTONE - Dark grey, siltstone 70% with 30% black shale		
			57	.....	40% black shale		
			56	.....	100% siltstone, some minor carbonaceous staining		
			55	.....	SANDSTONE - Grey, fine grained sandstone (60%) with 30% grey siltstone and 10% shale		
			54	.....	SILTSTONE - Dark grey, siltstone (90%) with 10% black shale		
			53	.....	100% siltstone, some minor carbonaceous staining		
			52	.....	SANDSTONE - Grey, very fine grained sandstone (70%) with 30% grey siltstone		
			51	.....	20% black shale (50% sandstone)		
			50	.....	SILTSTONE - Dark grey, siltstone (80%) with 20% grey, fine grained sandstone		
			49	.....	SANDSTONE - Light grey, fine - medium grained sandstone (80%) with 10% grey siltstone and 10% shale		
			48	.....	100% grey, fine grained sandstone, some minor carbonaceous staining		
			47	.....	SHALE - Black, shale (60%) with 40% dark grey siltstone		
			46	.....	SILTSTONE - Dark grey, siltstone (60%) with 40% black shale		
			45	.....	SANDSTONE - Grey, fine grained sandstone (80%) with 10% shale and 10% grey siltstone		
			44	.....	no siltstone, 20% black shale		
			43	.....	SHALE - Black, shale (80%) with 20% very dark grey siltstone		
			42	.....	SILTSTONE - Dark grey, siltstone (90%) with 10% black shale		
			41	.....	SHALE - Black, shale (60%) with 40% light brown and grey, very fine grained sandstone		
			40	.....	SANDSTONE - Grey, fine - medium grained sandstone (80%) with 10% grey siltstone and 10% shale		
			39	.....	no siltstone, 20% black shale		
			38	.....	SHALE - Black, shale (80%) with 20% very dark grey siltstone		
			37	.....	SILTSTONE - Dark grey, siltstone (90%) with 10% black shale		
			36	.....	SHALE - Black, shale (60%) with 40% light brown and grey, very fine grained sandstone		
			35	.....	SANDSTONE - Grey, fine - medium grained sandstone (80%) with 10% grey siltstone and 10% shale		
			34	.....	no siltstone, 20% black shale		
			33	.....	no siltstone, 20% black shale		
			32	.....	no siltstone, 20% black shale		
			31	.....	no siltstone, 20% black shale		
			30	.....	no siltstone, 20% black shale		
			29	.....	no siltstone, 20% black shale		
			28	.....	no siltstone, 20% black shale		
			27	.....	no siltstone, 20% black shale		
			26	.....	no siltstone, 20% black shale		
			25	.....	no siltstone, 20% black shale		
			24	.....	no siltstone, 20% black shale		
			23	.....	no siltstone, 20% black shale		
			22	.....	no siltstone, 20% black shale		
			21	.....	no siltstone, 20% black shale		
			20	.....	no siltstone, 20% black shale		
			19	.....	no siltstone, 20% black shale		
			18	.....	no siltstone, 20% black shale		
			17	.....	no siltstone, 20% black shale		
			16	.....	no siltstone, 20% black shale		

END OF BOREHOLE AT 90.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

Client:	AGL Energy Ltd	Date Commenced:	11/3/11
Project:	Tiedeman Fault Investigation	Date Completed:	11/4/11
Bore Location:	Tiedman Property	Recorded By:	NPH
Project Number:	2162406B	Log Checked By:	JD

Drilling Method:	Air Hammer - Longyea B55	Borehole Diameter:	140 mm	Surface RL:	115.36 mAHD
Drilling Company:	Highland Drilling	Co-ords:	E 402699.042 N 6449357.504		

Bore Information		Field Material Description					
WATER	WELL CONSTRUCTION	RL (mAHD)	DEPTH (mBGL)	GRAPHIC LOG	LITHOLOGY	FORMATION	HYDROGEOLOGY
	50 mm ID, class 18 uPVC & grout	115	1		TOPSOIL - Brown, clayey topsoil		
		114	2		COBBLES - Brown, chert, subrounded alluvial cobbles (60%) with 40% brown / orange clay		
		113	3		CLAY - Dark brown, high plasticity clay (70%) with 30% brown, soft claystone		
		112	4				
		111	5				
		110	6		WEATHERED COAL - Black, very well weathered coal and siltstone, with very minor coal and grey siltstone		
		109	7				
		108	8				
		107	9				
	Gravel backfill	106	10				
		105	11		SAND - Colourless, fine grained quartz sand with 20% light grey clay		
		104	12		SILTSTONE - Grey, siltstone (60%) with 30% grey clay and 10% black, hard shale		
		103	13				
		102	14				
		101	15		CLAY - Light grey, clay (80%) with 20% light grey, fine grained sandstone and grey siltstone		
		100	16				
		99	17		SILTSTONE - Grey and brown, siltstone (60%) with 40% grey clay		
		98	18		CLAY - Light grey, clay (90%) with 10% dark grey siltstone and very fine grained, grey sandstone		
		97	19				
		96	20				
		95	21		SILTSTONE - Grey, siltstone (60 - 70%) with 30 - 40% light grey clay		
		94	22				
		93	23		some black shale		
		92	24				
		91	25				
		90	26				
		89	27				
		88	28				
		87	29		SANDY CLAY - Grey, fine grained sandy clay (40%) with 30% fine grained grey sandstone, 30% siltstone and very minor shale		
		86	30		SILTSTONE - Grey, carbonaceous stained siltstone (80%) with 20% shale and light grey, fine - medium grained sandstone some grey clay		
		85	31				
		84	32		SANDSTONE - Grey, fine grained sandstone (40%) with 40% light grey clay and 20% grey siltstone		
		83	33		SHALE - Black, shale (50%) with 40% clay and 10% grey siltstone		
		82	34		SILTSTONE - Grey, siltstone 50 - 80% with 20 - 50% clay and fine grained, grey sandstone brown and grey siltstone (100%)		
		81	35				
		80	36		some shale (10%)		
		79	37				
		78	38				
		77	39				
		76	40				
		75	41				
		74	42		some shale (30%)		
		73	43		SHALE - Black, hard shale (80%) with 20% brown and grey siltstone		
		72	44		SANDSTONE - Grey, very fine and fine grained, carbonaceous stained sandstone (80%) with 20% siltstone		
		71	45				
		70	46				
		69	47				
		68	48		SHALE - Black, shale (80%) with 20% grey siltstone		
		67	49				
		66					

EC: 2490 µS/cm
Temp: 21.8 °C
Cut: 0.01 L/s

EC: 2960 µS/cm
Temp: 23.9 °C
Cut: 0.01 L/s

END OF BOREHOLE AT 90.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

Client:	AGL Energy Ltd	Date Commenced:	11/3/11
Project:	Tiedeman Fault Investigation	Date Completed:	11/4/11
Bore Location:	Tiedman Property	Recorded By:	NPH
Project Number:	2162406B	Log Checked By:	JD

Drilling Method:	Air Hammer - Longyea B550	Borehole Diameter:	140 mm	Surface RL:	115.36 mAHD
Drilling Company:	Highland Drilling	Co-ords:	E 402699.042 N 6449357.504		

Bore Information		Field Material Description					
WATER	WELL CONSTRUCTION	RL (mAHD)	DEPTH (mBGL)	GRAPHIC LOG	LITHOLOGY	FORMATION	HYDROGEOLOGY
		65	51		SHALE - Black, shale (80%) with 20% grey siltstone (<i>continued</i>)		
		64	52		SANDSTONE - Grey, very fine and fine grained sandstone (50 - 80%) with 30 - 50% grey siltstone and black shale		
		63	53				
		62	54				
		61	55		90% sandstone with 10% brown claystone		EC: 2570 µS/cm Temp: 22 °C Cut: 0.01 L/s
		60	56		SILTSTONE - Dark grey, siltstone (70%) with 20% black shale and 10% grey, very fine grained sandstone		
		59	57				
		58	58		no shale (30% sandstone)		
		57	59				
		56	60		SHALE - Black, shale (40%) with 30% grey siltstone and 30% grey, fine grained sandstone		EC: 2140 µS/cm Temp: 21.4 °C Cut: 0.24 L/s
	Bentonite seal	55	61		SANDSTONE - Light grey, fine to medium grained sandstone (50%) with 40% grey siltstone and 10% brown claystone		
		54	62		SILTSTONE - Grey, siltstone (70%) with 30% light grey, fine grained sandstone		
		53	63		SHALE - Black, shale (60%) with 20% dark grey siltstone and 20% grey, fine grained sandstone		
		52	64				
		51	65		SILTSTONE - Grey, siltstone (60%) with 40% black shale		
		50	66		some light grey, fine to medium grained sandstone (30%)		EC: 2250 µS/cm Temp: 20.9 °C Cut: 1.25 L/s
	Gravel 5 mm graded	49	67		SANDSTONE - Grey, fine grained sandstone (90%) with 10% black shale		
		48	68		SILTSTONE - Grey, siltstone (50%) with 40% grey, fine grained sandstone and 10% black shale		
		47	69		no sandstone (shale 40%)		
		46	70		SANDSTONE - Grey, very fine grained sandstone (60%) with 40% dark grey, carbonaceous stained siltstone		
		45	71				
		44	72		SILTSTONE - Dark brown, siltstone (60%) with 20% black shale and 20% light grey, fine grained sandstone		EC: 2620 µS/cm Temp: 22.2 °C Cut: 1.25 L/s
		43	73		siltstone is dark grey and no sandstone (shale 30%)		
		42	74				
		41	75				
		40	76		SHALE - Black, shale (60%) with 40% dark grey siltstone		
		39	77				
		38	78		SILTSTONE - Dark grey, siltstone		EC: 2280 µS/cm Temp: 21.1 °C Cut: 1 L/s
		37	79		some black shale (30%)		
		36	80		siltstone dark brown and grey		
		35	81		SANDSTONE - Grey, fine and fine - medium grained, carbonaceous stained sandstone (80%) with 20% grey siltstone		
		34	82				
		33	83		SILTSTONE - Dark grey, siltstone		
		32	84		SHALE - Black, shale (80%) with 10% grey siltstone and 10% grey, fine grained sandstone		EC: 2380 µS/cm Temp: 20.1 °C Cut: 1.6 L/s
		31	85		SANDSTONE - Grey, fine grained, carbonaceous stained sandstone (90%) with 10% grey siltstone		
		30	86		SILTSTONE - Dark grey, siltstone (70%) with 30% fine grained, light grey sandstone		
		29	87				
		28	88		SANDSTONE - Grey, very fine grained sandstone		
		27	89		some grey siltstone (30%)		
	Sump / 5 mm graded gravel	26	90				EC: 2440 µS/cm Temp: 20.8 °C Cut: 2 L/s
		25	91				
		24	92				
		23	93				
		22	94				
		21	95				
		20	96				
		19	97				
		18	98				
		17	99				
		16					

END OF BOREHOLE AT 90.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

Client:	AGL Energy Ltd	Date Commenced:	11/15/11
Project:	Tiedeman Fault Investigation	Date Completed:	11/17/11
Bore Location:	Tiedman Property	Recorded By:	NPH
Project Number:	2162406B	Log Checked By:	JD

Drilling Method:	Air Hammer - Longyea B55	Borehole Diameter:	200 mm	Surface RL:	115.81 mAHD
Drilling Company:	Highland Drilling	Co-ords:	E 402730.023 N 6449387.353		

Bore Information			Field Material Description				
WATER	WELL CONSTRUCTION	RL (mAHD)	DEPTH (mBGL)	GRAPHIC LOG	LITHOLOGY	FORMATION	HYDROGEOLOGY
	150 mm ID, coated steel casing & grout	115	1		TOPSOIL - Brown, topsoil	LELOMA FORMATION	
		114	2		CLAY - Brown, clay with some fine grained sand		
		113	3		SANDY CLAY - Light brown, fine grained sandy clay		
		112	4		CLAYSTONE - Dark brown, soft claystone (80%) with 20% brown clay	LELOMA FORMATION Bindaboo Coal	
		111	5				
		110	6		COAL - Black, soft coal (80%) with 20% brown claystone	LELOMA FORMATION Bindaboo Coal	
		109	7		50% coal with 40% grey siltstone and 10% light grey clay		
		108	8		80% coal with 20% light brown, medium grained tuff		
		107	9		40% coal with 30% grey siltstone, 20% tuff and 10% clay	LELOMA FORMATION	
		106	10		SANDY CLAY - Light grey, fine grained sandy clay (80%) with 20% grey siltstone		
		105	11		SILTSTONE - Grey, siltstone (70%) with 20% black shale and 10% light grey clay		
		104	12		CLAY - Light grey, clay with a few chips of grey siltstone and black shale	LELOMA FORMATION	
		103	13		SILTSTONE - Dark grey, siltstone (50%) with 30% black shale and 20% light grey clay		
		102	14		SANDSTONE - Light grey, very fine grained sandstone (40%) with 30% dark grey siltstone and 30% shale		
		101	15		90% sandstone with 10% light grey clay	LELOMA FORMATION	
		100	16		70% sandstone with 30% dark grey siltstone		
		99	17		50% sandstone with 50% siltstone		
		98	18		SILTSTONE - Dark grey, siltstone (80%) with 20% light grey, very fine and fine grained sandstone	LELOMA FORMATION	
		97	19		SANDSTONE - Grey, fine grained sandstone (80%) with 20% dark grey siltstone		
		96	20		SHALE - Black, hard shale		
		95	21		SILTSTONE - Grey, siltstone (60%) with 40% grey, fine grained sandstone. some minor carbonaceous staining	LELOMA FORMATION	
		94	22		SANDSTONE - Light grey, fine grained sandstone (70%) with 30% light grey clay		
		93	23		SILTSTONE - Grey, siltstone (90%) with 10% clay		
		92	24		60% siltstone with 40% black shale	LELOMA FORMATION	
		91	25		no shale, dark grey siltstone		
		90	26		40% dark grey siltstone with 30% grey, fine grained sandstone and 30% black shale		
		89	27		70% dark grey siltstone with 30% clay	LELOMA FORMATION	
		88	28		40% dark grey siltstone with grey and brown siltstone; grey, fine grained sandstone; black shale		
		87	29		80% grey siltstone with 20% light grey, fine grained sandstone		
		86	30		dark grey, carbonaceous stained siltstone	LELOMA FORMATION	
	85	31		grey siltstone (70%) with 30% grey, fine grained sandstone			
	84	32		SANDSTONE - Grey, fine - medium and medium grained sandstone (90%) with 10% dark grey siltstone			
	83	33		SILTSTONE - Dark grey, siltstone (70%) with 30% dark grey, very fine grained sandstone	LELOMA FORMATION		
	82	34		SANDSTONE - Grey, fine grained sandstone (80%) with 10% dark grey siltstone and 10% light grey clay			
	81	35		SILTSTONE - Grey, siltstone with some minor carbonaceous staining			
	80	36		90% dark grey siltstone with 10% black shale	LELOMA FORMATION		
	79	37		60% dark grey siltstone with 20% black shale and 20% grey, very fine grained sandstone			
	78	38		90% dark grey siltstone with 10% black shale			
	77	39			LELOMA FORMATION		
	76	40					
	75	41					
	74	42			LELOMA FORMATION		
	73	43					
	72	44					
	71	45			LELOMA FORMATION		
	70	46					
	69	47					
	68	48			LELOMA FORMATION		
	67	49					
	66	50					

pH: 6.92
EC: 1481 µS/cm
Temp: 25.71 °C
Redox: -82.9 mV
DO: 71.6 % Sat
TDS: 0.966 g/L
Cut: - L/s

pH: 7.6
EC: 1632 µS/cm
Temp: 26.01 °C
Redox: -77.3 mV
DO: 71.5 % Sat
TDS: 1.061 g/L
Cut: 0.2 L/s

END OF BOREHOLE AT 90.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

Client:	AGL Energy Ltd	Date Commenced:	11/15/11
Project:	Tiedeman Fault Investigation	Date Completed:	11/17/11
Bore Location:	Tiedman Property	Recorded By:	NPH
Project Number:	2162406B	Log Checked By:	JD

Drilling Method:	Air Hammer - Longyea B55	Borehole Diameter:	200 mm	Surface RL:	115.81 mAHD
Drilling Company:	Highland Drilling	Co-ords:	E 402730.023 N 6449387.353		

Bore Information		Field Material Description					
WATER	WELL CONSTRUCTION	RL (mAHD)	DEPTH (mBGL)	GRAPHIC LOG	LITHOLOGY	FORMATION	HYDROGEOLOGY
		65	51		SILTSTONE - Grey, siltstone with some minor carbonaceous staining (<i>continued</i>)	LELOMA FOMRATION	<p>pH: 7.86 EC: 1734 µS/cm Temp: 25.51 °C Redox: -81.3 mV DO: 82.4 % Sat TDS: 1.127 g/L Cut: 1.1 L/s</p> <p>pH: 7.93 EC: 1787 µS/cm Temp: 25 °C Redox: -72.7 mV DO: 79.3 % Sat TDS: 1.162 g/L Cut: 1.4 L/s</p> <p>pH: 7.84 EC: 1830 µS/cm Temp: 24.31 °C Redox: -70.9 mV DO: 87.4 % Sat TDS: 1.189 g/L Cut: 1.6 L/s</p> <p>pH: 7.55 EC: 1881 µS/cm Temp: 22.89 °C Redox: -78.9 mV DO: 79 % Sat TDS: 1.224 g/L Cut: 1.6 L/s</p> <p>pH: 7.88 EC: 1802 µS/cm Temp: 25.86 °C Redox: -75.6 mV DO: 77.7 % Sat TDS: 1.172 g/L Cut: 1.8 L/s</p> <p>pH: 8.01 EC: 1768 µS/cm Temp: 24.94 °C Redox: -79.8 mV DO: % Sat TDS: 1.149 g/L Cut: 2 L/s</p>
		64	52		60% dark grey siltstone with 20% black shale and 20% light grey, fine - medium grained sandstone		
		63	53		70% dark grey siltstone with 30% black shale		
		62	54				
		61	55				
		60	56		60% dark grey siltstone with 40% light grey, fine - medium grained sandstone		
		59	57		90% dark grey siltstone with 10% black shale		
		58	58		70% grey siltstone with 30% light grey, fine grained sandstone		
		57	59				
		56	60		90% dark grey siltstone with 10% black shale		
	Bentonite seal	55	61		50% grey siltstone with 20% black shale, 20% light grey, fine grained sandstone and some brown, soft claystone		
		54	62		SANDSTONE - Light grey, medium grained sandstone (80%) with 20% grey, fine - medium grained sandstone		
		53	63		SILTSTONE - Grey, siltstone (60%) with 40% light grey, fine - medium grained sandstone		
		52	64		SHALE - Black, shale (60%) with 40% dark grey siltstone		
		51	65		SILTSTONE - Grey, siltstone (70%) with 30% black shale		
		50	66		SANDSTONE - Grey, fine grained sandstone (some minor medium grained sandstone) (90%) with 10% grey siltstone		
	Gravel 5 mm graded	49	67		SILTSTONE - Grey, siltstone (90%) with 10% light brown claystone		
		48	68		SHALE - Black, shale (80%) with 20% dark brown siltstone		
		47	69		SILTSTONE - Grey & brown, siltstone (70%) with 30% black shale		
		46	70		SHALE - Black, shale (70%) with 30% grey and brown siltstone		
		45	71				
		44	72		SANDSTONE - Light grey, fine to medium grained sandstone (60%) with 30% grey, carbonaceous stained siltstone and 10% black shale no shale, 30% siltstone		
		43	73		SILTSTONE - Dark grey, siltstone (60%) with 40% black shale		
		42	74				
		41	75		60% dark grey siltstone with 30% shale and 10% light grey, fine grained sandstone		
		40	76		SHALE - Black, shale (40%) with 30% grey siltstone and 30% light grey, fine grained sandstone		
	150 mm ID, 1 mm aperture stainless screen	39	77		SILTSTONE - Grey, siltstone (60%) with 40% grey, very fine grained sandstone		
		38	78		SANDSTONE - Grey, fine to medium grained sandstone (90%) with 10% grey siltstone		
		37	79		SILTSTONE - Grey, siltstone (80%) with 20% grey, very fine grained sandstone		
		36	80				
		35	81				
		34	82		SANDSTONE - Light grey, fine grained sandstone (80%) with 20% grey siltstone		
		33	83		80% sandstone with 10% siltstone and 10% black shale		
		32	84		SILTSTONE - Grey, siltstone (70%) with 10% black shale and 20% light grey, fine grained sandstone		
		31	85		SHALE - Black, shale (60%) with 40% dark grey siltstone		
		30	86		SILTSTONE - Grey, siltstone (60%) with 40% black shale		
		29	87		70% brown siltstone with 30% light grey, fine - medium grained sandstone		
		28	88		70% grey siltstone with 30% grey, very fine grained sandstone		
	Sump / 5 mm graded gravel	27	89		SHALE - Black, shale (70%) with 30% dark brown siltstone		
		26	90				
		25	91				
		24	92				
		23	93				
		22	94				
		21	95				
		20	96				
		19	97				
		18	98				
		17	99				
		16					

END OF BOREHOLE AT 90.00 m

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

NSW Office of Water

Hunter Region
P O Box 2213

Dangar NSW 2309
Phone: (02) 49042500

BORE LICENSE CERTIFICATE
UNDER SECTION 115 OF THE WATER ACT, 1912

20BL172626

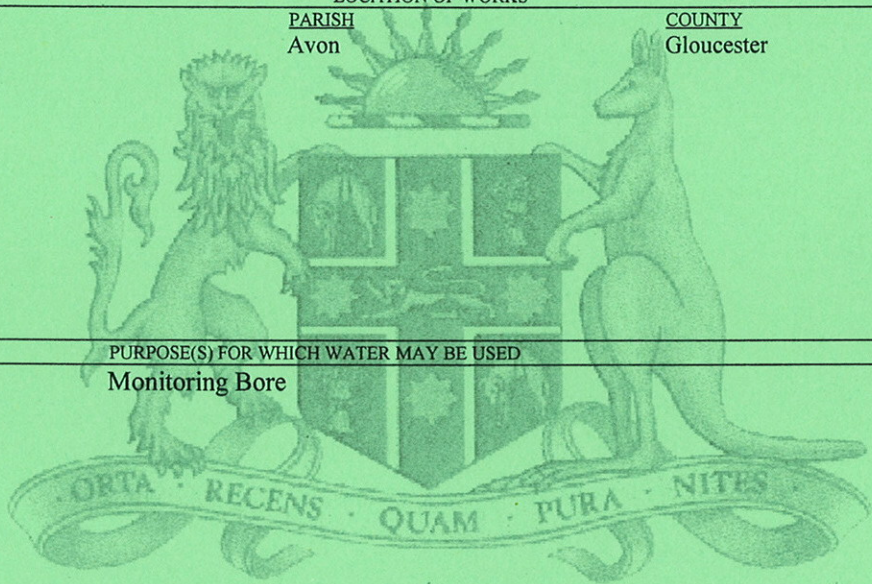


A G L Upstream Investments Pty Ltd
Locked Bag 1837
St Leonards NSW 2065

LICENSE NUMBER
20BL172626
DATE LICENSE VALID FROM
01-Nov-2010
DATE LICENSE VALID TO
PERPETUITY
FEE
\$0.00

ABN 47661556763 GST NIL

LOCATION OF WORKS
Portion(s) or Lot/Section/DP 85//979859
PARISH Avon
COUNTY Gloucester



TYPE OF WORKS Test Bore
PURPOSE(S) FOR WHICH WATER MAY BE USED Monitoring Bore

CONDITIONS APPLYING TO THIS LICENSE ARE

As shown on the attached Condition Statement

ORIGINAL

NSW Office of Water**CONDITIONS STATEMENT REFERRED TO ON
20BL172626
ISSUED UNDER PART V OF THE WATER ACT, 1912
ON 01-Nov-2010**

(1) THE LICENCE SHALL LAPSE IF THE WORK IS NOT COMMENCED AND COMPLETED WITHIN THREE YEARS OF THE DATE OF THE ISSUE OF THE LICENCE.

(2) THE LICENSEE SHALL WITHIN TWO MONTHS OF COMPLETION OR AFTER THE ISSUE OF THE LICENSE IF THE WORK IS EXISTING, FURNISH TO NSW OFFICE OF WATER:-

(A) DETAILS OF THE WORK SET OUT IN THE ATTACHED FORM "A" (MUST BE COMPLETED BY A DRILLER).

(B) A PLAN SHOWING ACCURATELY THE LOCATION OF THE WORK, IN RELATION TO PORTION AND PROPERTY BOUNDARIES.

(C) A ONE LITRE WATER SAMPLE FOR ALL LICENCES OTHER THAN THOSE FOR STOCK, DOMESTIC, TEST BORES AND FARMING PURPOSES.

(D) DETAILS OF ANY WATER ANALYSIS AND/OR PUMPING TESTS.

(3) THE LICENSEE SHALL ALLOW NSW OFFICE OF WATER OR ANY PERSON AUTHORISED BY IT, FULL AND FREE ACCESS TO THE WORKS, EITHER DURING OR AFTER CONSTRUCTION, FOR THE PURPOSE OF CARRYING OUT INSPECTION OR TEST OF THE WORKS AND ITS FITTINGS AND SHALL CARRY OUT ANY WORK OR ALTERATIONS DEEMED NECESSARY BY THE DEPARTMENT FOR THE PROTECTION AND PROPER MAINTENANCE OF THE WORKS, OR THE CONTROL OF THE WATER EXTRACTED AND FOR THE PROTECTION OF THE QUALITY AND THE PREVENTION FROM POLLUTION OR CONTAMINATION OF SUB-SURFACE WATER.

(4) IF DURING THE CONSTRUCTION OF THE WORK, SALINE OR POLLUTED WATER IS ENCOUNTERED ABOVE THE PRODUCING AQUIFER, SUCH WATER SHALL BE SEALED OFF BY:-

(A) INSERTING THE APPROPRIATE LENGTH(S) OF CASING TO A DEPTH SUFFICIENT TO EXCLUDE THE SALINE OR POLLUTED WATER FROM THE WORK.

(B) CEMENTING BETWEEN THE CASING(S) AND THE WALLS OF THE BORE HOLE FROM THE BOTTOM OF THE CASING TO GROUND LEVEL.

ANY DEPARTURE FROM THESE PROCEDURES MUST BE APPROVED BY THE DEPARTMENT BEFORE UNDERTAKING THE WORK.

(5) (A) THE LICENSEE SHALL NOTIFY NSW OFFICE OF WATER IF A FLOWING SUPPLY OF WATER IS OBTAINED. THE BORE SHALL THEN BE LINED WITH CASING AND CEMENTED AND A SUITABLE CLOSING GEAR SHALL BE ATTACHED TO THE BOREHEAD AS SPECIFIED BY NSW OFFICE OF WATER.

(B) IF A FLOWING SUPPLY OF WATER IS OBTAINED FROM THE WORK, THE LICENSEE SHALL ONLY DISTRIBUTE WATER FROM THE BORE HEAD BY A SYSTEM OF PIPE LINES AND SHALL NOT DISTRIBUTE IT IN DRAINS, NATURAL OR ARTIFICIAL CHANNELS OR DEPRESSIONS.

(6) IF A WORK IS ABANDONED AT ANY TIME THE LICENSEE SHALL NOTIFY NSW OFFICE OF WATER THAT THE WORK HAS BEEN ABANDONED AND SEAL OFF THE AQUIFER BY:-

(A) BACKFILLING THE WORK TO GROUND LEVEL WITH CLAY OR CEMENT AFTER WITHDRAWING THE CASING (LINING); OR

(B) SUCH METHODS AS AGREED TO OR DIRECTED BY NSW OFFICE OF WATER.

(7) THE LICENSEE SHALL NOT ALLOW ANY TAILWATER/DRAINAGE TO DISCHARGE INTO OR ONTO:-

- ANY ADJOINING PUBLIC OR CROWN ROAD;
- ANY OTHER PERSONS LAND;
- ANY CROWN LAND;
- ANY RIVER, CREEK OR WATERCOURSE;
- ANY NATIVE VEGETATION AS DESCRIBED UNDER THE NATIVE VEGETATION CONSERVATION ACT 1997;
- ANY WETLANDS OF ENVIRONMENTAL SIGNIFICANCE.

(8) WATER SHALL NOT BE PUMPED FROM THE BORE AUTHORISED BY THIS LICENSE FOR ANY PURPOSE OTHER THAN GROUNDWATER INVESTIGATION.

End Of Conditions

Appendix B

Geophysical investigation results



**Geophysical Services for the Environmental,
Exploration, Engineering and Ordnance Industries**



**REPORT
GEOPHYSICAL SURVEY
TRANSIENT ELECTROMAGNETIC SURVEY**

GLOUCESTER, NSW

**PARSONS BRINCKERHOFF
AUSTRALIA PTY. LTD.**

Survey Date: Sept 2011

Draft Report Date: Oct 2011

Final Report Date: Oct 2011

**REPORT
GEOPHYSICAL SURVEY
TRANSIENT ELECTROMAGNETIC SURVEY
GLOUCESTER, NSW**

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AUSTRALIA PTY. LTD.**

Survey Date: Sept 2011

Draft Report Date: Oct 2011

Final Report Date: Oct 2011

FOR:

Parsons Brinckerhoff Australia Pty. Ltd.

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REVISION HISTORY

Alpha Reference: AG-11-45

Revision	Date	Comments	Originated by:	Signatures	
				Checked by:	Authorised by:
1	19 October	Final Report	Jeremy Hill	Jamie Speer	Jamie Speer

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1 INTRODUCTION

Alpha Geoscience Pty. Ltd. (Alpha) was contracted by Parsons Brinckerhoff Australia Pty. Ltd., the Client, to undertake a Geophysical investigation on an AGL site near Gloucester, NSW.

The aim of the survey was to use Time Domain Electromagnetics (TEM) to locate faults in the near surface.

2 AUTHORITY

An authority to proceed with the project was provided by way of a Purchase Order, PB Reference Number PO_2508, signed by Lilian Roque, Project Administrator and dated 12 September 2011, sent as an email attachment from, Lilian Roque of PB.

3 SURVEY RATIONALE

The basic principle of the TEM method is that a current flowing in a transmitter loop sets up a magnetic field which when switched off induces eddy currents to flow in any good electrical conductor in the ground. These eddy currents set up a secondary magnetic field which can be detected by a receiver loop as a time-dependant decaying voltage. The decaying transient is recorded by measuring the voltage produced in a receiver coil at multiple time gates. The character of this decay (duration, amplitude, etc.) depends on the conductivity, shape, size, depth and attitude of the conductor and its position with respect to the receiver loop and can be used to provide information on all these factors.

Faults are generally good targets for detection with TEM as they are often significantly more conductive than the surrounding bedrock. This is because faults are often mineralised and/or weathered and can also direct the flow of groundwater.

4 SURVEY PARAMETERS

Survey team mobilized to site, conducted field testing and marked the boundaries of the area to be surveyed (as was indicated by the Client Representative) on the 27th September 2011. The TEM survey was conducted on the 28th and 29th of September 2011.

Transient Electromagnetic (TEM) Data Collection

TEM data was collected by G. Brabec, J. Hill and S. Jaggar. All are Geophysicists employed by Alpha Geoscience.

Data was collected with a TerraTEM system, using an In-Loop setup with 50m x 50m transmitter loop and a roving, multi-turn receiver coil with 105m² effective loop area. Maximum current amplitude of approximately 9 amps was employed to maximise the depth of exploration. Soundings were collected at 50m intervals in the areas indicated by Parsons Brinckerhoff staff. The location of soundings is shown in the Schematic of the site shown in Image 1 below.



Image 1: Google Earth Image of the site, with location of transmitter loops (blue squares) and receiver locations (green points).

5 DATA PROCESSING AND PRESENTATION

The data was processed using Templot software. Contour plots of some individual time gates were generated; these are presented in Appendix 1 A-C.

The Spiker algorithm in Templot software was used to transform sounding data to modelled conductivity with depth. Conductivity profiles were produced by interpolating conductivity values between the modelled soundings using Templot. Profiles of modelled conductivity were generated for each line of soundings in a direction semi-perpendicular to the strike of the drainage channel/possible fault.

The Profiles of modelled conductivity are displayed in Appendices 2A-G. Note that the long line (2E) is shown in full in Appendix 2G, whilst Appendix 2E shows only the part of the line which crosses the anomaly. Note also, that the distance scale on all profiles is relative to our local grid. The orientation of the local grid as well as the location of modelled lines and their Appendix reference numbers are shown in image 2 below. Also note that the horizontal distance axis varies in scale between the profiles in Appendices 2A-G.



Image 2: Schematic of site. Showing origin and orientation of local grid (red dashed lines), Line Locations for pseudosections (black lines), Appendix reference numbers for pseudosections and location of transmitter loops (blue squares) and receiver locations (green points).

6 SURVEY RESULTS AND DISCUSSION

The data collected was of high quality, although electromagnetic noise has affected some of the late time data, which is normal. The presence of a conductive surface layer restricted the effective modelled depth of exploration to 70m or slightly less on average.

The contour plots in Appendix 1 show an increase in amplitude of early and mid time response around the area of the suspected fault. This indicates the presence of a shallow conductor.

If the contour plots are compared with the Satellite image of the site in Image 1; the peak amplitude of the anomaly as shown in the contour plots is offset to the west when compared to the location of the drainage channel. This indicates that weathering and/or groundwater flow may be following a fault underground which is offset from the drainage channel to the west. Furthermore, a careful comparison of the three contour plots show the area of peak anomaly shifting to the west slightly during the later time gates, this may be evidence of a fluid filled fault dipping steeply to the west.

The modelling (Appendices 2A-G) shows a general trend of relatively high conductivities near the surface grading into lower conductivity values at depth. This is generally what we would expect for a regolith profile consisting of clays and other weathering products near surface, grading into resistive bedrock at depth.

The modelled soundings in the area of the suspected fault all show increased surface conductivity and a zone of relatively high conductivity continuing deeper than in the adjacent soundings. This area of increased conductivity appears to extend to a maximum depth of approximately 40-50 meters with conductivity decreasing as depth increases. The modelled conductivity in the anomalous soundings does still decrease with depth in accordance with the overall pattern. Therefore this anomaly is interpreted as a deepening of the weathering into the surrounding bedrock and probably also the presence of groundwater. This could be the result of fault related fracturing. Both the permeation of groundwater through the fractures and the subsequent weathering of fresh rock to clay minerals would both increase the conductivity in and around the fractured zone.

The modelled sections in Appendices 2D and 2E both show a slight thickening of the anomaly towards the west which may be further evidence of a fault dipping steeply to the west.

The long line (Appendix 2G) shows two shallower anomalies which may indicate further faulting. One anomaly lies in the far west of the profile and is in the approximate location of the creek. The last sounding to the west on the long line just reaches the edge of this anomaly, so the anomaly has not been covered completely by the survey. The other anomaly is located around the middle of the profile which is near the top of the hill on the survey line. It is difficult to infer from the TEM data alone that these anomalies mark the location of faults. However it can be said that the weathered portion of the geological profile is probably thicker and/or wetter in these areas.

It should be noted that the spiker algorithm creates a smooth model of conductivity, whereas the actual geology may consist of distinct boundaries and linear features. Therefore regions of profiles with anomalously high or low modelled conductivity cannot be thought of literally as the cross-section of a geological feature, just as the interface between different colours in the profiles cannot be thought of as geological layers.

It would be difficult to infer from the modelled TEM data alone that any of the anomalies are due to the presence of a fault. This is partly because the model does not show any of the anomalies continuing deeper than 40 or 50m, which we would expect from a fluid filled fault at depth.

It should also be noted that the colour scale has been altered to best display the data and that maximum values at the most shallow parts of the anomaly, in the area of the suspected fault, are modelled to be over 400 mS/m. These very high conductivity values may be due to a higher concentration of clay minerals and water near the surface of the drainage channel/possible fault.

It may be that groundwater flow is restricted to or concentrated in the near surface. However, the presence of highly conductive surface layers (which are present in these models) can trap eddy currents. This effect could essentially mask the presence or continuation of conductive features at depth. It should therefore not be inferred that the flow of groundwater in the possible fault is limited to the vertical extent of the anomaly. In other words the model does not prove that ground water is not flowing through the fault at depths greater than those described above.

7 RECOMMENDATIONS

It is recommended that if further geophysics is to be conducted, a resistivity survey be conducted over the suspected fault.

A comparative analysis of TEM and resistivity models should allow for a more informed geophysical interpretation. This is because TEM is optimal for detecting conductors such as groundwater in faults, whereas resistivity modelling should provide higher resolution. As well as defining more distinctly the interfaces between bodies of significantly differing resistance, the presence of which are indicated by the modelled TEM data.

8 CONCLUSIONS

The survey was conducted within the time frame proposed.

Data collected with the TerraTEM was of good quality.

Three main anomalies were found in the data, the largest of which coincides with the hypothesised location of the fault. This anomaly is interpreted as a deepening of the weathering into the surrounding bedrock and probably also the presence of groundwater. This could be the result of fault related fracturing.

9 LIMITATIONS OF REPORT

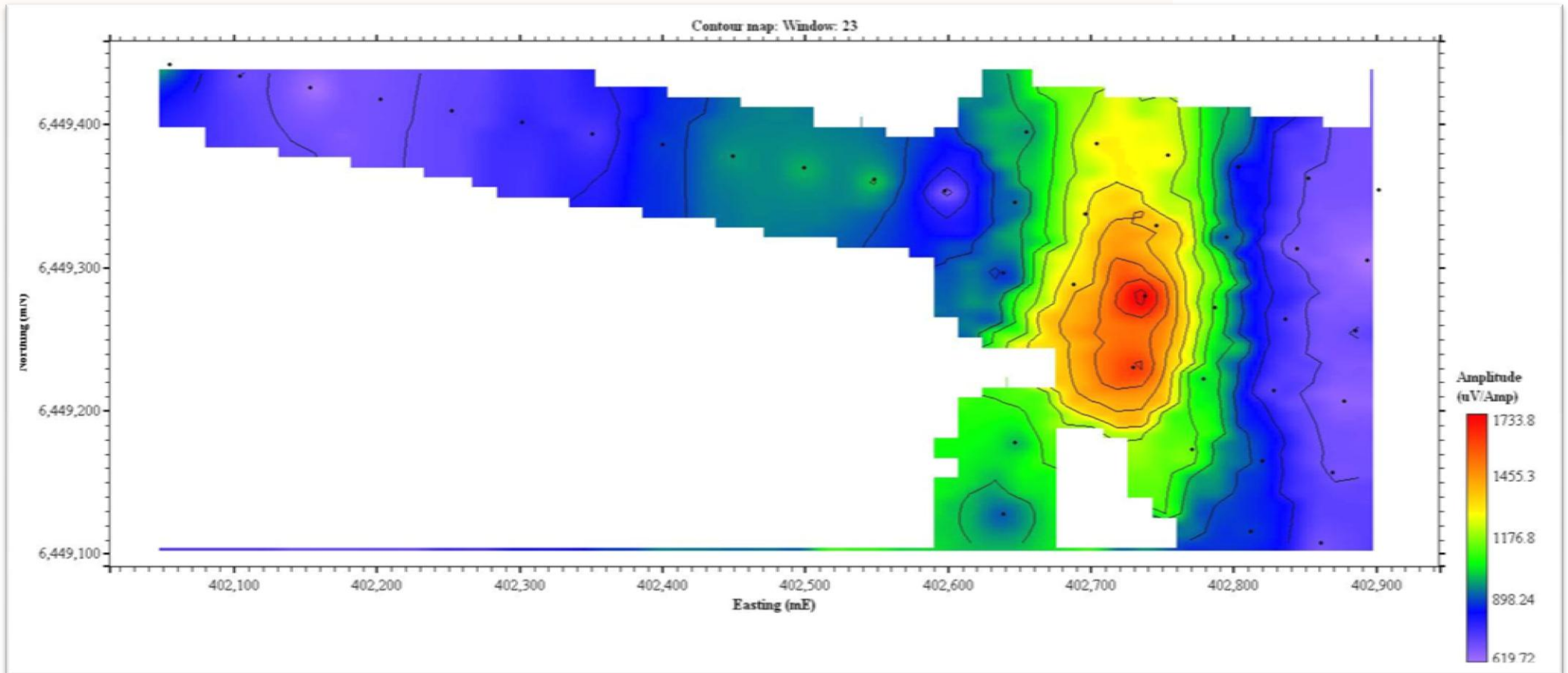
This report has been prepared for the use of Parsons Brinckerhoff Australia Pty. Ltd. in accordance with general accepted Consulting practice. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has not been prepared for the use by parties other than the client, the owner and their respective consulting advisors. It may not contain sufficient information for purposes of other parties or for other uses.

This report was prepared on completion of the field work and is based on conditions encountered and reviewed at the time of preparation. Alpha Geoscience disclaims responsibility for any changes that might have occurred after this time.

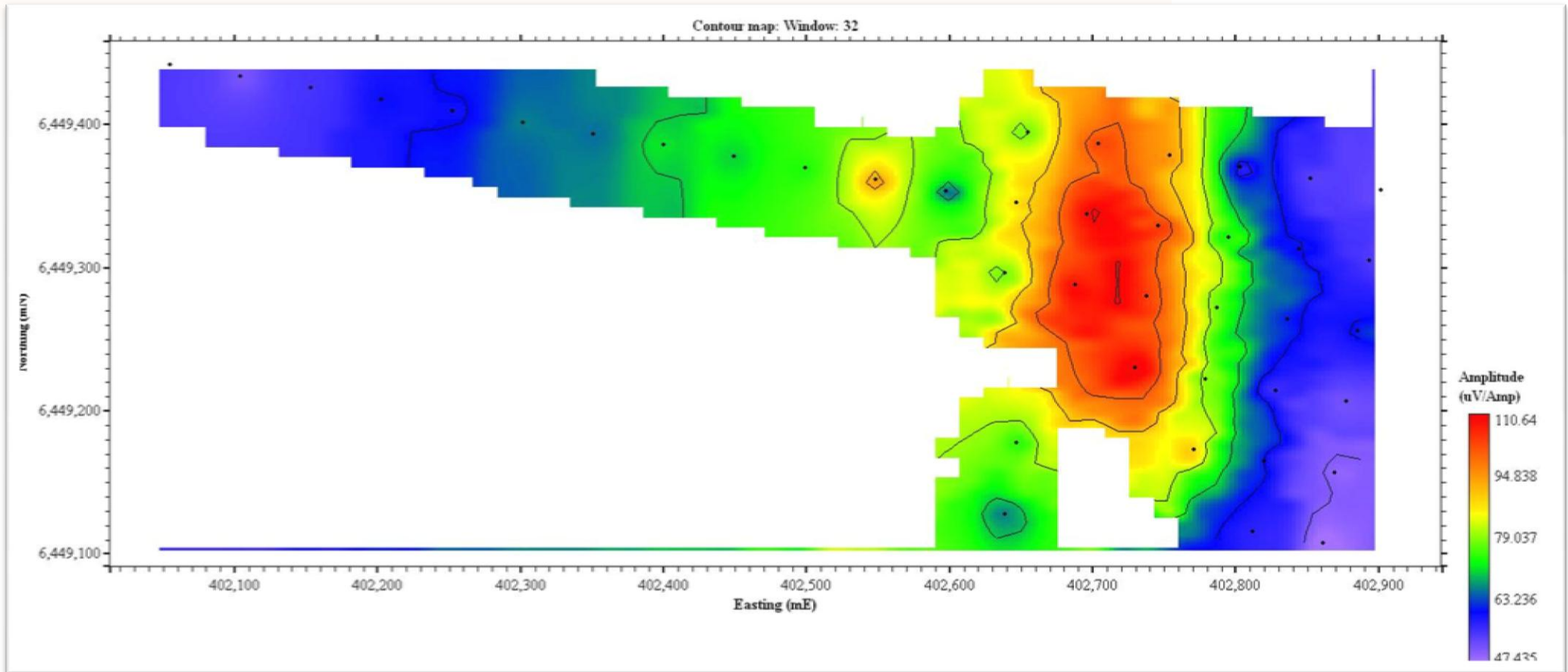
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Whilst to the best of our knowledge, information contained in this report is accurate at the date of issue, conditions on the site (including the depositing and removal of contamination) can change in a limited time. This should be borne in mind if the report is used after a protracted delay.

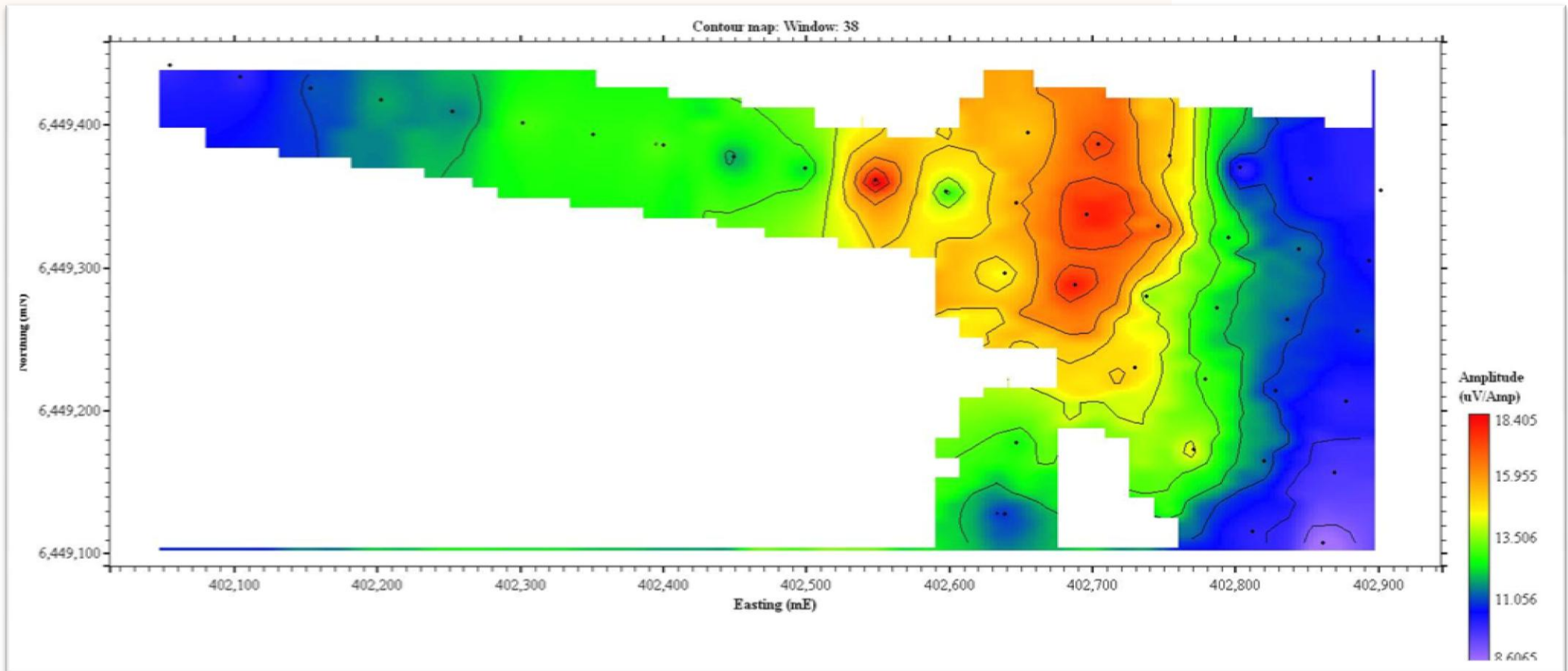
10 APPENDIX 1A: CONTOUR PLOT OF CHANNEL 23



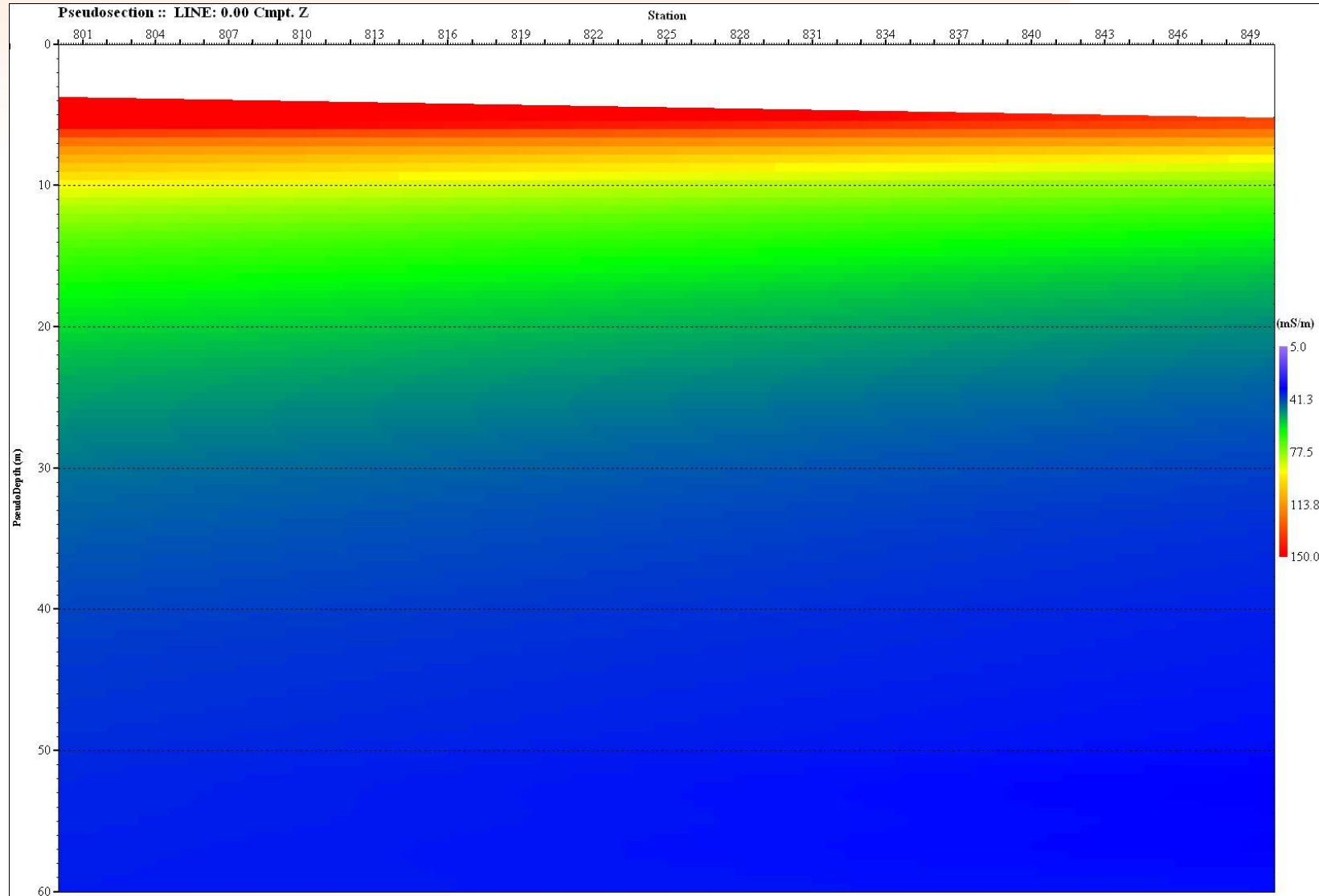
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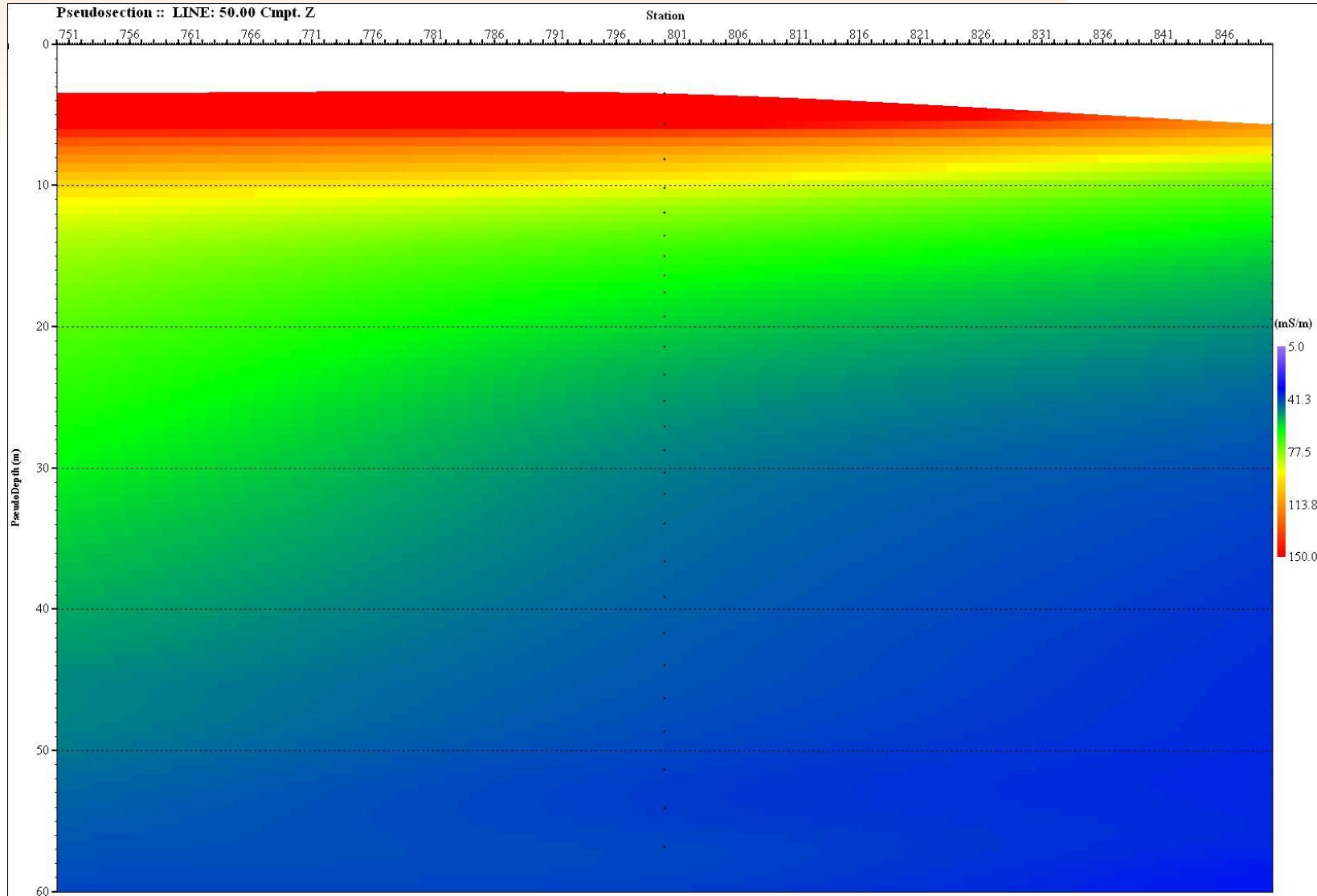
12 APPENDIX 1C: CONTOUR PLOT OF CHANNEL 38

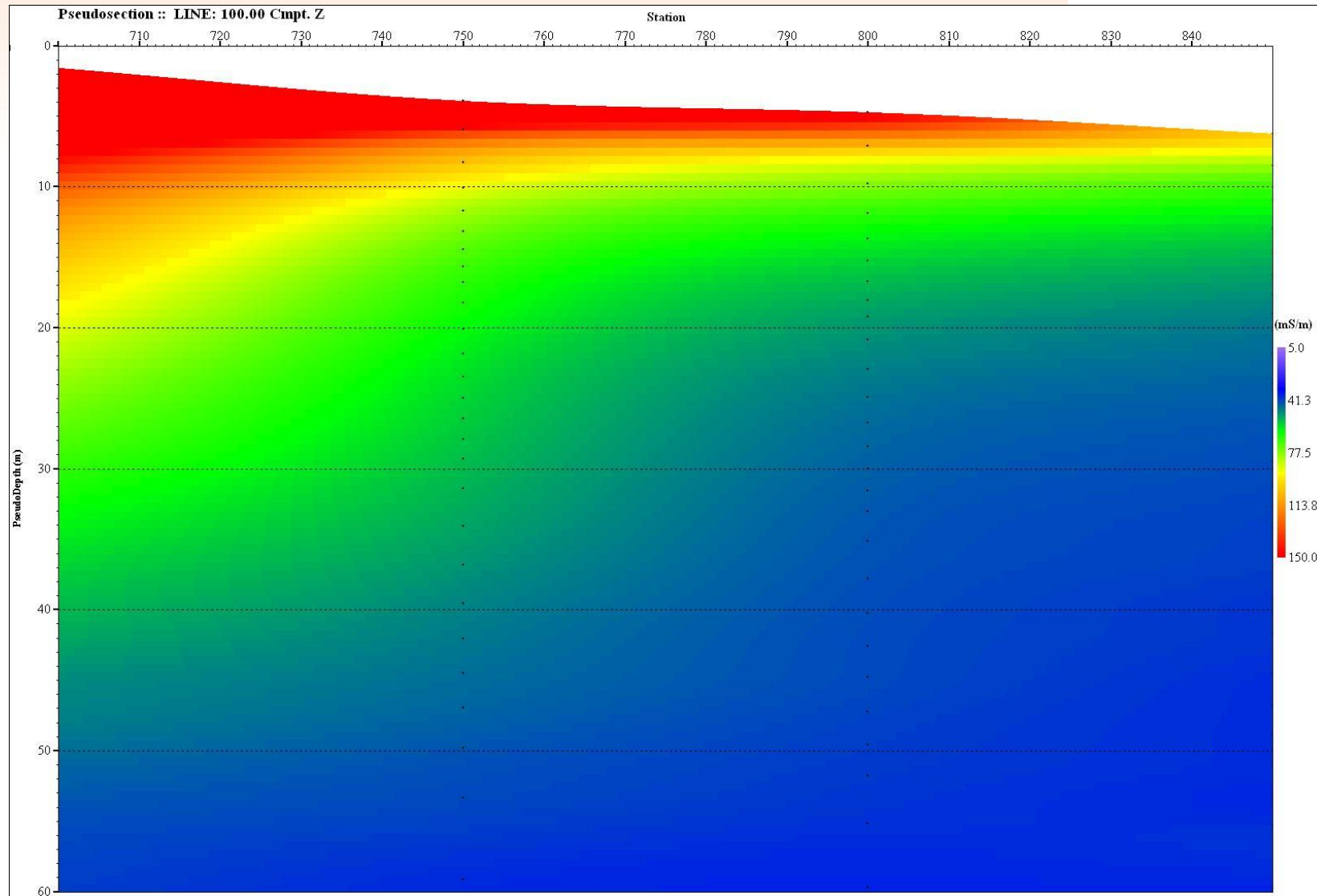


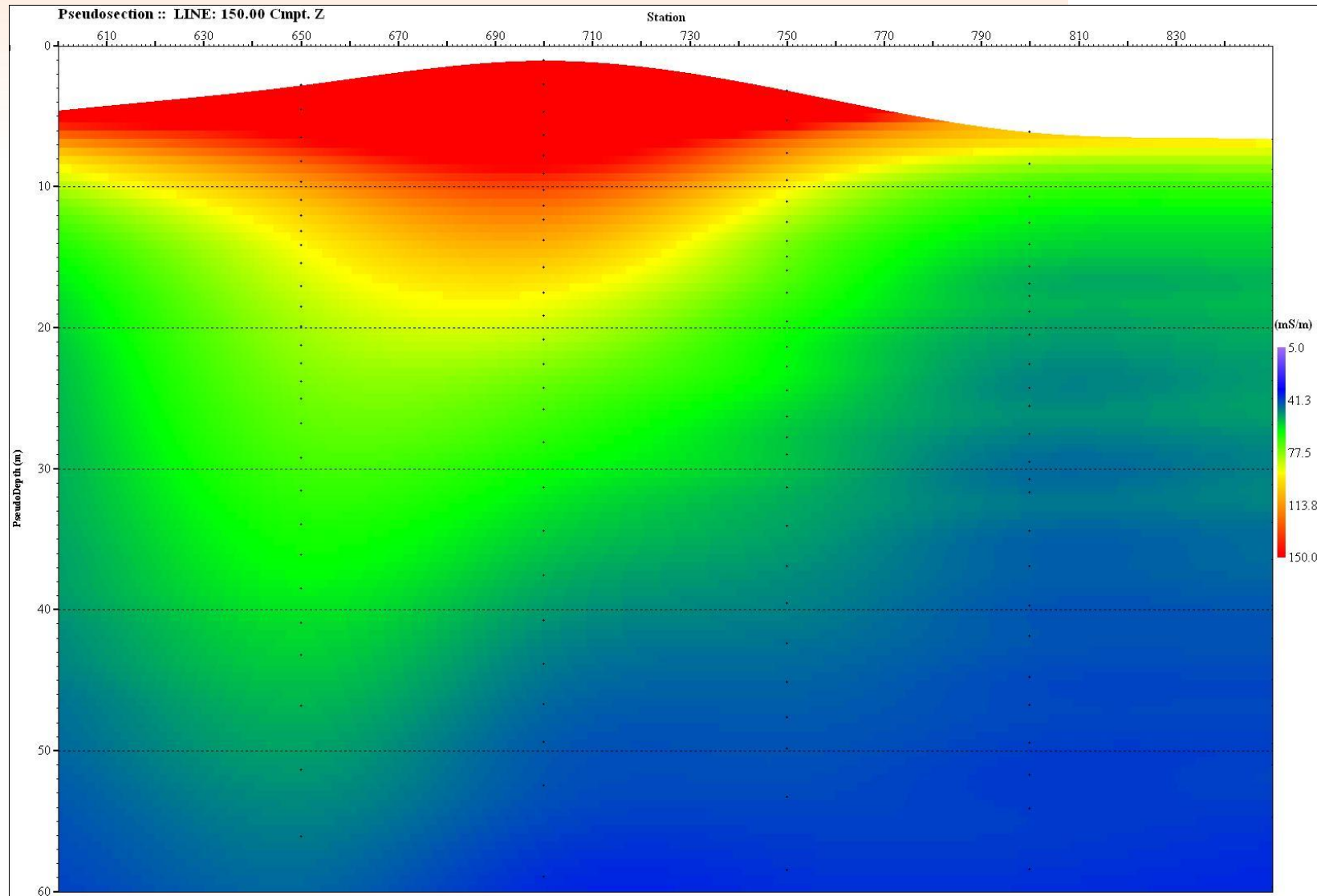
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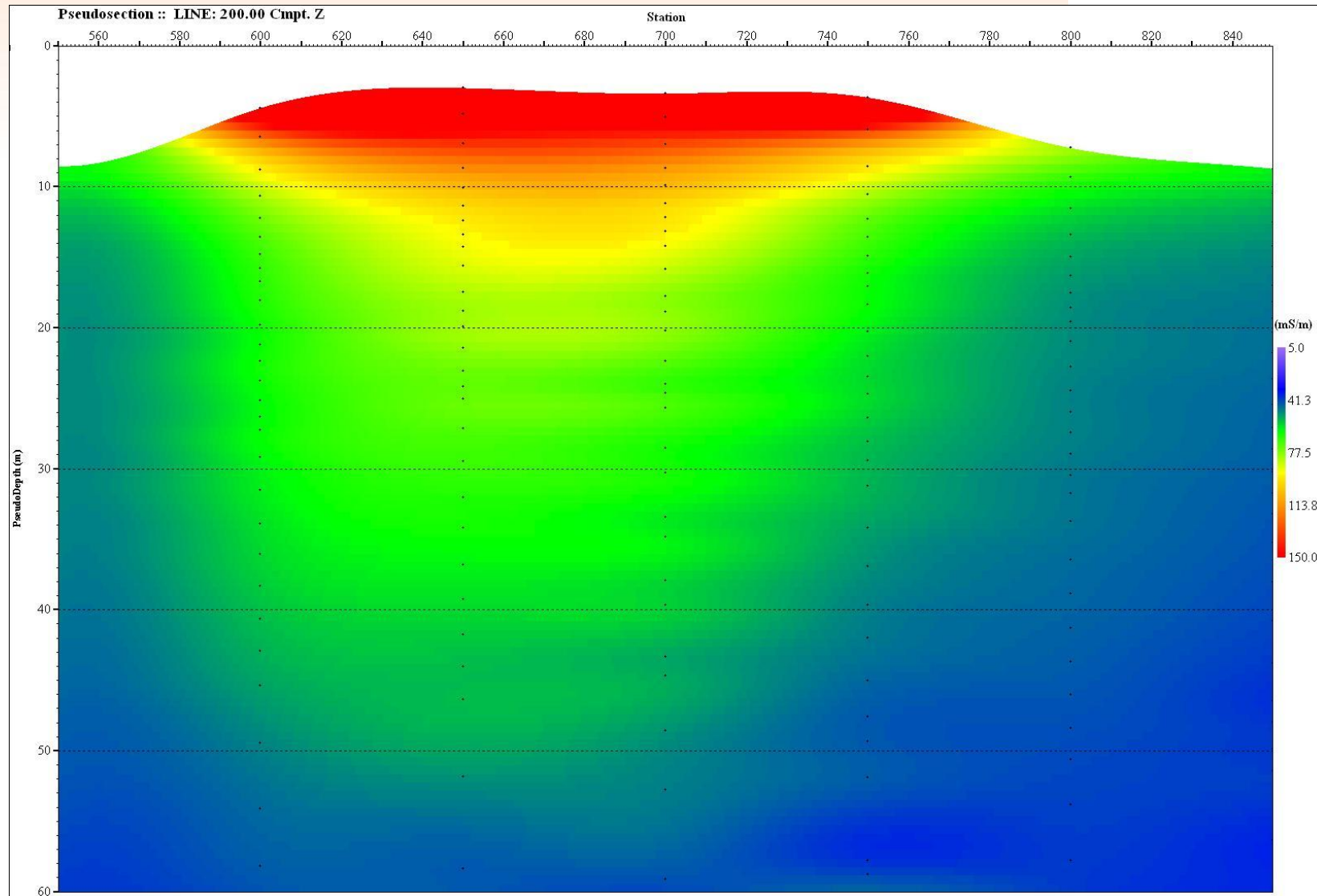


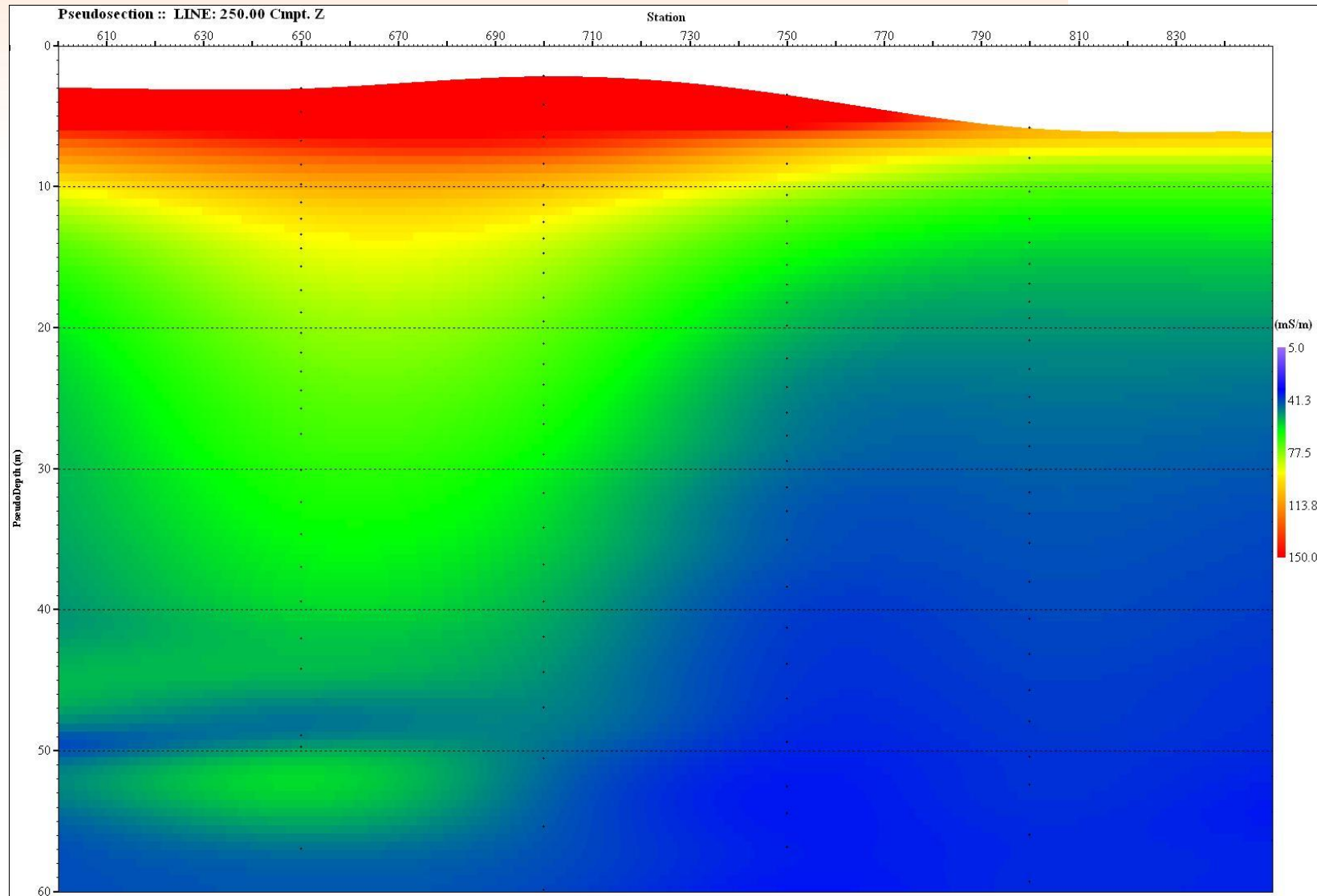
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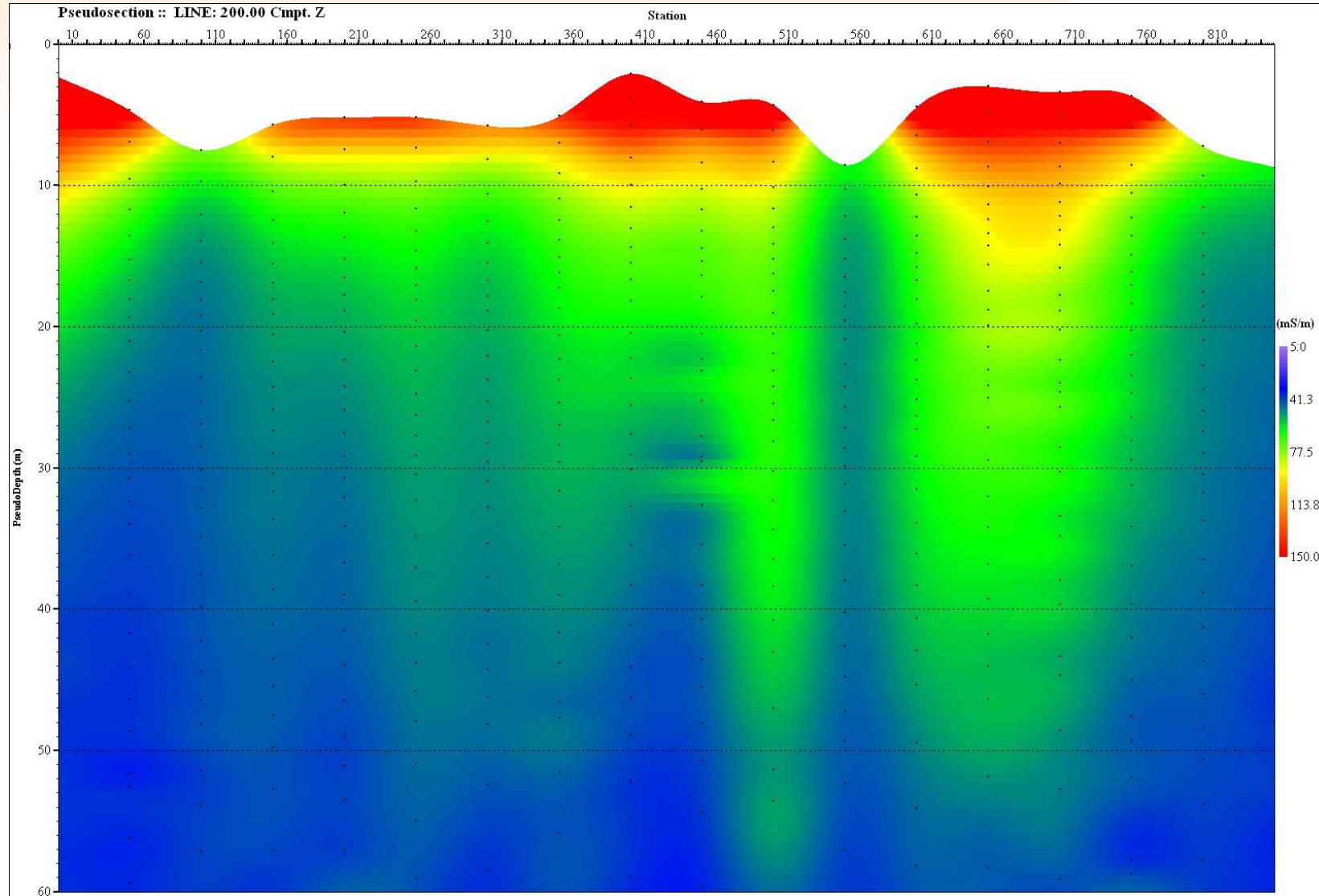








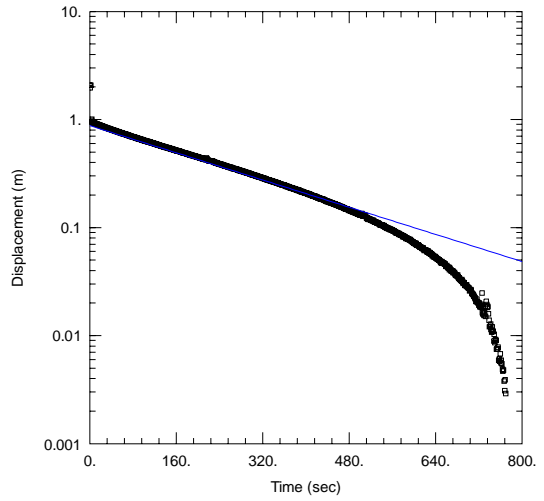
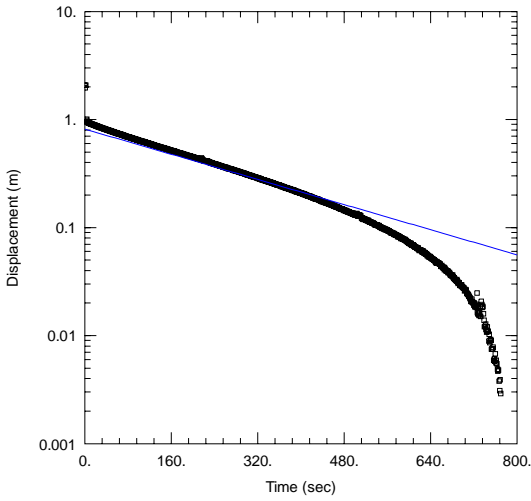




Appendix C

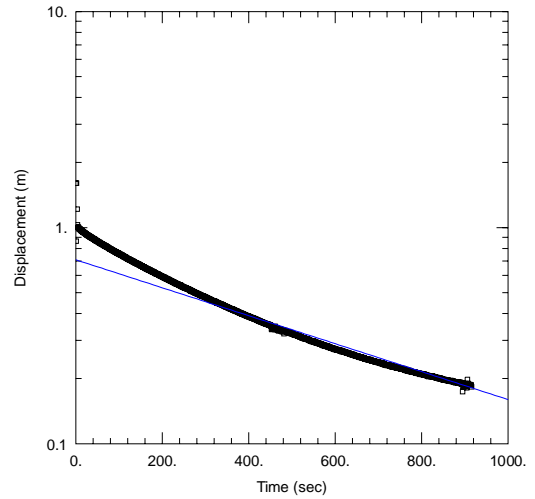
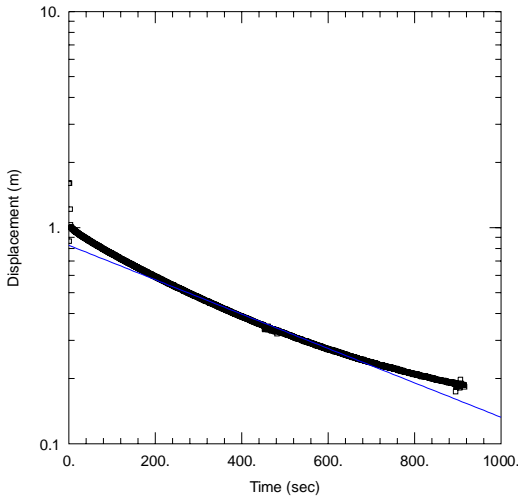
Slug test worksheets





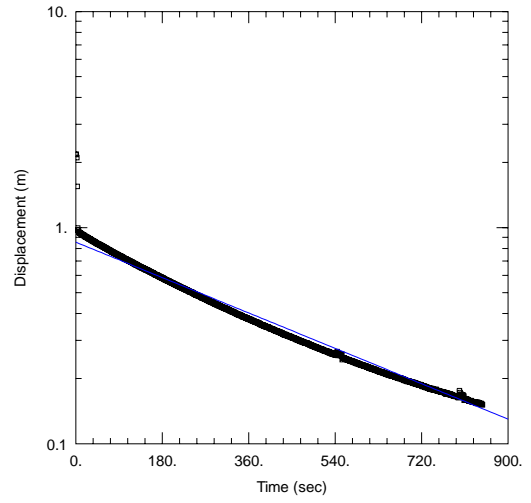
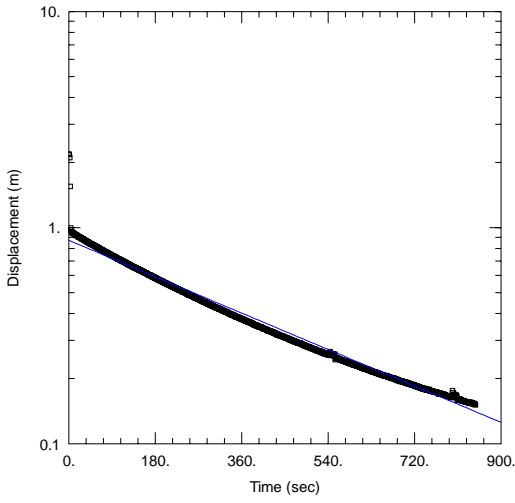
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Date: 11/29/11	
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Company: Parsons Brinckerhoff	
Client: AGL Energy Ltd	
Project: 2162406B	
Location: Tiedeman	
Test Well: TTMB01_Falling_A	
Test Date: 15/11/11	
AQUIFER DATA	
Saturated Thickness: 24. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 2.07 m	Static Water Column Height: 89.33 m
Total Well Penetration Depth: 87.33 m	Screen Length: 12. m
Casing Radius: 0.025 m	Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 0.003095 m/day	y0 = 0.8151 m

WELL TEST ANALYSIS	
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Date: 11/29/11	
PROJECT INFORMATION	
Company: Parsons Brinckerhoff	
Client: AGL Energy Ltd	
Project: 2162406B	
Location: Tiedeman	
Test Well: TTMB01_Falling_A	
Test Date: 15/11/11	
AQUIFER DATA	
Saturated Thickness: 24. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 2.07 m	Static Water Column Height: 89.33 m
Total Well Penetration Depth: 87.33 m	Screen Length: 12. m
Casing Radius: 0.025 m	Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined	Solution Method: Hvorslev
K = 0.003729 m/day	y0 = 0.8781 m



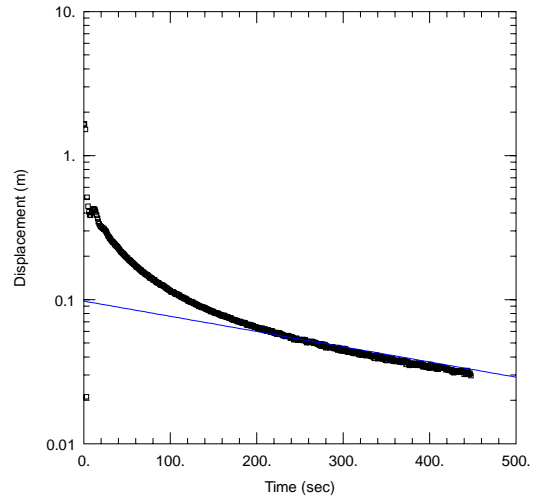
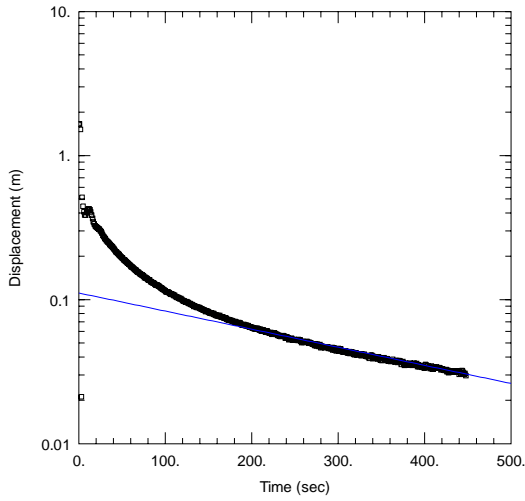
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Data Set: __TTMB01b.agt	Time: 13:22:50
Date: 11/29/11	
PROJECT INFORMATION	
Company: Parsons Brinckerhoff	
Client: AGL Energy Ltd	
Location: Tiedeman	
Test Well: TTMB01_Rising	
Test Date: 15/11/11	
AQUIFER DATA	
Saturated Thickness: 24. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 1.606 m	Static Water Column Height: 89.33 m
Total Well Penetration Depth: 87.33 m	Screen Length: 12. m
Casing Radius: 0.025 m	Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 0.001692 m/day	y0 = 0.8275 m

WELL TEST ANALYSIS	
Data Set: __TTMB01b.agt	Time: 13:22:32
Date: 11/29/11	
PROJECT INFORMATION	
Company: Parsons Brinckerhoff	
Client: AGL Energy Ltd	
Location: Tiedeman	
Test Well: TTMB01_Rising	
Test Date: 15/11/11	
AQUIFER DATA	
Saturated Thickness: 24. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 1.606 m	Static Water Column Height: 89.33 m
Total Well Penetration Depth: 87.33 m	Screen Length: 12. m
Casing Radius: 0.025 m	Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined	Solution Method: Hvorslev
K = 0.001534 m/day	y0 = 0.7093 m



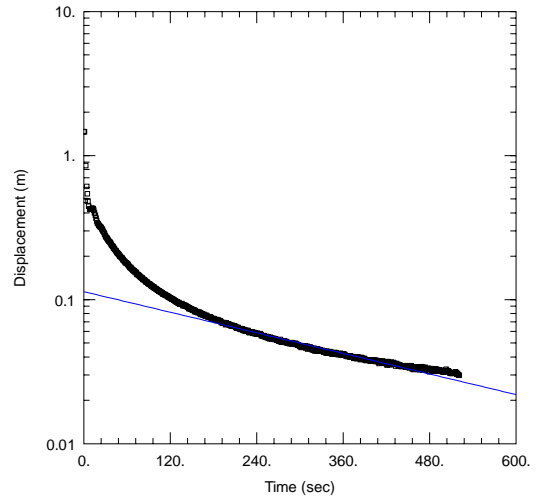
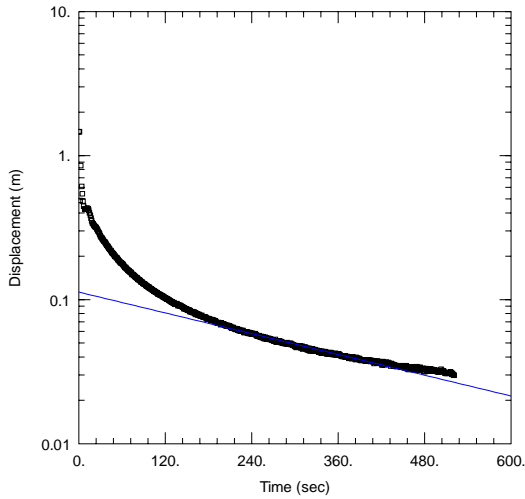
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Date: 11/29/11	
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Company: Parsons Brinckerhoff	
Client: AGL Energy Ltd	
Location: Tiedeman	
Test Well: TTMB01_Falling_B	
Test Date: 15/11/11	
AQUIFER DATA	
Saturated Thickness: 24. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 2.18 m	Static Water Column Height: 89.33 m
Total Well Penetration Depth: 87.33 m	Screen Length: 12. m
Casing Radius: 0.025 m	Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 0.001992 m/day	y0 = 0.8736 m

WELL TEST ANALYSIS	
Data Set: __TTMB01c.aqt	Time: 13:23:43
Date: 11/29/11	
PROJECT INFORMATION	
Company: Parsons Brinckerhoff	
Client: AGL Energy Ltd	
Location: Tiedeman	
Test Well: TTMB01_Falling_B	
Test Date: 15/11/11	
AQUIFER DATA	
Saturated Thickness: 24. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 2.18 m	Static Water Column Height: 89.33 m
Total Well Penetration Depth: 87.33 m	Screen Length: 12. m
Casing Radius: 0.025 m	Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined	Solution Method: Hvorslev
K = 0.002157 m/day	y0 = 0.8558 m



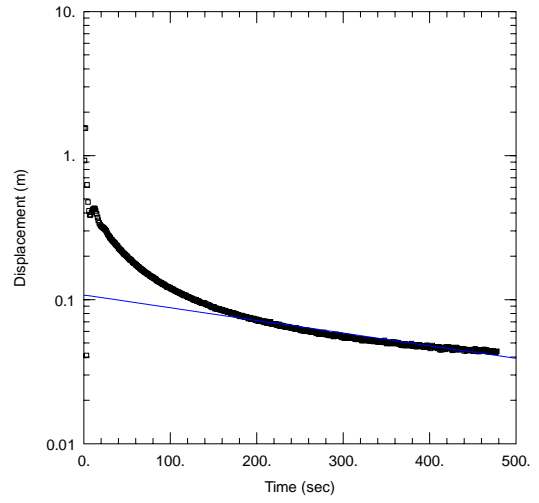
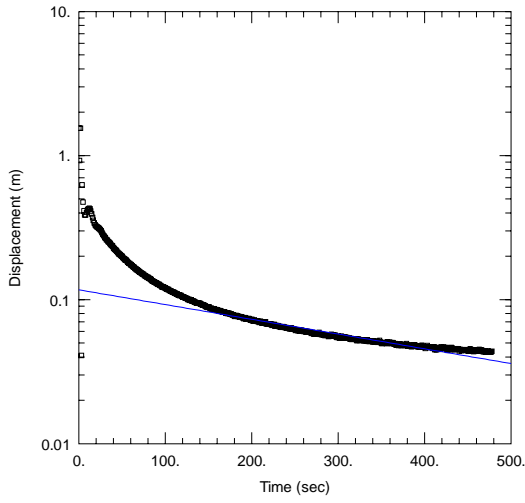
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Data Set: __TTMB02a.agt Date: 11/29/11	Time: 13:42:20
PROJECT INFORMATION	
Company: Parsons Brinckerhoff Client: AGL Energy Ltd Location: Tiedeman Test Well: TTMB02_Falling_A Test Date: 16/11/11	
AQUIFER DATA	
Saturated Thickness: 24. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 1.653 m Total Well Penetration Depth: 86.93 m Casing Radius: 0.025 m	Static Water Column Height: 88.93 m Screen Length: 12. m Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined K = 0.00267 m/day	Solution Method: Bouwer-Rice y0 = 0.1111 m

WELL TEST ANALYSIS	
Data Set: __TTMB02a.agt Date: 11/29/11	Time: 13:42:48
PROJECT INFORMATION	
Company: Parsons Brinckerhoff Client: AGL Energy Ltd Location: Tiedeman Test Well: TTMB02_Falling_A Test Date: 16/11/11	
AQUIFER DATA	
Saturated Thickness: 24. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 1.653 m Total Well Penetration Depth: 86.93 m Casing Radius: 0.025 m	Static Water Column Height: 88.93 m Screen Length: 12. m Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined K = 0.002504 m/day	Solution Method: Hvorslev y0 = 0.09762 m



WELL TEST ANALYSIS	
Data Set: __TTMB02b.agt Date: 11/29/11	Time: 13:25:36
PROJECT INFORMATION	
Company: Parsons Brinckerhoff Client: AGL Energy Ltd Location: Tiedeman Test Well: TTMB02_Rising Test Date: 16/11/11	
AQUIFER DATA	
Saturated Thickness: 24. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 1.465 m Total Well Penetration Depth: 86.93 m Casing Radius: 0.025 m	Static Water Column Height: 88.93 m Screen Length: 12. m Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined K = 0.002554 m/day	Solution Method: Bouwer-Rice y0 = 0.1126 m

WELL TEST ANALYSIS	
Data Set: __TTMB02b.agt Date: 11/29/11	Time: 13:25:17
PROJECT INFORMATION	
Company: Parsons Brinckerhoff Client: AGL Energy Ltd Location: Tiedeman Test Well: TTMB02_Rising Test Date: 16/11/11	
AQUIFER DATA	
Saturated Thickness: 24. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 1.465 m Total Well Penetration Depth: 86.93 m Casing Radius: 0.025 m	Static Water Column Height: 88.93 m Screen Length: 12. m Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined K = 0.002823 m/day	Solution Method: Hvorslev y0 = 0.1135 m



WELL TEST ANALYSIS

Data Set: __TTMB02c.aqt
 Date: 11/29/11 Time: 13:26:34

PROJECT INFORMATION

Company: Parsons Brinckerhoff
 Client: AGL Energy Ltd
 Location: Tiedeman
 Test Well: TTMB02_Falling_B
 Test Date: 16/11/11

AQUIFER DATA

Saturated Thickness: 24. m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 1.552 m Static Water Column Height: 88.93 m
 Total Well Penetration Depth: 86.93 m Screen Length: 12. m
 Casing Radius: 0.025 m Well Radius: 0.07 m

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice
 K = 0.002176 m/day y0 = 0.1169 m

WELL TEST ANALYSIS

Data Set: __TTMB02c.aqt
 Date: 11/29/11 Time: 13:26:15

PROJECT INFORMATION

Company: Parsons Brinckerhoff
 Client: AGL Energy Ltd
 Location: Tiedeman
 Test Well: TTMB02_Falling_B
 Test Date: 16/11/11

AQUIFER DATA

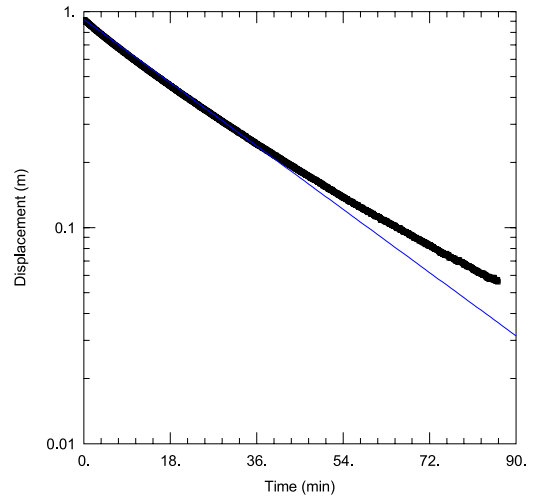
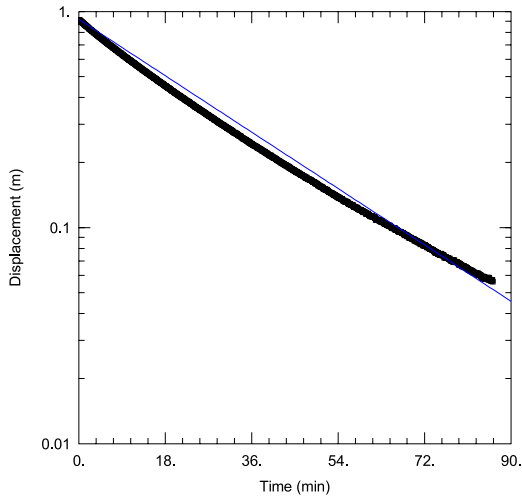
Saturated Thickness: 24. m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 1.552 m Static Water Column Height: 88.93 m
 Total Well Penetration Depth: 86.93 m Screen Length: 12. m
 Casing Radius: 0.025 m Well Radius: 0.07 m

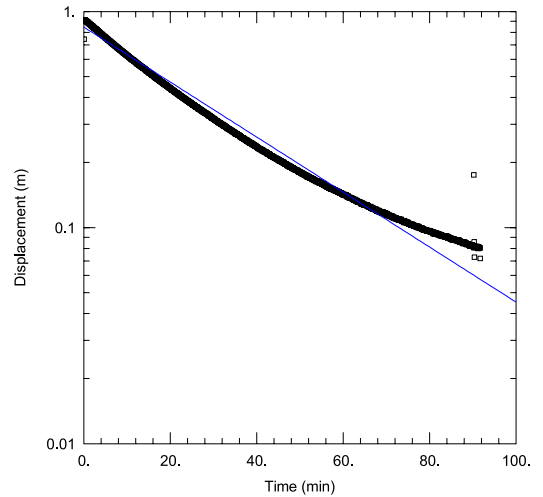
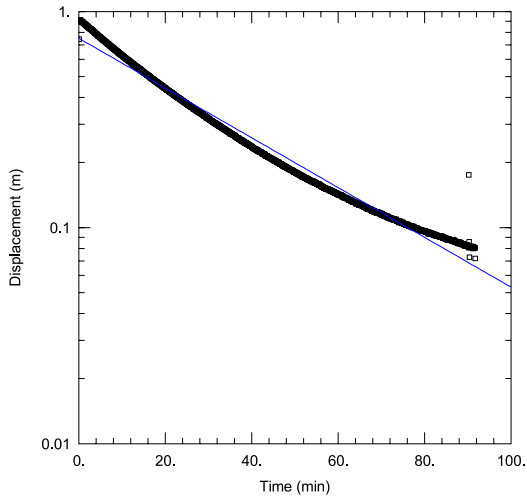
SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev
 K = 0.002083 m/day y0 = 0.1074 m



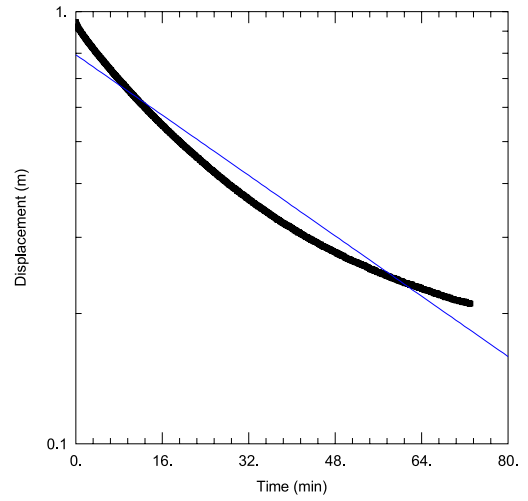
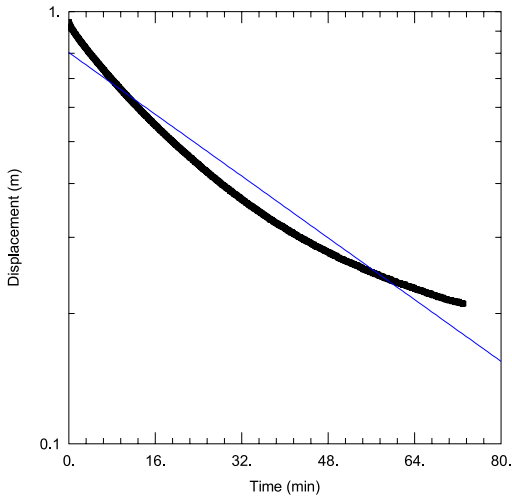
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Date: 06/29/12	
PROJECT INFORMATION	
Company: Parsons Brinckerhoff	
Client: AGL Energy Ltd	
Project: 2162406B	
Location: Tiedman	
Test Well: TTMB03 Falling_B	
Test Date: 16/5/12	
AQUIFER DATA	
Saturated Thickness: 20. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 0.9141 m	Static Water Column Height: 194.5 m
Total Well Penetration Depth: 194.5 m	Screen Length: 20. m
Casing Radius: 0.025 m	Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 0.004468 m/day	y0 = 0.9204 m

WELL TEST ANALYSIS	
Data Set: _\Falling_B.aqt	Time: 15:11:35
Date: 06/29/12	
PROJECT INFORMATION	
Company: Parsons Brinckerhoff	
Client: AGL Energy Ltd	
Project: 2162406B	
Location: Tiedman	
Test Well: TTMB03 Falling_B	
Test Date: 16/5/12	
AQUIFER DATA	
Saturated Thickness: 20. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 0.9141 m	Static Water Column Height: 194.5 m
Total Well Penetration Depth: 194.5 m	Screen Length: 20. m
Casing Radius: 0.025 m	Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined	Solution Method: Hvorslev
K = 0.004468 m/day	y0 = 0.9204 m



WELL TEST ANALYSIS	
Data Set:	Time: 15:29:32
Date: 06/29/12	
PROJECT INFORMATION	
Company: Parsons Brinckerhoff	
Client: AGL Energy Ltd	
Project: 2162406B	
Location: Tiedman	
Test Well: TTMB03 Falling_C	
Test Date: 23/5/12	
AQUIFER DATA	
Saturated Thickness: 20. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 0.9108 m	Static Water Column Height: 194.5 m
Total Well Penetration Depth: 194.5 m	Screen Length: 20. m
Casing Radius: 0.025 m	Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined	Solution Method: Bouwer-Rice
K = 0.003549 m/day	y0 = 0.752 m

WELL TEST ANALYSIS	
Data Set:	Time: 15:30:12
Date: 06/29/12	
PROJECT INFORMATION	
Company: Parsons Brinckerhoff	
Client: AGL Energy Ltd	
Project: 2162406B	
Location: Tiedman	
Test Well: TTMB03 Falling_C	
Test Date: 23/5/12	
AQUIFER DATA	
Saturated Thickness: 20. m	Anisotropy Ratio (Kz/Kr): 1.
WELL DATA (New Well)	
Initial Displacement: 0.9108 m	Static Water Column Height: 194.5 m
Total Well Penetration Depth: 194.5 m	Screen Length: 20. m
Casing Radius: 0.025 m	Well Radius: 0.07 m
SOLUTION	
Aquifer Model: Confined	Solution Method: Hvorslev
K = 0.003494 m/day	y0 = 0.8475 m



WELL TEST ANALYSIS

Data Set: _\Rising.aqt
 Date: 06/29/12 Time: 15:20:31

PROJECT INFORMATION

Company: Parsons Brinckerhoff
 Client: AGL Energy Ltd
 Project: 2162406B
 Location: Tiedman
 Test Well: TTMB03_Rising
 Test Date: 16/5/12

AQUIFER DATA

Saturated Thickness: 20. m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.9443 m Static Water Column Height: 194.5 m
 Total Well Penetration Depth: 194.5 m Screen Length: 20. m
 Casing Radius: 0.025 m Well Radius: 0.07 m

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev
 K = 0.002451 m/day $y_0 = 0.8035$ m

WELL TEST ANALYSIS

Data Set: _\Rising.aqt
 Date: 06/29/12 Time: 15:20:50

PROJECT INFORMATION

Company: Parsons Brinckerhoff
 Client: AGL Energy Ltd
 Project: 2162406B
 Location: Tiedman
 Test Well: TTMB03_Rising
 Test Date: 16/5/12

AQUIFER DATA

Saturated Thickness: 20. m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.9443 m Static Water Column Height: 194.5 m
 Total Well Penetration Depth: 194.5 m Screen Length: 20. m
 Casing Radius: 0.025 m Well Radius: 0.07 m

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice
 K = 0.002689 m/day $y_0 = 0.7943$ m

Appendix D

Groundwater bore hydrographs



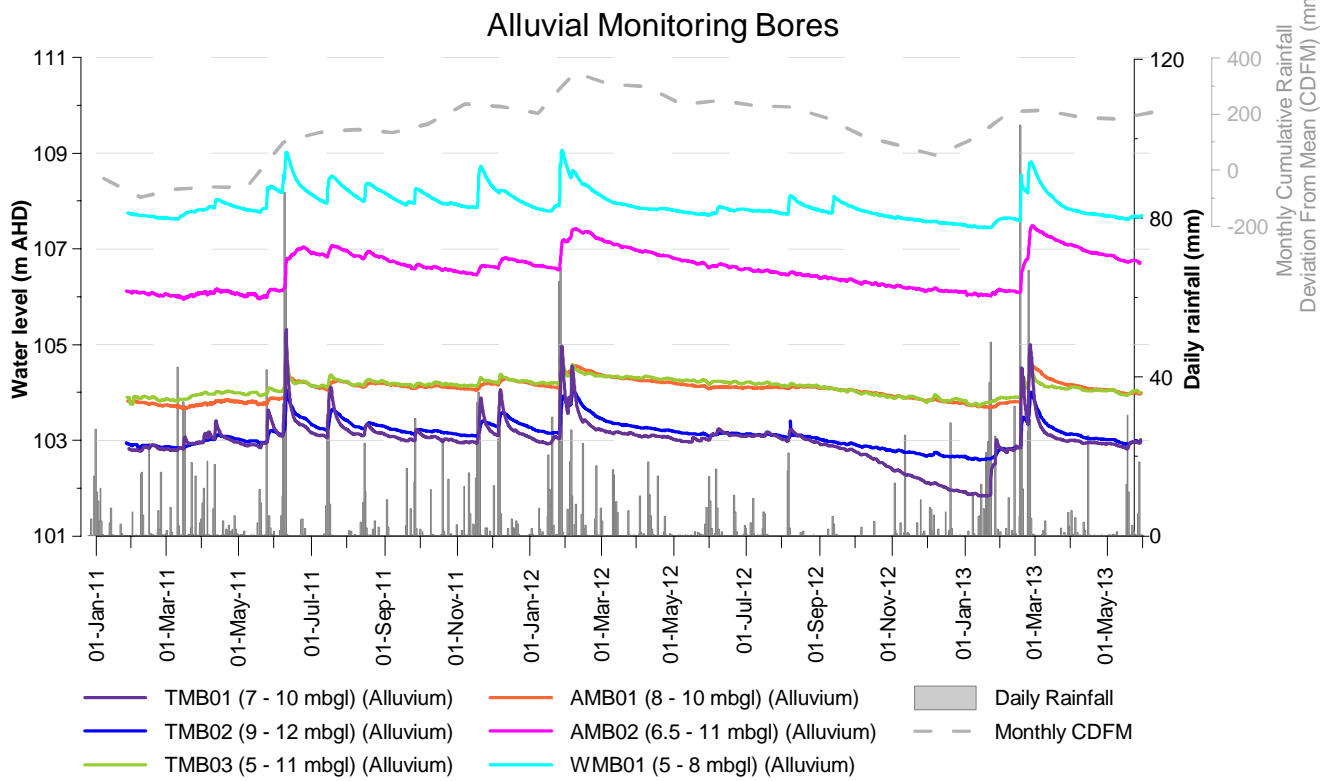


Figure X: Hydrographs

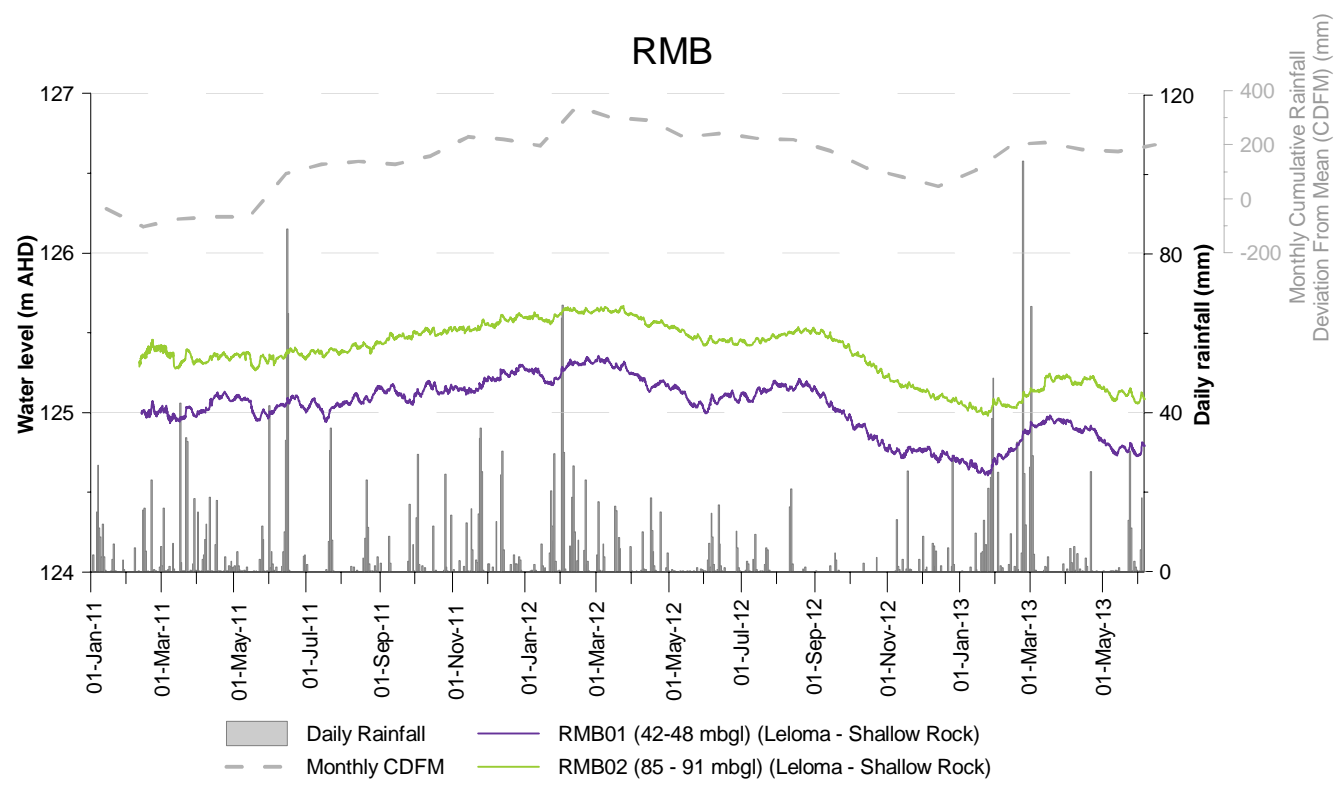
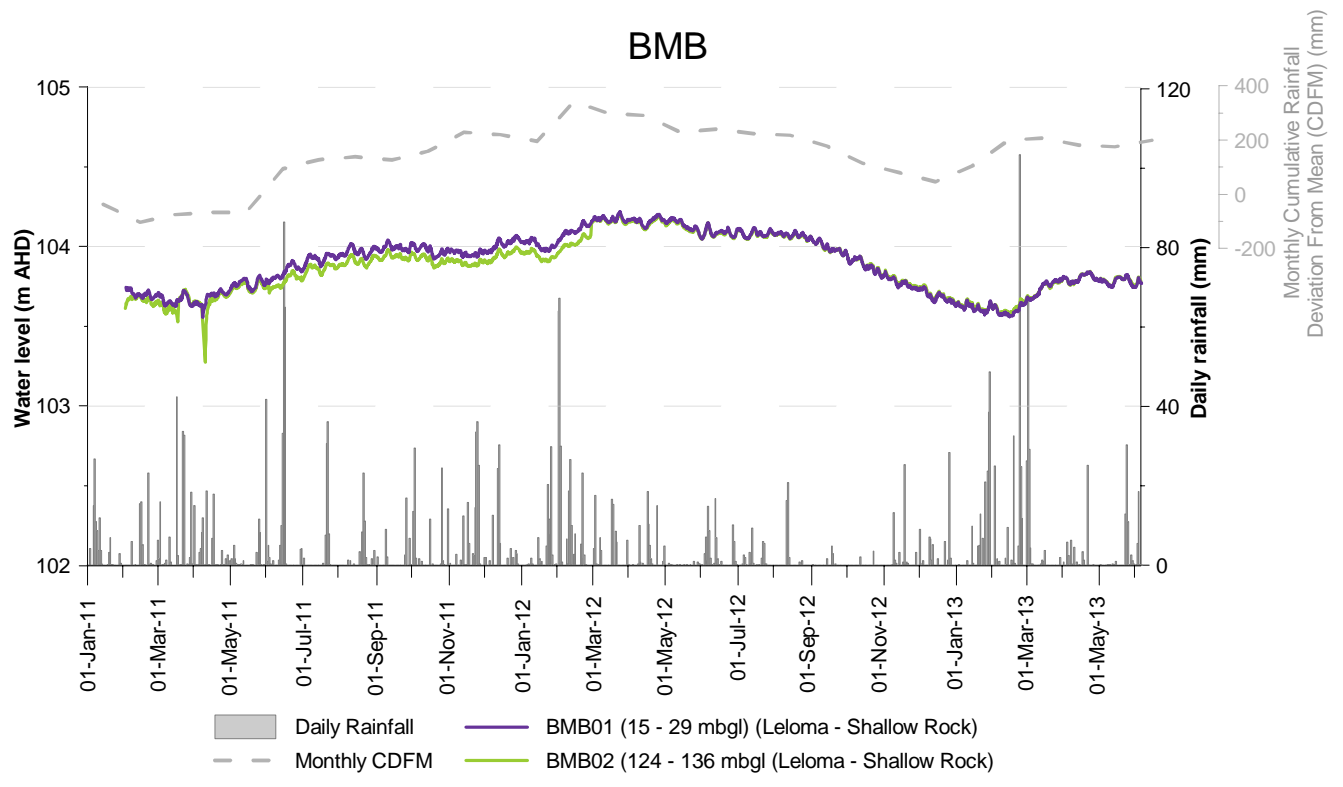


Figure X: Hydrographs

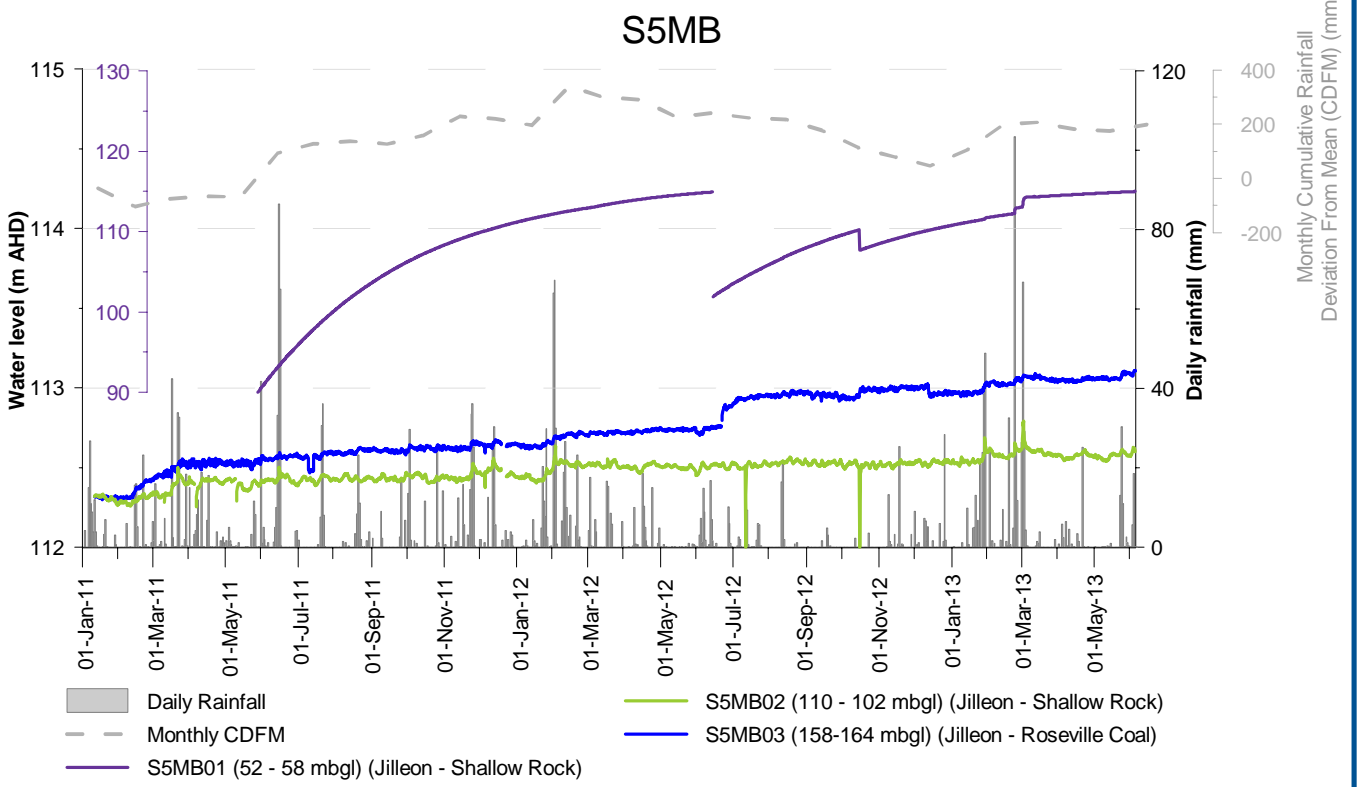
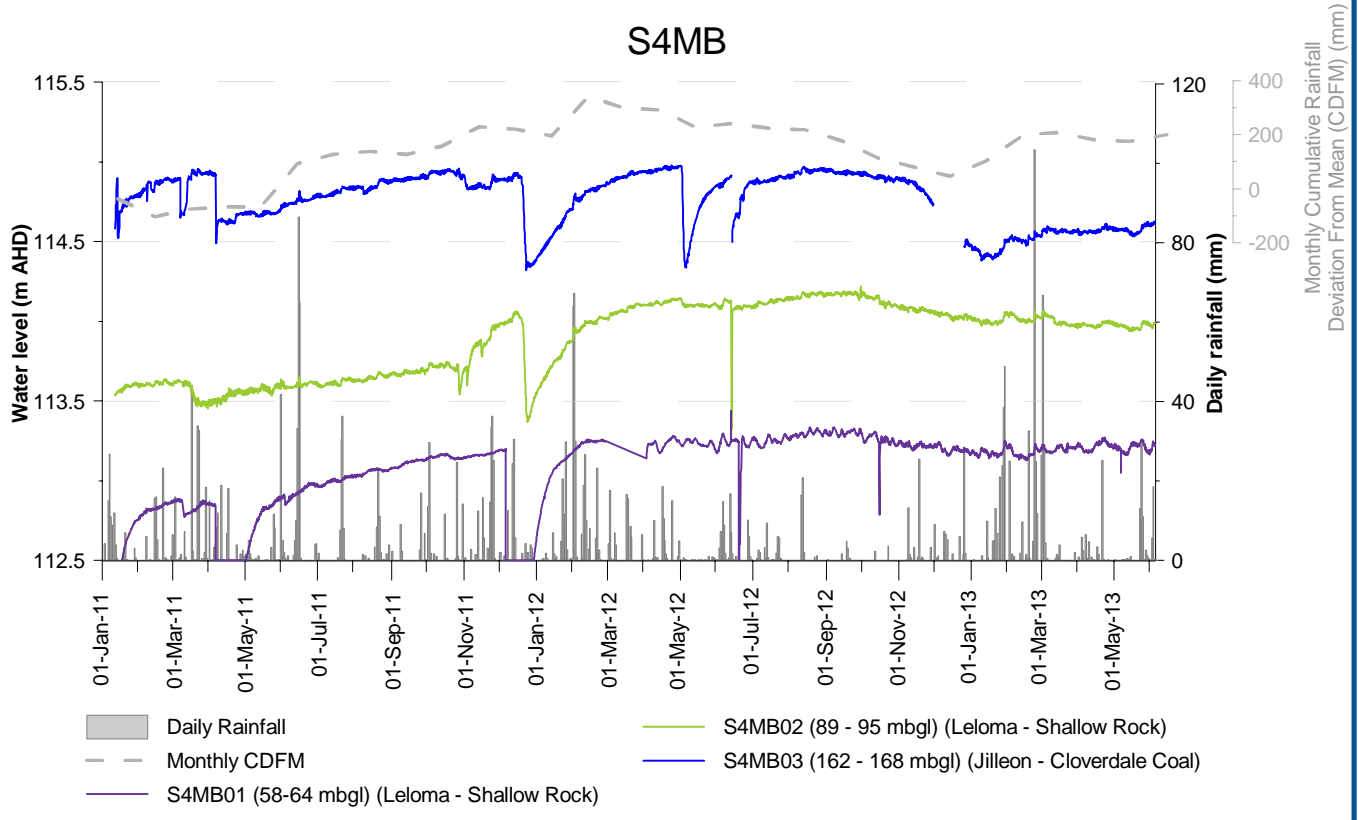


Figure X: Hydrographs

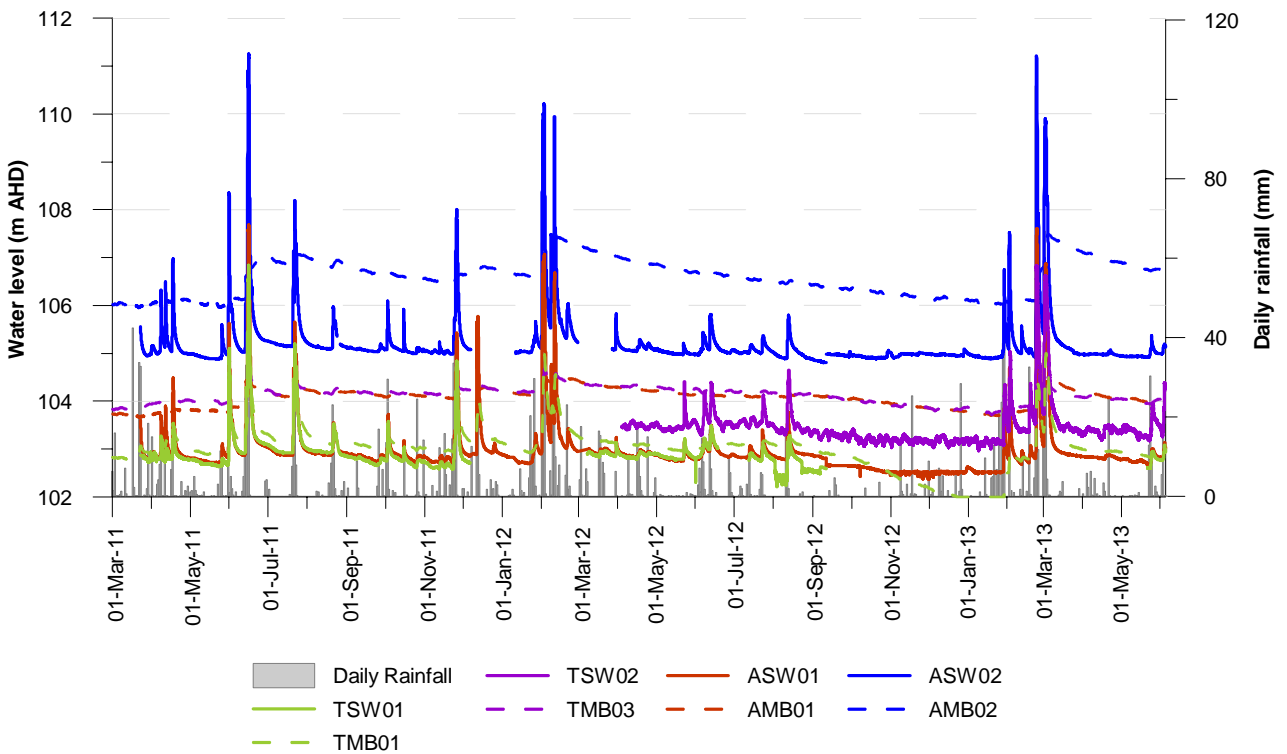
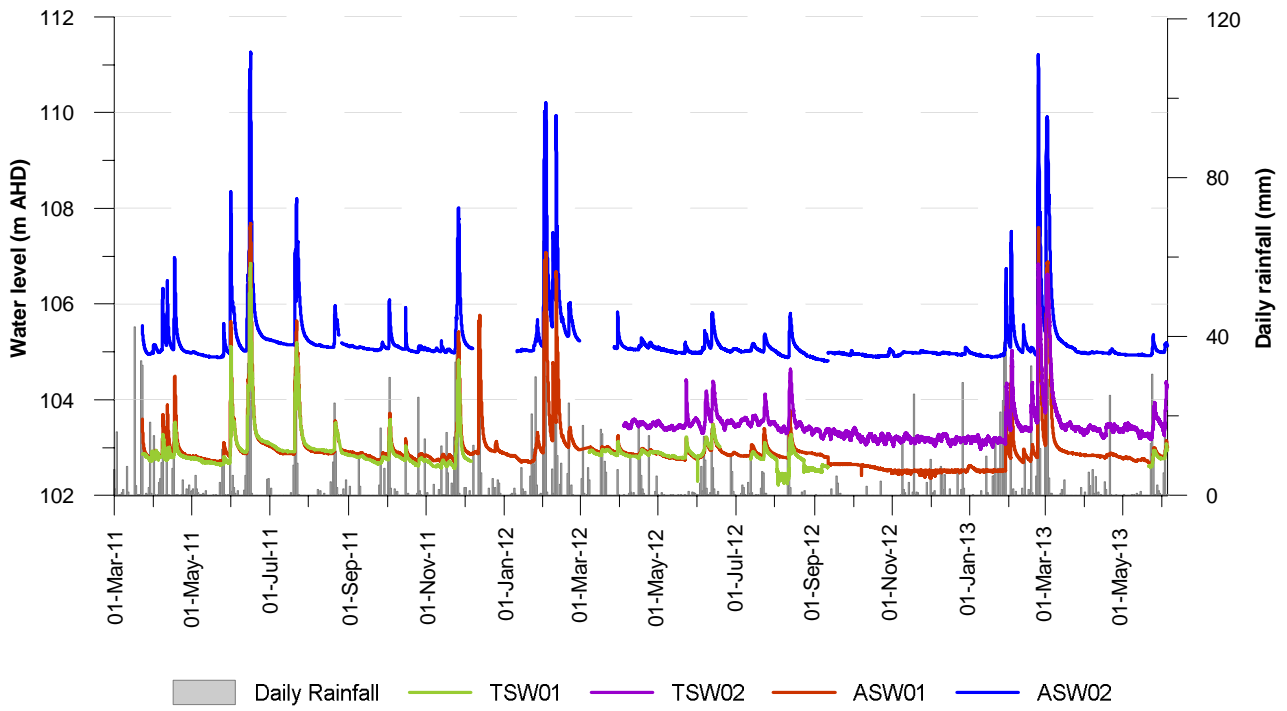


Figure X: Hydrographs

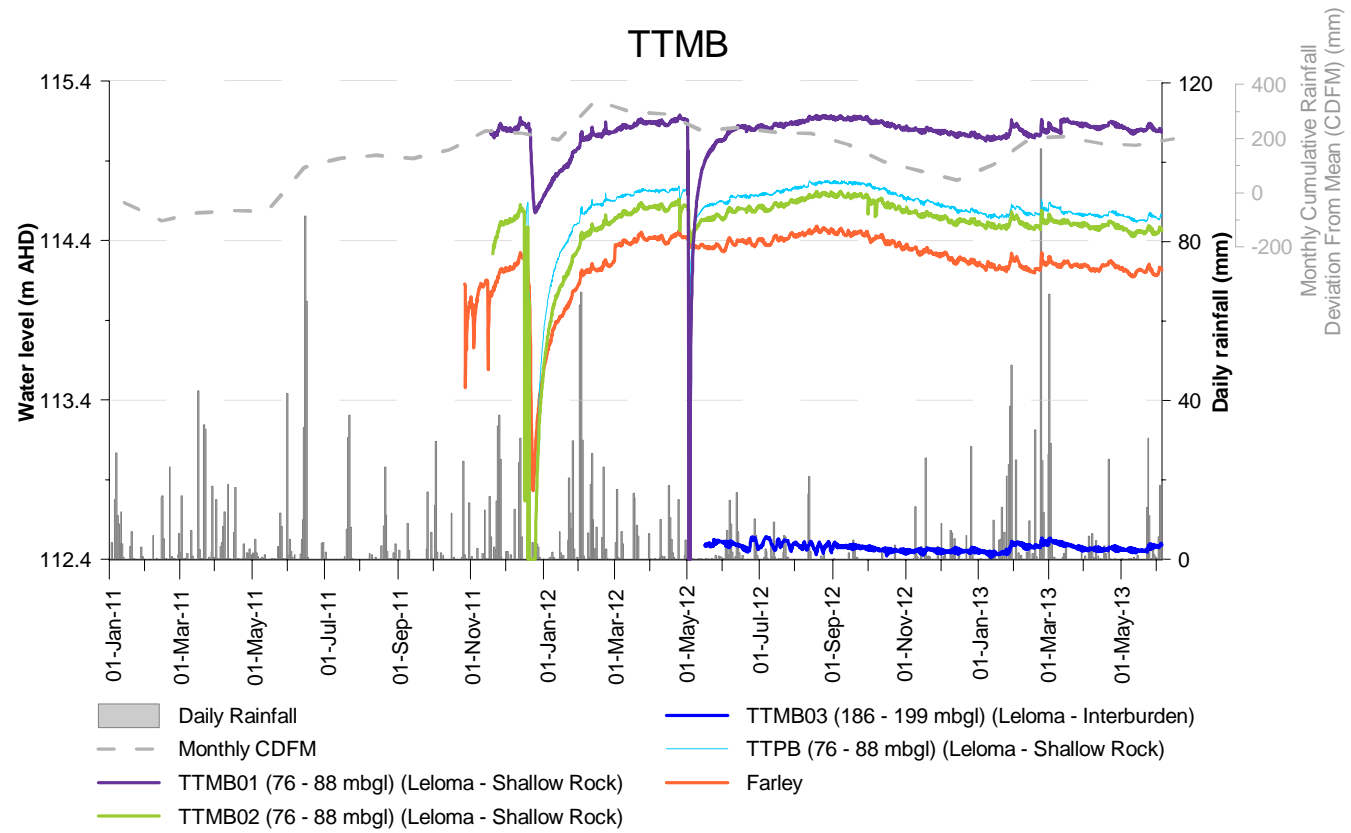
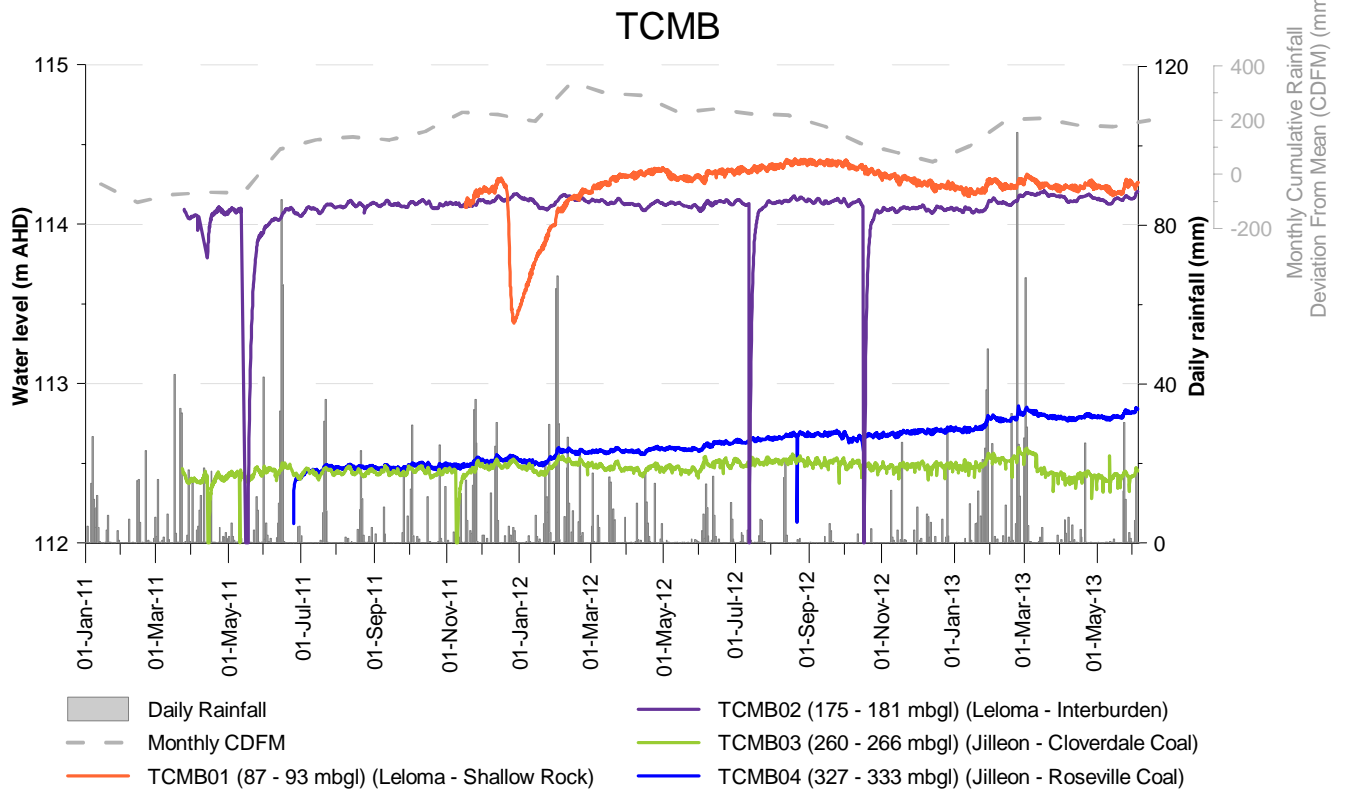


Figure X: Hydrographs

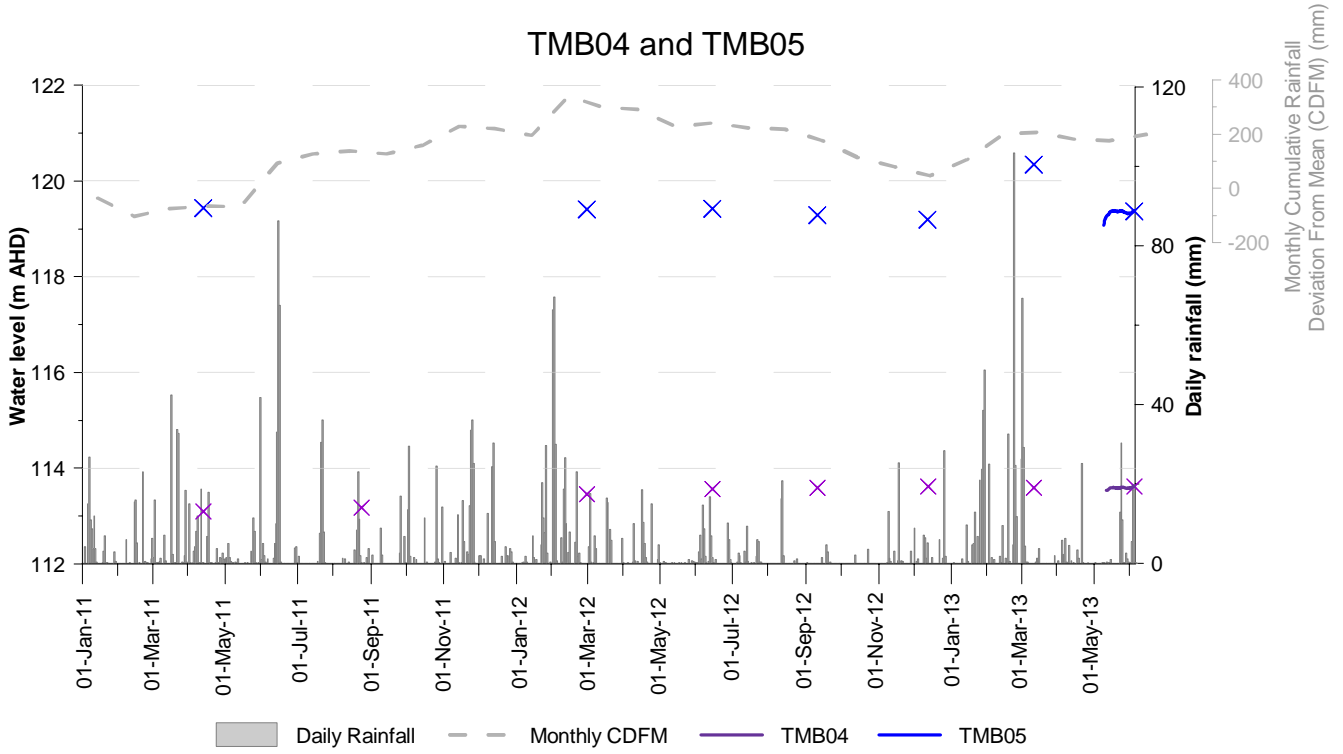


Figure X: Hydrographs

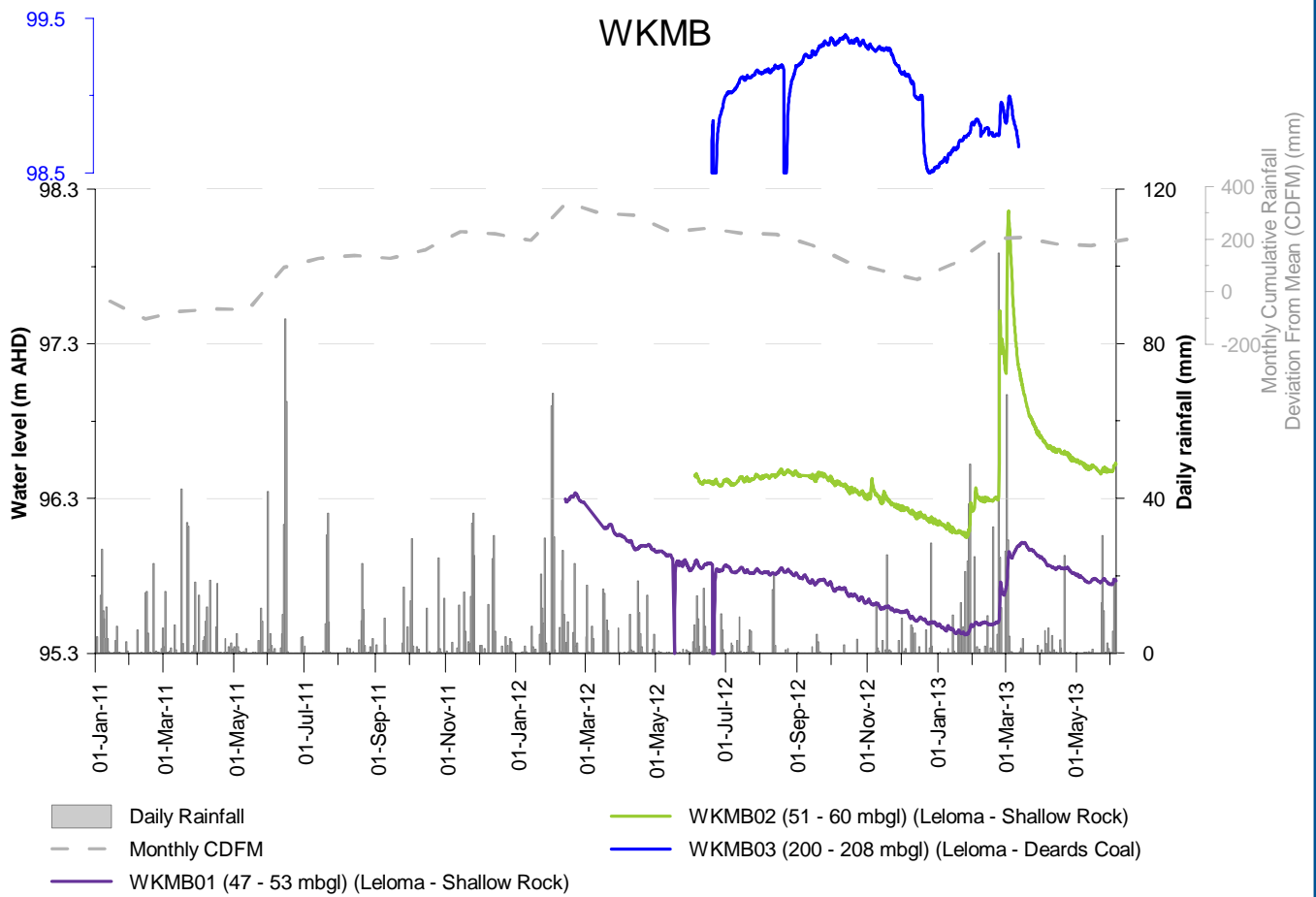
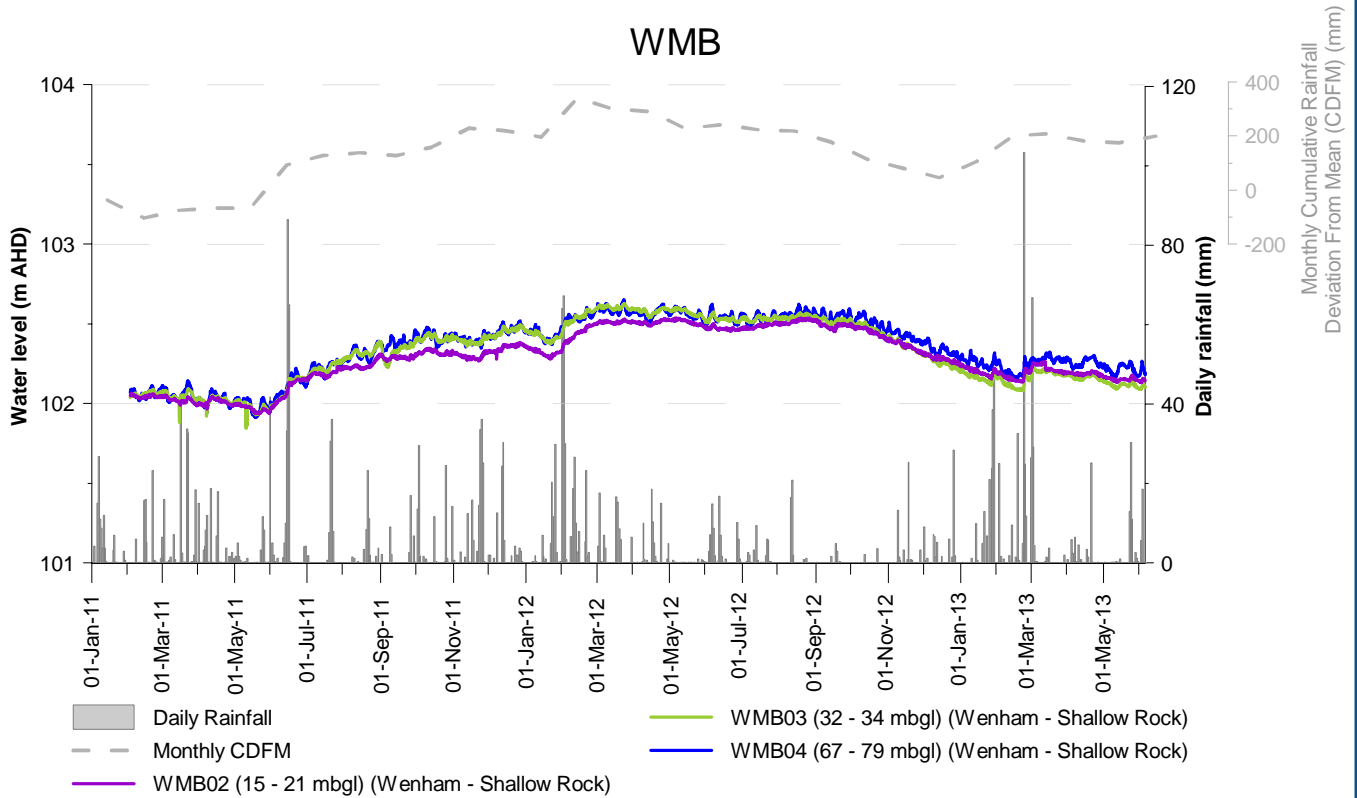


Figure X: Hydrographs

Appendix E

Water quality results summary table



Summary Table 1: Fault Testing water quality results - December 2011

Analyte	Units	LOR	ANZECC 2000 Guidelines	TTP	TTP
Sample date				19/12/2011	23/12/2011
Project area				Gloucester	Gloucester
Lithology				Siltstone/sandstone	Siltstone/sandstone
Formation				Leloma Formation	Leloma Formation
Screen Depth				76-88	76-88
Aquifer				Fault zone/shallow rock	Fault zone/shallow rock
General Parameters					
Field measured conductivity	µS/cm	0.1	125-2200*	2459	2465
pH		0.01	6.5-8*	6.62	6.4
Dissolved Oxygen	% sat	0.1	85-110 %* saturation	1.85 (ppm)	28.7
Temperature	°C	0.1	-	23.73	20.75
Redox	mV	1	-	-97.6	-49.9
Total Dissolved Solids	g/L	1	-	1598	1602
Laboratory Analytes					
Laboratory measured conductivity	µS/cm	1	125 - 2200*	2460	2190
Hydroxide Alkalinity as CaCO3	mg/L	1	-	<1	<1
Carbonate Alkalinity as CaCO3	mg/L	1	-	<1	<1
Bicarbonate Alkalinity as CaCO3	mg/L	1	-	564	329
Total Alkalinity as CaCO3	mg/L	1	-	564	329
Sulfate as SO4 2-	mg/L	1	-	20	30
Chloride	mg/L	1	-	640	688
Calcium	mg/L	1	-	162	148
Magnesium	mg/L	1	-	52	52
Sodium	mg/L	1	-	340	320
Potassium	mg/L	1	-	5	5
Silica	mg/L	0.1	-	32.8	35.1
Ions					
Total Anions	meq/L	0.01	-	29.7	26.6
Total Cations	meq/L	0.01	-	27.3	25.7
Ionic Balance	%	0.01	-	4.31	1.7
Dissolved Metals					
Aluminium	mg/L	0.01	0.055	<0.01	<0.01
Arsenic	mg/L	0.001	0.013 (As V)	<0.001	<0.001
Beryllium	mg/L	0.001	ID	<0.001	<0.001
Barium	mg/L	0.001	-	2.29	2.25
Cadmium	mg/L	0.0001	0.0002	<0.0001	<0.0001
Cobalt	mg/L	0.001	ID	<0.001	<0.001
Copper	mg/L	0.001	0.0014	0.002	<0.001
Lead	mg/L	0.001	0.0034	<0.001	<0.001
Manganese	mg/L	0.001	1.9	0.191	0.137
Molybdenum	mg/L	0.001	ID	<0.001	<0.001
Nickel	mg/L	0.001	0.011	0.002	<0.001
Selenium	mg/L	0.01	0.011 (total)	<0.01	<0.01
Strontium	mg/L	0.001	-	3.1	2.98
Uranium	mg/L	0.001	ID	<0.001	<0.001
Vanadium	mg/L	0.01	ID	<0.01	<0.01
Zinc	mg/L	0.005	0.008	0.056	0.041
Boron	mg/L	0.05	0.37	<0.05	<0.05
Iron	mg/L	0.05	ID	9.42	3.4
Bromine	mg/L	0.1	ID	0.8	0.7
Nutrients					
Ammonia as N	mg/L	0.01	0.02*	0.69	1.44
Nitrite as N	mg/L	0.01	-	<0.01	<0.01
Nitrate as N	mg/L	0.01	0.7	0.01	<0.01
Nitrite + Nitrate as N	mg/L	0.01	0.04*	0.01	<0.01
Total Phosphorous	mg/L	0.01	0.05*	0.34	0.38
Reactive Phosphorous	mg/L	0.01	0.02*	<0.01	<0.01
Total Organic Carbon	mg/L	1	-	3	5
Dissolved Gases					
Methane	µg/L	10	-	1210	972
Phenolic compounds					
Phenol	µg/L	1	320	<1	<1
2-Chlorophenol	µg/L	1	490	<1	<1
2-Methylphenol	µg/L	1	-	<1	<1
3,4-Methylphenol	µg/L	2	-	<2	<2
2-Nitrophenol	µg/L	1	ID	<1	<1
2,4-Dimethylphenol	µg/L	1	ID	<1	<1
2,4-Dichlorophenol	µg/L	1	160	<1	<1
2,6-Dichlorophenol	µg/L	1	ID	<1	<1
4-Chloro-3-Methylphenol	µg/L	1	-	<1	<1
2,4,6-Trichlorophenol	µg/L	1	20	<1	<1
2,4,5-Trichlorophenol	µg/L	1	ID	<1	<1
Pentachlorophenol	µg/L	2	ID	<2	<2
Polycyclic aromatic hydrocarbons					
Naphthalene	µg/L	1	16	<1	<1
Acenaphthylene	µg/L	1	-	<1	<1
Acenaphthene	µg/L	1	-	<1	<1
Fluorene	µg/L	1	-	<1	<1
Phenanthrene	µg/L	1	ID	<1	<1
Anthracene	µg/L	1	ID	<1	<1
Fluoranthene	µg/L	1	ID	<1	<1
Pyrene	µg/L	1	-	<1	<1
Benz(a)anthracene	µg/L	1	-	<1	<1
Chrysene	µg/L	1	-	<1	<1
Benzo(b)fluoranthene	µg/L	1	-	<1	<1
Benzo(k)fluoranthene	µg/L	1	-	<1	<1
Benzo(a)pyrene	µg/L	0.5	ID	<0.5	<0.5
Indeno(1,2,3-cd)pyrene	µg/L	1	-	<1	<1
Dibenz(a,h)anthracene	µg/L	1	-	<1	<1
Benzo(g,h,i)perylene	µg/L	1	-	<0.5	<0.5
Total petroleum hydrocarbons					
C6-C9 Fraction	µg/L	20	ID	<20	<20
C10-C14 Fraction	µg/L	50	ID	<50	<50
C15-C28 Fraction	µg/L	100	ID	<100	<100
C29-C36 Fraction	µg/L	50	ID	<50	<50
C10-C36 Fraction (sum)	µg/L	50	-	<50	<50
Total Recoverable Hydrocarbons					
C6-C9 Fraction				<20	<20
C6-C9 Fraction minus BTEX				<20	<20
C10-C16 Fraction				<100	<100
C16-C34 Fraction				<100	<100
C34-C40 Fraction				<100	<100
C10-C40 Fraction (sum)				<100	<100
Aromatic Hydrocarbons					
Benzene	µg/L	1	950	<1	<1
Toluene	µg/L	2	ID	8	<5
Ethyl Benzene	µg/L	2	ID	<2	<2
m&p-Xylenes	µg/L	2	ID	<2	<2
p-Xylenes	µg/L	2	350	<2	<2
Total xylenes	µg/L	2	-	<2	<2
Sum of BTEX	µg/L	1	-	8	<1
Naphthalene	µg/L	5	-	<5	<5
Isotopes					
Oxygen-18	‰	0.01	-	-4.89	-4.93
Deuterium	‰	0.1	-	-26.95	-26.39
Carbon-13	‰	0.1	-	-19	-18.3
Radiocarbon	pMC	0.1	-	1.16±0.05	2.3±0.05
Radiocarbon Age (uncorrected)	yrs BP	1	-	35750±370	30230±190
Tridium	TU	0.01	-		

exceeds guideline limits ID - Insufficient data

Guideline values

ANZECC 2000 - Water Quality Guidelines: 95% protection levels (trigger values) for the protection of freshwater aquatic ecosystems.

* ANZECC 2000 - Water Quality Guidelines: 95% protection levels (trigger values) for the protection of freshwater aquatic ecosystems, South-East Australia, low lying river ecosystems

^ This result is below the Minimum Detectable Activity (MDA) and Limit of Quantification (Quant Limit) and therefore has an unacceptable level of uncertainty. Hence the data should only be used as an indicator of true concentration.

Summary Table 4: Stratfird 4 Water Quality during flow testing

Analyte	Units	LOR	ANZECC 2000 Guidelines	S4	S4	S4
Sample date				17/09/2012	26/09/2012	8/10/2012
Project area				Gloucester	Gloucester	Gloucester
Hydrostratigraphic unit				Coal	Coal	Coal
Field parameters						
Temperature	°C	0.1	-	17.93	22.85	23.38
Conductivity	µS/cm	1	125 - 2200*	8397	9017	8323
Dissolved Oxygen	% sat	0.1	85-110 %* saturation	48.4	51.9	25.87
Dissolved Oxygen	mg/L	0.01	-	4.39	4.32	2.14
pH	pH units	0.01	6.5-8*	6.97	7.45	7.4
TDS	mg/L	1	-	-	5487	5412
Redox	mV	0.1	-	-120.9	-71	-86.8
Laboratory water quality parameters						
pH	pH units	0.01	6.5-8*	7.96	8.05	8.2
Conductivity	µS/cm	1	125 - 2200*	8620	8990	9470
Total Dissolved Solids	mg/L	1	-	5650	6280	5460
Cations / anions						
Hydroxide Alkalinity as CaCO3	mg/L	1	-	<1	<1	<1
Carbonate Alkalinity as CaCO3	mg/L	1	-	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	mg/L	1	-	4970	5240	5120
Total Alkalinity as CaCO3	mg/L	1	-	4970	5240	5120
Sulfate as SO4 2-	mg/L	1	-	<1	<1	<10
Chloride	mg/L	1	-	612	565	577
Calcium	mg/L	1	-	19	20	24
Magnesium	mg/L	1	-	3	3	4
Sodium	mg/L	1	-	2430	2530	2470
Potassium	mg/L	1	-	42	34	29
Silica	mg/L	0.1	-	17.6	17.8	17.5
Fluoride	mg/L	0.1	-	1.1	1.1	1.2
Ions						
Total Anions	meq/L	0.01	-	116	121	118
Total Cations	meq/L	0.01	-	108	112	110
Ionic Balance	%	0.01	-	3.89	3.7	3.95
Dissolved Metals						
Aluminium	mg/L	0.01	0.055	0.02	<0.01	<0.1
Arsenic	mg/L	0.001	0.013 (As V)	0.004	0.001	<0.01
Beryllium	mg/L	0.001	ID	<0.001	<0.001	<0.01
Barium	mg/L	0.001	-	11.2	12.3	6.62
Cadmium	mg/L	0.0001	0.0002	<0.0001	<0.0001	<0.001
Cobalt	mg/L	0.001	ID	<0.001	0.001	<0.01
Copper	mg/L	0.001	0.0014	0.003	<0.001	<0.01
Lead	mg/L	0.001	0.0034	<0.001	<0.001	<0.01
Manganese	mg/L	0.001	1.9	0.063	0.113	0.071
Molybdenum	mg/L	0.001	ID	0.005	0.009	<0.01
Nickel	mg/L	0.001	0.011	0.001	0.002	<0.01
Selenium	mg/L	0.01	0.011 (total)	<0.01	<0.01	<0.1
Strontium	mg/L	0.001	-	5.29	8.07	4.3
Uranium	mg/L	0.001	ID	<0.001	<0.001	<0.01
Vanadium	mg/L	0.01	ID	<0.01	<0.01	<0.1
Zinc	mg/L	0.005	0.008	0.041	0.056	<0.05
Boron	mg/L	0.05	0.37	0.31	0.32	<0.5
Iron	mg/L	0.05	ID	0.64	0.96	0.51
Bromine	mg/L	0.1	ID	1.2	1.5	<1
Nutrients						
Ammonia as N	mg/L	0.01	-	3.6	3.03	3
Nitrite as N	mg/L	0.01	-	<0.01	<0.01	<0.1
Nitrate as N	mg/L	0.01	-	0.04	<0.01	<0.1
Nitrite + Nitrate as N	mg/L	0.01	-	0.04	<0.01	<0.1
Total Phosphorous	mg/L	0.01	-	0.49	0.33	0.02
Reactive Phosphorous	mg/L	0.01	-	0.06	<0.10	0.02
Total Organic Carbon	mg/L	1	-	<1	<1	5
Dissolved Gases						
Methane	µg/L	10	-	4110	12100	90
Ethane	µg/L	10	-	<10	<10	<10
Propane	µg/L	10	-	<10	<10	<10
Butane	µg/L	10	-	<10	<10	<10
Butene	µg/L	10	-	<10	<10	<10
Phenolic compounds						
Phenol	µg/L	1	320	<1.0	<1.0	<1.0
2-Chlorophenol	µg/L	1	490	<1.0	<1.0	<1.0
2-Methylphenol	µg/L	1	-	<1.0	<1.0	<1.0
3,4-Methylphenol	µg/L	2	-	<2.0	<2.0	<2.0
2-Nitrophenol	µg/L	1	ID	<1.0	<1.0	<1.0
2,4-Dimethylphenol	µg/L	1	ID	<1.0	<1.0	<1.0
2,4-Dichlorophenol	µg/L	1	160	<1.0	<1.0	<1.0
2,6-Dichlorophenol	µg/L	1	ID	<1.0	<1.0	<1.0
4-Chloro-3-Methylphenol	µg/L	1	-	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol	µg/L	1	20	<1.0	<1.0	<1.0
2,4,5-Trichlorophenol	µg/L	1	ID	<1.0	<1.0	<1.0
Pentachlorophenol	µg/L	2	ID	<2.0	<2.0	<2.0
Polycyclic aromatic hydrocarbons						
Naphthalene	µg/L	1	0.016	<1.0	<1.0	<1.0
Acenaphthylene	µg/L	1	-	<1.0	<1.0	<1.0
Acenaphthene	µg/L	1	-	<1.0	<1.0	<1.0
Fluorene	µg/L	1	-	<1.0	<1.0	<1.0
Phenanthrene	µg/L	1	ID	<1.0	<1.0	<1.0
Anthracene	µg/L	1	ID	<1.0	<1.0	<1.0
Fluoranthene	µg/L	1	ID	<1.0	<1.0	<1.0
Pyrene	µg/L	1	-	<1.0	<1.0	<1.0
Benzo(a)anthracene	µg/L	1	-	<1.0	<1.0	<1.0
Chrysene	µg/L	1	-	<1.0	<1.0	<1.0
Benzo(b)fluoranthene	µg/L	1	-	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	µg/L	1	-	<1.0	<1.0	<1.0
Benzo(a)pyrene	µg/L	0.5	ID	<0.5	<0.5	<0.5
Indeno(1,2,3-cd)pyrene	µg/L	1	-	<1.0	<1.0	<1.0
Dibenzo(a,h)anthracene	µg/L	1	-	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	µg/L	1	-	<0.5	<0.5	<0.5
Total petroleum hydrocarbons						
C6-C9 Fraction	µg/L	20	ID	<20	<20	<20
C10-C14 Fraction	µg/L	50	ID	<50	<50	<50
C15-C28 Fraction	µg/L	100	ID	2870	<100	500
C29-C36 Fraction	µg/L	50	ID	1750	<50	220
C10-C36 Fraction (sum)	µg/L	50	-	4620	<50	720
Total recoverable hydrocarbons						
C6-C10 Fraction	µg/L	20	-	<20	<20	<20
C6-C10 Fraction minus BTEX (F1)	µg/L	20	-	<20	<20	<20
<-C10-C16 Fraction	µg/L	100	-	<100	<100	<100
<-C16-C34 Fraction	µg/L	100	-	4210	<100	640
<-C34-C40 Fraction	µg/L	100	-	750	<100	110
<-C10-C40 Fraction (sum)	µg/L	100	-	4960	<100	750
Aromatic Hydrocarbons						
Benzene	µg/L	1	950	<1	<1	<1
Toluene	µg/L	2	ID	<2	<2	<2
Ethyl Benzene	µg/L	2	ID	<2	<2	<2
m,p-Xylenes	µg/L	2	ID	<2	<2	<2
o-Xylenes	µg/L	2	350	<2	<2	<2
Total xylenes	µg/L	2	-	<2	<2	<2
Sum of BTEX	µg/L	1	-	<1	<1	<1
Naphthalene	µg/L	5	-	<5	<5	<5
Isotopes						
Oxygen-18	‰	0.01	-	-6.59	-6.92	-7.64
Deuterium	‰	0.1	-	-42.4	-46.6	-50.1
Carbon-13	‰	0.1	-	29.1	29.3	28.7
RadioCarbon	pMC	0.1	-	0.0124±304	0.897±0.08	0.492±0.08
RadioCarbon Age (uncorrected)	yr BP	1	-	35287±304	37805±707	42622±1283
Tritium	TU	0.01	-	0.037±0.03	0.30±0.03	0.24±0.03

exceeds guideline limits

ID - Insufficient data

Guideline values

ANZECC 2000 - Water Quality Guidelines: 95% protection levels (trigger values) for the protection of freshwater aquatic ecosystems.

* ANZECC 2000 - Water Quality Guidelines: 95% protection levels (trigger values) for the protection of freshwater aquatic ecosystems, South-East Australia, low lying river ecosystems

* This result is below the Minimum Detectable Activity (MDA) and Limit of Quantification (Quant Limit) and therefore has an unacceptable level of uncertainty. Hence the data should only be used as an indicator of true concentration.

Appendix F

ALS laboratory results



CERTIFICATE OF ANALYSIS

Work Order : ES1214911 Client : PARSONS BRINCKERHOFF AUST P/L Contact : MS NINA PEARSE-HAWKINS Address : GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001 E-mail : npearsehawkins@pb.com.au Telephone : +61 02 9272 5100 Facsimile : +61 02 9272 5101 Project : 2162406B Order number : ---- C-O-C number : ---- Sampler : NPH Site : ---- Quote number : SY/394/09	Page : 1 of 7 Laboratory : Environmental Division Sydney Contact : Loren Schiavon Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : loren.schiavon@alsglobal.com Telephone : +61 2 8784 8503 Facsimile : +61 2 8784 8500 QC Level : NEPM 1999 Schedule B(3) and ALS QCS3 requirement Date Samples Received : 15-JUN-2012 Issue Date : 25-JUN-2012 No. of samples received : 5 No. of samples analysed : 5
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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
- Surrogate Control Limits



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Edwandy Fadjar	Organic Coordinator	Sydney Organics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 insufficient sample for analysis.

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

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

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

LOR = Limit of reporting

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

- **EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.**
- **EP080: Positive Toluene of S4MB02 have been confirmed by re-analysis.**



Analytical Results

Sub-Matrix: WATER

				Client sample ID				
				Client sampling date / time				
				TCMB01	S5MB01	S4MB03	TTPB	S4MB02
				14-JUN-2012 13:00	14-JUN-2012 09:00	13-JUN-2012 12:00	14-JUN-2012 02:30	13-JUN-2012 11:00
Compound	CAS Number	LOR	Unit	ES1214911-001	ES1214911-002	ES1214911-003	ES1214911-004	ES1214911-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.63	8.03	8.29	7.86	7.84
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	2960	6350	3260	2700	2210
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	1700	4360	1670	1470	1220
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	4	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	313	1110	298	462	153
Total Alkalinity as CaCO3	----	1	mg/L	313	1110	302	462	153
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	12	875	<1	<1	<1
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	848	1130	910	677	673
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	192	138	16	146	66
Magnesium	7439-95-4	1	mg/L	68	84	5	54	22
Sodium	7440-23-5	1	mg/L	338	1320	747	345	381
Potassium	7440-09-7	1	mg/L	6	69	4	6	4
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.27	<0.01	0.06
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.020	<0.001	<0.001	<0.001
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L	6.90	0.109	1.65	6.42	4.26
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.075	0.096	0.023	0.140	0.058
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.002	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	0.014	0.022	<0.001	<0.001	0.003
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	7440-24-6	0.001	mg/L	16.0	16.5	1.79	6.38	9.15
Uranium	7440-61-1	0.001	mg/L	<0.001	0.002	<0.001	<0.001	<0.001
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.013	<0.005	<0.005	<0.005	0.011



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				TCMB01	S5MB01	S4MB03	TTPB	S4MB02
				14-JUN-2012 13:00	14-JUN-2012 09:00	13-JUN-2012 12:00	14-JUN-2012 02:30	13-JUN-2012 11:00
Compound	CAS Number	LOR	Unit	ES1214911-001	ES1214911-002	ES1214911-003	ES1214911-004	ES1214911-005
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	<0.05	0.30	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L	1.58	0.12	0.09	7.64	0.39
Bromine	7726-95-6	0.1	mg/L	0.9	3.3	1.5	0.9	1.0
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.10	mg/L	19.7	24.3	13.2	19.8	14.9
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	<0.1	0.2	<0.1	<0.1	0.1
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	1.03	4.18	1.05	0.78	1.93
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.04	0.16	0.11	1.72	0.40
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.16	0.02	<0.01	0.06
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	30.4	72.3	31.7	28.3	22.0
Total Cations	----	0.01	meq/L	30.0	73.0	33.8	26.9	21.8
Ionic Balance	----	0.01	%	0.64	0.46	3.18	2.60	0.61
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	3	214	2	7	3
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	502	4440	39600	3790	8900
Ethene	74-85-1	10	µg/L	<10	<10	<10	<10	<10
Ethane	74-84-0	10	µg/L	<10	<10	<10	<10	<10
Propene	115-07-1	10	µg/L	<10	<10	<10	<10	<10
Propane	74-98-6	10	µg/L	<10	<10	<10	<10	<10
Butene	25167-67-3	10	µg/L	<10	<10	<10	<10	<10
Butane	106-97-8	10	µg/L	<10	<10	<10	<10	<10
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	<1.0	3.8	<1.0	<1.0	<1.0



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	TCMB01	S5MB01	S4MB03	TTPB	S4MB02
				14-JUN-2012 13:00	14-JUN-2012 09:00	13-JUN-2012 12:00	14-JUN-2012 02:30	13-JUN-2012 11:00
				ES1214911-001	ES1214911-002	ES1214911-003	ES1214911-004	ES1214911-005
EP075(SIM)A: Phenolic Compounds - Continued								
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	70	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	750	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	820	<50	<50	<50

EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				TCMB01	S5MB01	S4MB03	TTPB	S4MB02
				14-JUN-2012 13:00	14-JUN-2012 09:00	13-JUN-2012 12:00	14-JUN-2012 02:30	13-JUN-2012 11:00
Compound	CAS Number	LOR	Unit	ES1214911-001	ES1214911-002	ES1214911-003	ES1214911-004	ES1214911-005
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft - Continued								
C6 - C10 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	120	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	700	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	820	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	3
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	3
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	21.2	20.4	21.2	18.9	21.1
2-Chlorophenol-D4	93951-73-6	0.1	%	51.4	47.5	47.7	51.5	48.6
2,4,6-Tribromophenol	118-79-6	0.1	%	53.3	74.1	52.3	50.4	66.9
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	50.4	50.1	50.8	51.8	49.7
Anthracene-d10	1719-06-8	0.1	%	52.8	56.3	50.4	52.8	57.3
4-Terphenyl-d14	1718-51-0	0.1	%	56.0	66.2	52.4	56.4	63.3
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	129	126	124	125	128
Toluene-D8	2037-26-5	0.1	%	113	121	115	114	114
4-Bromofluorobenzene	460-00-4	0.1	%	111	116	114	112	111



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	64.1
2-Chlorophenol-D4	93951-73-6	11.3	122.9
2,4,6-Tribromophenol	118-79-6	11.7	144.0
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	19.9	122.8
Anthracene-d10	1719-06-8	23.3	125.8
4-Terphenyl-d14	1718-51-0	20.3	134.5
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: ES1214911	Page	: 1 of 14
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS NINA PEARSE-HAWKINS	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: npearsehawkins@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 15-JUN-2012
Sampler	: NPH	Issue Date	: 25-JUN-2012
Order number	: ----		
Quote number	: SY/394/09	No. of samples received	: 5
		No. of samples analysed	: 5

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Edwandy Fadjar	Organic Coordinator	Sydney Organics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2356456)									
ES1214868-010	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.93	6.01	14.2	0% - 20%
ES1214911-004	TTPB	EA005-P: pH Value	----	0.01	pH Unit	7.86	7.82	0.5	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2356454)									
ES1214868-008	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1570	1580	0.4	0% - 20%
ES1214868-010	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	<1	0.0	No Limit
EA015: Total Dissolved Solids (QC Lot: 2361311)									
ES1214698-025	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	155	154	0.8	0% - 50%
ES1214747-002	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	504	492	2.4	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2362474)									
ES1214788-001	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	538	524	2.6	0% - 20%
ES1214911-001	TCMB01	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	1700	1700	0.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2356453)									
ES1214747-002	Anonymous	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	138	137	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	138	137	0.0	0% - 20%
ES1214868-008	Anonymous	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	99	102	2.9	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	608	605	0.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	707	708	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2356930)									
ES1214657-011	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	334	332	0.7	0% - 20%
ES1214897-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	33	33	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2356935)									
ES1214911-005	S4MB02	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
ES1214986-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	203	203	0.0	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 2356929)									
ES1214657-011	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	622	616	1.0	0% - 20%
ES1214901-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	251	254	1.1	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2356926)									
ES1214657-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	78	81	3.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	37	37	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	425	430	1.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	16	16	0.0	0% - 50%



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 (%)
ED093F: Dissolved Major Cations (QC Lot: 2356926) - continued									
ES1214901-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	119	119	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	35	36	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	87	85	1.9	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2358633)									
ES1214650-003	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	2.28	2.29	0.4	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	0.005	0.005	0.0	No Limit
ES1214650-012	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	2.10	2.10	0.08	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	0.009	0.009	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2358635)									
ES1214911-004	TTPB	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	6.42	6.43	0.2	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.140	0.139	0.0	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.006	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	7.64	7.67	0.4	0% - 20%
EG020A-F: Bromine	7726-95-6	0.1	mg/L	0.9	0.9	0.0	No Limit		
ES1214912-005	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.132	0.132	0.0	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.009	0.016	49.5	0% - 50%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.016	0.015	0.0	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.027	0.024	11.8	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	49.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit



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: 2358635) - continued									
ES1214912-005	Anonymous	EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.75	0.79	5.6	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.06	<0.05	0.0	No Limit
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	1.6	1.6	0.0	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2358636)									
ES1214911-004	TTPB	EG020B-F: Strontium	7440-24-6	0.001	mg/L	6.38	6.36	0.3	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
ES1214912-005	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	0.211	0.210	0.7	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 2356933)									
ES1214911-001	TCMB01	EG052G: Reactive Silica	----	0.10	mg/L	19.7	19.8	0.5	0% - 20%
EK040P: Fluoride by PC Titrator (QC Lot: 2356452)									
ES1214868-008	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.5	0.5	0.0	No Limit
ES1214868-010	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2360788)									
ES1214868-010	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1214897-007	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.04	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2356932)									
ES1214789-005	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0	No Limit
ES1214897-006	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	0.03	0.03	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2360789)									
ES1214868-011	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.26	2.36	3.9	0% - 20%
ES1214897-008	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.23	0.23	0.0	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2360187)									
ES1214851-037	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.19	0.18	0.0	0% - 50%
ES1214897-005	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.08	0.08	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2356931)									
ES1214788-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	0.07	0.06	14.9	No Limit
ES1214897-002	Anonymous	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	0.13	0.13	0.0	0% - 50%
EP005: Total Organic Carbon (TOC) (QC Lot: 2357467)									
ES1214897-006	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	6	6	0.0	No Limit
ES1214902-007	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.0	No Limit
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2365244)									
EB1215661-001	Anonymous	EP033: Methane	74-82-8	10	µg/L	9130	9360	2.4	0% - 20%
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	19	19	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit



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 (%)	
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2365244) - continued										
EB1215661-001	Anonymous	EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit	
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit	
ES1214734-003	Anonymous	EP033: Methane	74-82-8	10	µg/L	<10	<10	0.0	No Limit	
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit	
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit	
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit	
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit	
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit	
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2362128)										
ES1214911-001	TCMB01	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit	
ES1214989-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2362128)										
ES1214911-001	TCMB01	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit	
ES1214989-003	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit	
EP080: BTEXN (QC Lot: 2362128)										
ES1214911-001	TCMB01	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit	
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit	
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit	
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit	
			106-42-3							
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit	
ES1214989-003	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit	
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit	
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit	
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit	
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit	
			106-42-3							
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit	
EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	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			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EA010P: Conductivity by PC Titrator (QCLot: 2356454)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	99.5	92	116
EA015: Total Dissolved Solids (QCLot: 2361311)								
EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	<10	293 mg/L	98.8	70	130
EA015: Total Dissolved Solids (QCLot: 2362474)								
EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	<10	293 mg/L	98.4	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 2356453)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	96.3	75	107
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2356930)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	108	77	121
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2356935)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	109	77	121
ED045G: Chloride Discrete analyser (QCLot: 2356929)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	86.0	79	123
ED093F: Dissolved Major Cations (QCLot: 2356926)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.0	88	110
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.4	90	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	91.1	81	107
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	89	109
EG020F: Dissolved Metals by ICP-MS (QCLot: 2358633)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	103	88	112
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2358635)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	102	92	112
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	106	88	110
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	109	80	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	99.8	85	109
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	102	89	107
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	102	89	109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	101	87	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	104	90	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.4	87	113
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	96.8	84	114
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	104	89	109



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2358635) - continued									
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	99.1	79	119	
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	100	91	109	
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.6	85	115	
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	94.4	71	127	
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	91.0	84	114	
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2358636)									
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	102	88	112	
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----	
EG052G: Silica by Discrete Analyser (QCLot: 2356933)									
EG052G: Reactive Silica	----	0.1	mg/L	<0.10	10.0 mg/L	101	72	124	
EK040P: Fluoride by PC Titrator (QCLot: 2356452)									
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	104	71	121	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2360788)									
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1.00 mg/L	103	86	116	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2356932)									
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	105	78	128	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2360789)									
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	103	80	130	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2360187)									
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	90.3	67	130	
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2356931)									
EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.50 mg/L	109	85	115	
EP005: Total Organic Carbon (TOC) (QCLot: 2357467)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	108	78	114	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2365244)									
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	97.1	86	108	
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	102	87	111	
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	101	87	111	
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	109	86	112	
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	98.8	87	111	
EP033: Butene	25167-67-3	20	µg/L	<20	99.61 µg/L	112	87	113	
EP033: Butane	106-97-8	20	µg/L	<20	102.18 µg/L	113	87	113	
EP075(SIM)A: Phenolic Compounds (QCLot: 2358641)									
EP075(SIM): Phenol	108-95-2	0.2	µg/L	----	5 µg/L	39.4	24.5	61.9	
		1	µg/L	<1.0	----	----	----	----	



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
EP075(SIM)A: Phenolic Compounds (QCLot: 2358641) - continued									
EP075(SIM): 2-Chlorophenol	95-57-8	0.2	µg/L	----	5 µg/L	69.5	63.8	110	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Methylphenol	95-48-7	0.2	µg/L	----	5 µg/L	78.5	55.9	112	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	0.4	µg/L	----	10 µg/L	80.2	42.5	114	
		2	µg/L	<2.0	----	----	----	----	
EP075(SIM): 2-Nitrophenol	88-75-5	0.2	µg/L	----	5 µg/L	69.7	62.7	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.2	µg/L	----	5 µg/L	74.2	59.9	112	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.2	µg/L	----	5 µg/L	75.6	59.3	122	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.2	µg/L	----	5 µg/L	76.0	64.3	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	0.2	µg/L	----	5 µg/L	72.6	63	119	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.2	µg/L	----	5 µg/L	79.4	58.7	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.2	µg/L	----	5 µg/L	88.5	51.2	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Pentachlorophenol	87-86-5	0.4	µg/L	----	10 µg/L	58.7	6.85	95.6	
		2	µg/L	<2.0	----	----	----	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2358641)									
EP075(SIM): Naphthalene	91-20-3	0.2	µg/L	----	5 µg/L	69.6	58.6	119	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Acenaphthylene	208-96-8	0.2	µg/L	----	5 µg/L	73.0	63.6	114	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Acenaphthene	83-32-9	0.2	µg/L	----	5 µg/L	73.0	62.2	113	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Fluorene	86-73-7	0.2	µg/L	----	5 µg/L	73.2	63.9	115	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Phenanthrene	85-01-8	0.2	µg/L	----	5 µg/L	77.6	62.6	116	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Anthracene	120-12-7	0.2	µg/L	----	5 µg/L	75.7	64.3	116	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Fluoranthene	206-44-0	0.2	µg/L	----	5 µg/L	82.4	63.6	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Pyrene	129-00-0	0.2	µg/L	----	5 µg/L	81.5	63.1	118	
		1	µg/L	<1.0	----	----	----	----	



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2358641) - continued									
EP075(SIM): Benz(a)anthracene	56-55-3	0.2	µg/L	----	5 µg/L	74.8	64.1	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Chrysene	218-01-9	0.2	µg/L	----	5 µg/L	77.3	62.5	116	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.2	µg/L	----	5 µg/L	91.0	61.7	119	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.2	µg/L	----	5 µg/L	78.6	61.7	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.2	µg/L	----	5 µg/L	74.2	63.3	117	
		0.5	µg/L	<0.5	----	----	----	----	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.2	µg/L	----	5 µg/L	69.1	59.9	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	----	5 µg/L	68.9	61.2	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	----	5 µg/L	70.6	59.1	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	1	µg/L	<1.0	----	----	----	----	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2358640)									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	200 µg/L	91.2	58.9	131	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	250 µg/L	111	73.9	138	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	200 µg/L	77.9	62.7	131	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2362128)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	88.6	75	127	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2358640)									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	250 µg/L	79.5	58.9	131	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	350 µg/L	90.0	73.9	138	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----	
		50	µg/L	----	150 µg/L	104	62.7	131	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2362128)									
EP080: C6 - C10 Fraction	----	20	µg/L	<20	310 µg/L	91.0	75	127	
EP080: BTEXN (QCLot: 2362128)									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	94.8	70	124	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	92.2	66	132	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	85.8	70	120	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	87.8	69	121	
		106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	90.4	72	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	98.6	70	124	



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			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2356930)							
ES1214657-011	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2356935)							
ES1214911-005	S4MB02	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	101	70	130
ED045G: Chloride Discrete analyser (QCLot: 2356929)							
ES1214657-011	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	86.7	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2358635)							
ES1214791-004	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	121	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	119	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	119	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	117	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	117	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	121	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	112	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	# Not Determined	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	117	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	112	70	130
EG020A-F: Zinc	7440-66-6	0.2 mg/L	122	70	130		
EG052G: Silica by Discrete Analyser (QCLot: 2356933)							
ES1214911-001	TCMB01	EG052G: Reactive Silica	----	5.0 mg/L	85.8	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2356452)							
ES1214868-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	104	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2360788)							
ES1214868-010	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	80.0	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2356932)							
ES1214789-005	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	92.8	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2360789)							
ES1214868-011	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2360187)							
ES1214851-037	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	99.3	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2356931)							
ES1214788-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	114	70	130



Sub-Matrix: WATER

Laboratory sample ID				Matrix Spike (MS) Report					
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		
					MS	Low	High		
EP005: Total Organic Carbon (TOC) (QCLot: 2357467)									
ES1214897-007	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	113	70	130		
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2365244)									
EM1206716-002	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	102	70	130		
		EP033: Ethene	74-85-1	50.29 µg/L	104	70	130		
		EP033: Ethane	74-84-0	54.43 µg/L	104	70	130		
		EP033: Propene	115-07-1	73.97 µg/L	112	70	130		
		EP033: Propane	74-98-6	78.28 µg/L	102	70	130		
		EP033: Butene	25167-67-3	99.61 µg/L	118	70	130		
		EP033: Butane	106-97-8	102.18 µg/L	120	70	130		
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2362128)									
ES1214911-001	TCMB01	EP080: C6 - C9 Fraction	----	325 µg/L	115	70	130		
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2362128)									
ES1214911-001	TCMB01	EP080: C6 - C10 Fraction	----	375 µg/L	115	70	130		
EP080: BTEXN (QCLot: 2362128)									
ES1214911-001	TCMB01	EP080: Benzene	71-43-2	25 µg/L	95.7	70	130		
		EP080: Toluene	108-88-3	25 µg/L	100	70	130		
		EP080: Ethylbenzene	100-41-4	25 µg/L	96.1	70	130		
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	94.4	70	130		
			106-42-3						
		EP080: ortho-Xylene	95-47-6	25 µg/L	99.5	70	130		
		EP080: Naphthalene	91-20-3	25 µg/L	96.0	70	130		

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.

Sub-Matrix: WATER

Laboratory sample ID				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
					MS	MSD	Low	High	Value	Control Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2356930)										
ES1214657-011	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	----	70	130	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2356935)										
ES1214911-005	S4MB02	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	101	----	70	130	----	----
ED045G: Chloride Discrete analyser (QCLot: 2356929)										
ES1214657-011	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	86.7	----	70	130	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2358635)										
ES1214791-004	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	121	----	70	130	----	----



Sub-Matrix: WATER

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit
EG020F: Dissolved Metals by ICP-MS (QCLot: 2358635) - continued										
ES1214791-004	Anonymous	EG020A-F: Beryllium	7440-41-7	0.2 mg/L	119	----	70	130	----	----
		EG020A-F: Barium	7440-39-3	0.2 mg/L	119	----	70	130	----	----
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	117	----	70	130	----	----
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	117	----	70	130	----	----
		EG020A-F: Copper	7440-50-8	0.2 mg/L	121	----	70	130	----	----
		EG020A-F: Lead	7439-92-1	0.2 mg/L	112	----	70	130	----	----
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	# Not Determined	----	70	130	----	----
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	117	----	70	130	----	----
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	112	----	70	130	----	----
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	122	----	70	130	----	----
EG052G: Silica by Discrete Analyser (QCLot: 2356933)										
ES1214911-001	TCMB01	EG052G: Reactive Silica	----	5.0 mg/L	85.8	----	70	130	----	----
EK040P: Fluoride by PC Titrator (QCLot: 2356452)										
ES1214868-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	104	----	70	130	----	----
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2360788)										
ES1214868-010	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	80.0	----	70	130	----	----
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2356932)										
ES1214789-005	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	92.8	----	70	130	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2360789)										
ES1214868-011	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	----	70	130	----	----
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2360187)										
ES1214851-037	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	99.3	----	70	130	----	----
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2356931)										
ES1214788-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	114	----	70	130	----	----
EP005: Total Organic Carbon (TOC) (QCLot: 2357467)										
ES1214897-007	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	113	----	70	130	----	----
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2365244)										
EM1206716-002	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	102	----	70	130	----	----
		EP033: Ethene	74-85-1	50.29 µg/L	104	----	70	130	----	----
		EP033: Ethane	74-84-0	54.43 µg/L	104	----	70	130	----	----
		EP033: Propene	115-07-1	73.97 µg/L	112	----	70	130	----	----
		EP033: Propane	74-98-6	78.28 µg/L	102	----	70	130	----	----
		EP033: Butene	25167-67-3	99.61 µg/L	118	----	70	130	----	----
		EP033: Butane	106-97-8	102.18 µg/L	120	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2362128)										
ES1214911-001	TCMB01	EP080: C6 - C9 Fraction	----	325 µg/L	115	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2362128)										



Sub-Matrix: **WATER**

					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)		
				Concentration	MS	MSD	Low	High	Value	Control Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2362128) - continued											
ES1214911-001	TCMB01	EP080: C6 - C10 Fraction	----	375 µg/L	115	----	70	130	----	----	
EP080: BTEXN (QCLot: 2362128)											
ES1214911-001	TCMB01	EP080: Benzene	71-43-2	25 µg/L	95.7	----	70	130	----	----	
		EP080: Toluene	108-88-3	25 µg/L	100	----	70	130	----	----	
		EP080: Ethylbenzene	100-41-4	25 µg/L	96.1	----	70	130	----	----	
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	94.4	----	70	130	----	----	
			106-42-3								
		EP080: ortho-Xylene	95-47-6	25 µg/L	99.5	----	70	130	----	----	
		EP080: Naphthalene	91-20-3	25 µg/L	96.0	----	70	130	----	----	

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1214911	Page	: 1 of 11
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS NINA PEARSE-HAWKINS	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: npearsehawkins@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 15-JUN-2012
Sampler	: NPH	Issue Date	: 25-JUN-2012
Order number	: ----		
Quote number	: SY/394/09	No. of samples received	: 5
		No. of samples analysed	: 5

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	
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) S4MB03,	S4MB02	13-JUN-2012	---	13-JUN-2012	----	15-JUN-2012	13-JUN-2012	*
Clear Plastic Bottle - Natural (EA005-P) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	14-JUN-2012	----	15-JUN-2012	14-JUN-2012	*
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) S4MB03,	S4MB02	13-JUN-2012	---	11-JUL-2012	----	15-JUN-2012	11-JUL-2012	✓
Clear Plastic Bottle - Natural (EA010-P) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	12-JUL-2012	----	15-JUN-2012	12-JUL-2012	✓
EA015: Total Dissolved Solids								
Clear Plastic Bottle - Natural (EA015H) S4MB03,	S4MB02	13-JUN-2012	----	----	----	19-JUN-2012	20-JUN-2012	✓
Clear Plastic Bottle - Natural (EA015H) TCMB01, TTPB	S5MB01,	14-JUN-2012	----	----	----	20-JUN-2012	21-JUN-2012	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) S4MB03,	S4MB02	13-JUN-2012	---	27-JUN-2012	----	15-JUN-2012	27-JUN-2012	✓
Clear Plastic Bottle - Natural (ED037-P) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	28-JUN-2012	----	15-JUN-2012	28-JUN-2012	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) S4MB03,	S4MB02	13-JUN-2012	---	11-JUL-2012	----	15-JUN-2012	11-JUL-2012	✓
Clear Plastic Bottle - Natural (ED041G) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	12-JUL-2012	----	15-JUN-2012	12-JUL-2012	✓



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 (ED045G) S4MB03,	S4MB02	13-JUN-2012	---	11-JUL-2012	----	15-JUN-2012	11-JUL-2012	✓
Clear Plastic Bottle - Natural (ED045G) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	12-JUL-2012	----	15-JUN-2012	12-JUL-2012	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) S4MB03,	S4MB02	13-JUN-2012	---	20-JUN-2012	----	15-JUN-2012	20-JUN-2012	✓
Clear Plastic Bottle - Natural (ED093F) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	21-JUN-2012	----	15-JUN-2012	21-JUN-2012	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) S4MB03,	S4MB02	13-JUN-2012	---	10-DEC-2012	----	18-JUN-2012	10-DEC-2012	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	11-DEC-2012	----	18-JUN-2012	11-DEC-2012	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) S4MB03,	S4MB02	13-JUN-2012	---	10-DEC-2012	----	18-JUN-2012	10-DEC-2012	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	11-DEC-2012	----	18-JUN-2012	11-DEC-2012	✓
EG052G: Silica by Discrete Analyser								
Clear Plastic Bottle - Natural (EG052G) S4MB03,	S4MB02	13-JUN-2012	---	11-JUL-2012	----	15-JUN-2012	11-JUL-2012	✓
Clear Plastic Bottle - Natural (EG052G) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	12-JUL-2012	----	15-JUN-2012	12-JUL-2012	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) S4MB03,	S4MB02	13-JUN-2012	---	11-JUL-2012	----	15-JUN-2012	11-JUL-2012	✓
Clear Plastic Bottle - Natural (EK040P) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	12-JUL-2012	----	15-JUN-2012	12-JUL-2012	✓
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) S4MB03,	S4MB02	13-JUN-2012	---	11-JUL-2012	----	19-JUN-2012	11-JUL-2012	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	12-JUL-2012	----	19-JUN-2012	12-JUL-2012	✓



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	
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) S4MB03,	S4MB02	13-JUN-2012	---	15-JUN-2012	----	15-JUN-2012	15-JUN-2012	✓
Clear Plastic Bottle - Natural (EK057G) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	16-JUN-2012	----	15-JUN-2012	16-JUN-2012	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) S4MB03,	S4MB02	13-JUN-2012	---	11-JUL-2012	----	19-JUN-2012	11-JUL-2012	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	12-JUL-2012	----	19-JUN-2012	12-JUL-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) S4MB03,	S4MB02	13-JUN-2012	19-JUN-2012	11-JUL-2012	✓	19-JUN-2012	11-JUL-2012	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) TCMB01, TTPB	S5MB01,	14-JUN-2012	19-JUN-2012	12-JUL-2012	✓	19-JUN-2012	12-JUL-2012	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) S4MB03,	S4MB02	13-JUN-2012	---	15-JUN-2012	----	15-JUN-2012	15-JUN-2012	✓
Clear Plastic Bottle - Natural (EK071G) TCMB01, TTPB	S5MB01,	14-JUN-2012	---	16-JUN-2012	----	15-JUN-2012	16-JUN-2012	✓
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005) S4MB03,	S4MB02	13-JUN-2012	----	----	----	16-JUN-2012	11-JUL-2012	✓
Amber TOC Vial - Sulfuric Acid (EP005) TCMB01, TTPB	S5MB01,	14-JUN-2012	----	----	----	16-JUN-2012	12-JUL-2012	✓
EP033: C1 - C4 Hydrocarbon Gases								
Amber VOC Vial - Sulfuric Acid (EP033) S4MB03,	S4MB02	13-JUN-2012	----	----	----	21-JUN-2012	27-JUN-2012	✓
Amber VOC Vial - Sulfuric Acid (EP033) TCMB01, TTPB	S5MB01,	14-JUN-2012	----	----	----	21-JUN-2012	28-JUN-2012	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) S4MB03,	S4MB02	13-JUN-2012	19-JUN-2012	20-JUN-2012	✓	21-JUN-2012	29-JUL-2012	✓
Amber Glass Bottle - Unpreserved (EP071) TCMB01, TTPB	S5MB01,	14-JUN-2012	19-JUN-2012	21-JUN-2012	✓	21-JUN-2012	29-JUL-2012	✓



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	
EP075(SIM)A: Phenolic Compounds								
Amber Glass Bottle - Unpreserved (EP075(SIM)) S4MB03,	S4MB02	13-JUN-2012	19-JUN-2012	20-JUN-2012	✓	21-JUN-2012	29-JUL-2012	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) TCMB01, TTPB	S5MB01,	14-JUN-2012	19-JUN-2012	21-JUN-2012	✓	21-JUN-2012	29-JUL-2012	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM)) S4MB03,	S4MB02	13-JUN-2012	19-JUN-2012	20-JUN-2012	✓	21-JUN-2012	29-JUL-2012	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) TCMB01, TTPB	S5MB01,	14-JUN-2012	19-JUN-2012	21-JUN-2012	✓	21-JUN-2012	29-JUL-2012	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) S4MB03,	S4MB02	13-JUN-2012	20-JUN-2012	27-JUN-2012	✓	20-JUN-2012	27-JUN-2012	✓
Amber VOC Vial - Sulfuric Acid (EP080) TCMB01, TTPB	S5MB01,	14-JUN-2012	20-JUN-2012	28-JUN-2012	✓	20-JUN-2012	28-JUN-2012	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
Amber VOC Vial - Sulfuric Acid (EP080) S4MB03,	S4MB02	13-JUN-2012	20-JUN-2012	27-JUN-2012	✓	20-JUN-2012	27-JUN-2012	✓
Amber VOC Vial - Sulfuric Acid (EP080) TCMB01, TTPB	S5MB01,	14-JUN-2012	20-JUN-2012	28-JUN-2012	✓	20-JUN-2012	28-JUN-2012	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	10	20.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	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
Conductivity by PC Titrator	EA010-P	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	17	11.8	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	4	31	12.9	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	12	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	5	20.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	39	10.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	4	39	10.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	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	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	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
Conductivity by PC Titrator	EA010-P	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	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	31	6.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	5	20.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	39	5.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	4	39	10.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatiles Fraction	EP071	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	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	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	31	6.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	5	20.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	39	5.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	39	5.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	5.9	5.0	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	16	6.3	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	5	20.0	5.0	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	39	5.1	5.0	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	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
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids (High Level)	EA015H	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
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- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um 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) Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Total Hardness is calculated based on APHA 21st ed., 2340 B. 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): Samples are 0.45 um filtered prior to analysis. 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.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. 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.
Silica (Reactive) by Discrete Analyser	EG052G	WATER	APHA 21st ed. 4500-SiO2 D: Under Acidic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Analytical Methods	Method	Matrix	Method Descriptions
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TPH - Semivolatle Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



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

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1214657-011	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG020F: Dissolved Metals by ICP-MS	ES1214791-004	Anonymous	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	ES1214868-011	Anonymous	Nitrite + Nitrate as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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

Matrix: **WATER**

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural S4MB03,	S4MB02	----	----	----	15-JUN-2012	13-JUN-2012	2
Clear Plastic Bottle - Natural TCMB01, TTPB	S5MB01,	----	----	----	15-JUN-2012	14-JUN-2012	1

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.

CHAIN-OF-CUSTODY


Laboratory Nair ALS Environmental
 277-288 Woodpark Road
 SMITHFIELD NSW 2164
 Fax Number: 02 8784 8500
 Phone Number: 02 8784 8555
 Contact Name:

PB Job No.
 2162406

Results Expected By/On: 7 days
 James Duggleby
 Fax Results To: 02 9272 5101
 Fax Number: 02 9272 5101
 Phone Number: 9272 5248
 Email Results to: jduggleby@pb.com.au /
 pb@nairals.com.au
 Quotation Number: SY/384/09
 Invoice To: James Duggleby
 Head Office, Sydney

HIT

Sample ID	Date sampled	Time	Medium	Preservative Type	Filtered (x)	Containers	Cations (Na, K, Ca, Mg)	Anions (Alkalinity, SO4, Cl, reactive silica)	Dissolved Metals (Al, As, Ba, B, Be, Br, Cd, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, Sr, U, V, Zn)	Ammonia as N	Nitrate, nitrite	Fluoride	Reactive Phosphorus as P	Total phosphorus as P	TOC	Gases C1-C4 + methane	BTEX/TPH C8-C9	TPH C10-C36	PAH	Phenols	pH	EC	Total dissolved solids
JCM301	14/6/12	1pm					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
S3M301	14/6/12	9am					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
S4M303	13/6/12	7					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TPB	14/6/12	2:30					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
S4M302	14/6/12	11am					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Sampled By: INPH
 Company: PB
 Signature: [Signature]
 Remarks: Environmental Division
 Sydney
 Work Order
ES1214911

 Telephone : + 61-2-8784 8555

Relinquished By: N. Pearce-Haykins
 Date: 15/6/12
 Company: PB
 Time: 10:40
 Signature: [Signature]

Parsons Brinckerhoff & Young Consultants
PARSONS BRINCKERHOFF
 Environmental and Geotechnical Services
 Comments:
 Legend: S = Soil, W = Water, F = Filter
 T = Tube

CERTIFICATE OF ANALYSIS

<p>Work Order : ES1215256</p> <p>Client : PARSONS BRINCKERHOFF AUST P/L</p> <p>Contact : MS NINA PEARSE-HAWKINS</p> <p>Address : GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001</p> <p>E-mail : npearsehawkins@pb.com.au</p> <p>Telephone : +61 02 9272 5100</p> <p>Facsimile : +61 02 9272 5101</p> <p>Project : 2162406B</p> <p>Order number : ----</p> <p>C-O-C number : ----</p> <p>Sampler : NPH</p> <p>Site : ----</p> <p>Quote number : SY/394/09</p>	<p>Page : 1 of 7</p> <p>Laboratory : Environmental Division Sydney</p> <p>Contact : Loren Schiavon</p> <p>Address : 277-289 Woodpark Road Smithfield NSW Australia 2164</p> <p>E-mail : loren.schiavon@alsglobal.com</p> <p>Telephone : +61 2 8784 8503</p> <p>Facsimile : +61 2 8784 8500</p> <p>QC Level : NEPM 1999 Schedule B(3) and ALS QCS3 requirement</p> <p>Date Samples Received : 20-JUN-2012</p> <p>Issue Date : 27-JUN-2012</p> <p>No. of samples received : 2</p> <p>No. of samples analysed : 2</p>
---	--

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
- Surrogate Control Limits



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 insufficient sample for analysis.

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

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

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

LOR = Limit of reporting

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

- **EG020: LCS recoveries for some elements fall 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

				Client sample ID					
				TTMB02	S4MB01	---	---	---	
				18-JUN-2012 13:00	19-JUN-2012 10:00	---	---	---	
				Client sampling date / time					
Compound	CAS Number	LOR	Unit	ES1215256-001	ES1215256-002	---	---	---	
EA005P: pH by PC Titrator									
pH Value	---	0.01	pH Unit	7.42	---	---	---	---	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	---	1	µS/cm	2240	---	---	---	---	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	1240	---	---	---	---	
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	349	---	---	---	---	
Total Alkalinity as CaCO3	---	1	mg/L	349	---	---	---	---	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	44	---	---	---	---	
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L	581	---	---	---	---	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	160	---	---	---	---	
Magnesium	7439-95-4	1	mg/L	50	---	---	---	---	
Sodium	7440-23-5	1	mg/L	268	---	---	---	---	
Potassium	7440-09-7	1	mg/L	5	---	---	---	---	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.01	<0.01	---	---	---	
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.005	---	---	---	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	---	---	---	
Barium	7440-39-3	0.001	mg/L	0.861	0.541	---	---	---	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	---	---	---	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	---	---	---	
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	---	---	---	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	---	---	---	
Manganese	7439-96-5	0.001	mg/L	0.120	0.223	---	---	---	
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	---	---	---	
Nickel	7440-02-0	0.001	mg/L	0.006	0.002	---	---	---	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	---	---	---	
Strontium	7440-24-6	0.001	mg/L	3.16	21.2	---	---	---	
Uranium	7440-61-1	0.001	mg/L	<0.001	0.002	---	---	---	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	---	---	---	
Zinc	7440-66-6	0.005	mg/L	0.216	0.021	---	---	---	



Analytical Results

Sub-Matrix: WATER

				Client sample ID				
				TTMB02	S4MB01	---	---	---
				18-JUN-2012 13:00	19-JUN-2012 10:00	---	---	---
				Client sampling date / time				
Compound	CAS Number	LOR	Unit	ES1215256-001	ES1215256-002	---	---	---
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	<0.05	0.12	---	---	---
Iron	7439-89-6	0.05	mg/L	2.14	0.57	---	---	---
Bromine	7726-95-6	0.1	mg/L	0.7	2.8	---	---	---
EG052G: Silica by Discrete Analyser								
Reactive Silica	---	0.10	mg/L	29.6	---	---	---	---
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.1	---	---	---	---
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.66	2.45	---	---	---
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	---	0.01	mg/L	<0.01	---	---	---	---
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	---	---	---	---
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	---	0.01	mg/L	<0.01	---	---	---	---
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	---	0.01	mg/L	0.24	0.05	---	---	---
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	---	0.01	mg/L	0.16	---	---	---	---
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	---	1	mg/L	4	29	---	---	---
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	50	4230	---	---	---
Ethene	74-85-1	10	µg/L	<10	<10	---	---	---
Ethane	74-84-0	10	µg/L	<10	<10	---	---	---
Propene	115-07-1	10	µg/L	<10	<10	---	---	---
Propane	74-98-6	10	µg/L	<10	<10	---	---	---
Butene	25167-67-3	10	µg/L	<10	<10	---	---	---
Butane	106-97-8	10	µg/L	<10	<10	---	---	---
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	<1.0	<1.0	---	---	---
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	---	---	---
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	---	---	---
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	<2.0	---	---	---
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	---	---	---



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				TTMB02	S4MB01			
				18-JUN-2012 13:00	19-JUN-2012 10:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1215256-001	ES1215256-002	----	----	----
EP075(SIM)A: Phenolic Compounds - Continued								
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	<1.0	----	----	----
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	----	----	----
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	----	----	----
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	----	----	----
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	----	----	----
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	----	----	----
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	----	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	20	µg/L	<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				TTMB02	S4MB01	----	----	----
				18-JUN-2012 13:00	19-JUN-2012 10:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1215256-001	ES1215256-002	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft - Continued								
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	19.5	19.2	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	52.0	46.8	----	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	49.6	53.2	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	56.2	52.7	----	----	----
Anthracene-d10	1719-06-8	0.1	%	66.0	50.8	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	67.8	52.0	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	91.8	86.2	----	----	----
Toluene-D8	2037-26-5	0.1	%	103	121	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	103	120	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	64.1
2-Chlorophenol-D4	93951-73-6	11.3	122.9
2,4,6-Tribromophenol	118-79-6	11.7	144.0
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	19.9	122.8
Anthracene-d10	1719-06-8	23.3	125.8
4-Terphenyl-d14	1718-51-0	20.3	134.5
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: ES1215256	Page	: 1 of 14
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS NINA PEARSE-HAWKINS	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: npearsehawkins@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 20-JUN-2012
C-O-C number	: ----	Issue Date	: 27-JUN-2012
Sampler	: NPH	No. of samples received	: 2
Order number	: ----	No. of samples analysed	: 2
Quote number	: SY/394/09		

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics



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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 (%)
EA005P: pH by PC Titrator (QC Lot: 2364032)									
ES1215143-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	2.81	2.79	0.7	0% - 20%
ES1215276-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.52	6.76	3.6	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2364031)									
ES1215143-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1460	1500	2.6	0% - 20%
ES1215276-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	120	128	6.0	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2368314)									
ES1215256-001	TTMB02	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	1240	1210	2.3	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2364030)									
ES1215143-001	Anonymous	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	<1	<1	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.0	No Limit
ES1215276-002	Anonymous	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	4	4	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	4	4	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2364329)									
ES1215130-015	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1560	1560	0.4	0% - 20%
ES1215255-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	17	17	0.0	0% - 50%
ED045G: Chloride Discrete analyser (QC Lot: 2364328)									
ES1215130-015	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1540	1540	0.2	0% - 20%
ES1215255-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	56	56	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2364326)									
ES1215255-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	172	166	3.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	133	130	1.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	890	870	2.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.0	No Limit
ES1215256-001	TTMB02	ED093F: Calcium	7440-70-2	1	mg/L	160	153	4.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	50	48	3.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	268	261	2.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2364620)									
ES1215255-006	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.004	0.003	31.5	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit



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: 2364620) - continued									
ES1215255-006	Anonymous	EG020A-F: Barium	7440-39-3	0.001	mg/L	0.685	0.682	0.6	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.002	40.2	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	1.40	1.29	8.5	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.018	0.015	13.7	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	5.41	5.69	5.1	0% - 20%
EG020A-F: Bromine	7726-95-6	0.1	mg/L	2.3	2.2	6.2	0% - 20%		
ES1215290-007	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	4.70	4.79	1.8	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.017	0.018	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.06	0.06	0.0	No Limit
EG020A-F: Iron	7439-89-6	0.05	mg/L	0.32	0.14	79.3	No Limit		
EG020A-F: Bromine	7726-95-6	0.1	mg/L	1.2	1.2	0.0	0% - 50%		
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2364621)									
ES1215255-006	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	3.04	2.91	4.6	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 2364331)									
ES1215256-001	TTMB02	EG052G: Reactive Silica	----	0.10	mg/L	29.6	30.0	1.4	0% - 20%
EK040P: Fluoride by PC Titrator (QC Lot: 2364033)									
ES1215143-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.5	0.4	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2368594)									
ES1215255-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.16	0.14	13.5	0% - 50%



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 (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2368594) - continued									
ES1215290-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.42	1.45	2.1	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2364327)									
ES1215130-015	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	0.09	0.09	0.0	No Limit
ES1215255-006	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2368593)									
ES1215255-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1215290-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	<0.01	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2368422)									
ES1215207-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1215311-004	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.15	0.10	37.4	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2364330)									
ES1215168-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1215255-005	Anonymous	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 2367661)									
ES1215144-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.0	No Limit
ES1215255-002	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	14	12	15.4	0% - 50%
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2370648)									
EB1216300-001	Anonymous	EP033: Methane	74-82-8	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit
ES1215290-005	Anonymous	EP033: Methane	74-82-8	10	µg/L	5870	6610	11.8	0% - 20%
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2370281)									
ES1215256-001	TTMB02	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES1215290-007	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2370281)									
ES1215256-001	TTMB02	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES1215290-007	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 2370281)									
ES1215256-001	TTMB02	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit

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 Work Order : ES1215256
 Client : PARSONS BRINCKERHOFF AUST P/L
 Project : 2162406B



Sub-Matrix: **WATER**

Laboratory Duplicate (DUP) Report

<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD (%)</i>	<i>Recovery Limits (%)</i>
EP080: BTEXN (QC Lot: 2370281) - continued									
ES1215256-001	TTMB02	EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
ES1215290-007	Anonymous	EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	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			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EA010P: Conductivity by PC Titrator (QCLot: 2364031)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	99.8	92	116
EA015: Total Dissolved Solids (QCLot: 2368314)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	293 mg/L	93.8	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 2364030)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	84.1	75	107
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2364329)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	77	121
ED045G: Chloride Discrete analyser (QCLot: 2364328)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	108	79	123
ED093F: Dissolved Major Cations (QCLot: 2364326)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	93.3	88	110
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.2	90	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	97.3	81	107
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	107	89	109
EG020F: Dissolved Metals by ICP-MS (QCLot: 2364620)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	102	92	112
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	104	88	110
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	101	80	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	88.1	85	109
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	102	89	107
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	101	89	109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	# 111	87	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.6	90	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	100	87	113
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	95.9	84	114
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	89	109
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	106	79	119
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	91	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	110	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	93.9	71	127
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	103	84	114
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2364621)								



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2364621) - continued									
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	92.0	88	112	
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----	
EG052G: Silica by Discrete Analyser (QCLot: 2364331)									
EG052G: Reactive Silica	----	0.1	mg/L	<0.10	10.0 mg/L	102	72	124	
EK040P: Fluoride by PC Titrator (QCLot: 2364033)									
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	86.0	71	121	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2368594)									
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1.00 mg/L	105	86	116	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2364327)									
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	118	78	128	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2368593)									
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	102	80	130	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2368422)									
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	90.4	67	130	
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2364330)									
EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.50 mg/L	109	85	115	
EP005: Total Organic Carbon (TOC) (QCLot: 2367661)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	104	78	114	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2370648)									
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	98.4	86	108	
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	101	87	111	
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	100	87	111	
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	104	86	112	
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	96.2	87	111	
EP033: Butene	25167-67-3	20	µg/L	<20	99.61 µg/L	104	87	113	
EP033: Butane	106-97-8	20	µg/L	<20	102.18 µg/L	106	87	113	
EP075(SIM)A: Phenolic Compounds (QCLot: 2364061)									
EP075(SIM): Phenol	108-95-2	0.2	µg/L	----	5 µg/L	38.9	24.5	61.9	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Chlorophenol	95-57-8	0.2	µg/L	----	5 µg/L	79.7	63.8	110	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Methylphenol	95-48-7	0.2	µg/L	----	5 µg/L	81.7	55.9	112	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	0.4	µg/L	----	10 µg/L	69.0	42.5	114	
		2	µg/L	<2.0	----	----	----	----	
EP075(SIM): 2-Nitrophenol	88-75-5	0.2	µg/L	----	5 µg/L	75.2	62.7	117	
		1	µg/L	<1.0	----	----	----	----	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
EP075(SIM)A: Phenolic Compounds (QCLot: 2364061) - continued								
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.2	µg/L	----	5 µg/L	77.1	59.9	112
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.2	µg/L	----	5 µg/L	72.4	59.3	122
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.2	µg/L	----	5 µg/L	76.1	64.3	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	0.2	µg/L	----	5 µg/L	72.8	63	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.2	µg/L	----	5 µg/L	68.4	58.7	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.2	µg/L	----	5 µg/L	75.5	51.2	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pentachlorophenol	87-86-5	0.4	µg/L	----	10 µg/L	45.3	6.85	95.6
		2	µg/L	<2.0	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2364061)								
EP075(SIM): Naphthalene	91-20-3	0.2	µg/L	----	5 µg/L	75.1	58.6	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthylene	208-96-8	0.2	µg/L	----	5 µg/L	69.4	63.6	114
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthene	83-32-9	0.2	µg/L	----	5 µg/L	69.5	62.2	113
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluorene	86-73-7	0.2	µg/L	----	5 µg/L	72.5	63.9	115
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Phenanthrene	85-01-8	0.2	µg/L	----	5 µg/L	76.7	62.6	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Anthracene	120-12-7	0.2	µg/L	----	5 µg/L	77.1	64.3	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluoranthene	206-44-0	0.2	µg/L	----	5 µg/L	80.3	63.6	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pyrene	129-00-0	0.2	µg/L	----	5 µg/L	79.2	63.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benz(a)anthracene	56-55-3	0.2	µg/L	----	5 µg/L	78.6	64.1	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Chrysene	218-01-9	0.2	µg/L	----	5 µg/L	87.4	62.5	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.2	µg/L	----	5 µg/L	80.2	61.7	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.2	µg/L	----	5 µg/L	77.3	61.7	117
		1	µg/L	<1.0	----	----	----	----



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
EP075(SIM): Polynuclear Aromatic Hydrocarbons (QCLot: 2364061) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.2	µg/L	----	5 µg/L	79.8	63.3	117
		0.5	µg/L	<0.5	----	----	----	----
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.2	µg/L	----	5 µg/L	78.1	59.9	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	----	5 µg/L	77.1	61.2	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	----	5 µg/L	80.2	59.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	1	µg/L	<1.0	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2364060)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	200 µg/L	100	58.9	131
EP071: C15 - C28 Fraction	----	100	µg/L	<100	250 µg/L	122	73.9	138
EP071: C29 - C36 Fraction	----	50	µg/L	<50	200 µg/L	100	62.7	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2370281)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	99.7	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2364060)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	250 µg/L	74.1	58.9	131
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	350 µg/L	79.3	73.9	138
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
		50	µg/L	----	150 µg/L	97.8	62.7	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2370281)								
EP080: C6 - C10 Fraction	----	20	µg/L	<20	310 µg/L	105	75	127
EP080: BTEXN (QCLot: 2370281)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	85.2	70	124
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	104	66	132
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	97.4	70	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	110	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	105	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	108	70	124

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**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
				MS	Low	High	



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2364329)							
ES1215130-015	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride Discrete analyser (QCLot: 2364328)							
ES1215130-015	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2364620)							
ES1215255-007	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	112	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	110	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	100	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	114	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	104	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	120	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	102	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	112	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	104	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	108	70	130
EG020A-F: Zinc	7440-66-6	0.2 mg/L	115	70	130		
EG052G: Silica by Discrete Analyser (QCLot: 2364331)							
ES1215256-001	TTMB02	EG052G: Reactive Silica	----	5.0 mg/L	# Not Determined	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2364033)							
ES1215277-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	76.7	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2368594)							
ES1215255-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	90.3	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2364327)							
ES1215130-015	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	96.6	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2368593)							
ES1215255-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	96.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2368422)							
ES1215207-003	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	90.2	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2364330)							
ES1215168-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	121	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 2367661)							
ES1215144-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	107	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2370648)							
ES1215290-001	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	# Not Determined	70	130
		EP033: Ethene	74-85-1	50.29 µg/L	104	70	130
		EP033: Ethane	74-84-0	54.43 µg/L	105	70	130



Sub-Matrix: **WATER**

Laboratory sample ID				Matrix Spike (MS) Report					
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		
					MS	Low	High		
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2370648) - continued									
ES1215290-001	Anonymous	EP033: Propene	115-07-1	73.97 µg/L	112	70	130		
		EP033: Propane	74-98-6	78.28 µg/L	101	70	130		
		EP033: Butene	25167-67-3	99.61 µg/L	116	70	130		
		EP033: Butane	106-97-8	102.18 µg/L	118	70	130		
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2370281)									
ES1215256-001	TTMB02	EP080: C6 - C9 Fraction	----	325 µg/L	124	70	130		
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2370281)									
ES1215256-001	TTMB02	EP080: C6 - C10 Fraction	----	375 µg/L	128	70	130		
EP080: BTEXN (QCLot: 2370281)									
ES1215256-001	TTMB02	EP080: Benzene	71-43-2	25 µg/L	109	70	130		
		EP080: Toluene	108-88-3	25 µg/L	121	70	130		
		EP080: Ethylbenzene	100-41-4	25 µg/L	114	70	130		
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	124	70	130		
		EP080: ortho-Xylene	95-47-6	25 µg/L	117	70	130		
		EP080: Naphthalene	91-20-3	25 µg/L	95.9	70	130		

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.

Sub-Matrix: **WATER**

Laboratory sample ID				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
					MS	MSD	Low	High	Value	Control Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2364329)										
ES1215130-015	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	----	70	130	----	----
ED045G: Chloride Discrete analyser (QCLot: 2364328)										
ES1215130-015	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	----	70	130	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2364620)										
ES1215255-007	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	112	----	70	130	----	----
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	110	----	70	130	----	----
		EG020A-F: Barium	7440-39-3	0.2 mg/L	100	----	70	130	----	----
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	114	----	70	130	----	----
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	104	----	70	130	----	----
		EG020A-F: Copper	7440-50-8	0.2 mg/L	120	----	70	130	----	----
		EG020A-F: Lead	7439-92-1	0.2 mg/L	102	----	70	130	----	----
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	112	----	70	130	----	----
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	104	----	70	130	----	----



Sub-Matrix: WATER				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
					MS	MSD	Low	High	Value	Control Limit
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number							
EG020F: Dissolved Metals by ICP-MS (QCLot: 2364620) - continued										
ES1215255-007	Anonymous	EG020A-F: Vanadium	7440-62-2	0.2 mg/L	108	----	70	130	----	----
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	115	----	70	130	----	----
EG052G: Silica by Discrete Analyser (QCLot: 2364331)										
ES1215256-001	TTMB02	EG052G: Reactive Silica	----	5.0 mg/L	# Not Determined	----	70	130	----	----
EK040P: Fluoride by PC Titrator (QCLot: 2364033)										
ES1215277-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	76.7	----	70	130	----	----
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2368594)										
ES1215255-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	90.3	----	70	130	----	----
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2364327)										
ES1215130-015	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	96.6	----	70	130	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2368593)										
ES1215255-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	96.0	----	70	130	----	----
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2368422)										
ES1215207-003	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	90.2	----	70	130	----	----
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2364330)										
ES1215168-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	121	----	70	130	----	----
EP005: Total Organic Carbon (TOC) (QCLot: 2367661)										
ES1215144-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	107	----	70	130	----	----
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2370648)										
ES1215290-001	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	# Not Determined	----	70	130	----	----
		EP033: Ethene	74-85-1	50.29 µg/L	104	----	70	130	----	----
		EP033: Ethane	74-84-0	54.43 µg/L	105	----	70	130	----	----
		EP033: Propene	115-07-1	73.97 µg/L	112	----	70	130	----	----
		EP033: Propane	74-98-6	78.28 µg/L	101	----	70	130	----	----
		EP033: Butene	25167-67-3	99.61 µg/L	116	----	70	130	----	----
		EP033: Butane	106-97-8	102.18 µg/L	118	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2370281)										
ES1215256-001	TTMB02	EP080: C6 - C9 Fraction	----	325 µg/L	124	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2370281)										
ES1215256-001	TTMB02	EP080: C6 - C10 Fraction	----	375 µg/L	128	----	70	130	----	----
EP080: BTEXN (QCLot: 2370281)										
ES1215256-001	TTMB02	EP080: Benzene	71-43-2	25 µg/L	109	----	70	130	----	----
		EP080: Toluene	108-88-3	25 µg/L	121	----	70	130	----	----
		EP080: Ethylbenzene	100-41-4	25 µg/L	114	----	70	130	----	----
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	124	----	70	130	----	----
		EP080: ortho-Xylene	106-42-3	25 µg/L	117	----	70	130	----	----

Page : 14 of 14
 Work Order : ES1215256
 Client : PARSONS BRINCKERHOFF AUST P/L
 Project : 2162406B



Sub-Matrix: **WATER**

					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit
EP080: BTEXN (QCLot: 2370281) - continued										
ES1215256-001	TTMB02	EP080: Naphthalene	91-20-3	25 µg/L	95.9	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1215256	Page	: 1 of 10
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS NINA PEARSE-HAWKINS	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: npearsehawkins@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 20-JUN-2012
Sampler	: NPH	Issue Date	: 27-JUN-2012
Order number	: ----		
Quote number	: SY/394/09	No. of samples received	: 2
		No. of samples analysed	: 2

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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) TTMB02	18-JUN-2012	---	18-JUN-2012	----	20-JUN-2012	18-JUN-2012	*
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) TTMB02	18-JUN-2012	---	16-JUL-2012	----	20-JUN-2012	16-JUL-2012	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural (EA015) TTMB02	18-JUN-2012	----	----	----	22-JUN-2012	25-JUN-2012	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) TTMB02	18-JUN-2012	---	02-JUL-2012	----	20-JUN-2012	02-JUL-2012	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) TTMB02	18-JUN-2012	---	16-JUL-2012	----	20-JUN-2012	16-JUL-2012	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural (ED045G) TTMB02	18-JUN-2012	---	16-JUL-2012	----	20-JUN-2012	16-JUL-2012	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) TTMB02	18-JUN-2012	---	25-JUN-2012	----	20-JUN-2012	25-JUN-2012	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) TTMB02	18-JUN-2012	---	15-DEC-2012	----	21-JUN-2012	15-DEC-2012	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) S4MB01	19-JUN-2012	---	16-DEC-2012	----	21-JUN-2012	16-DEC-2012	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) TTMB02	18-JUN-2012	---	15-DEC-2012	----	21-JUN-2012	15-DEC-2012	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) S4MB01	19-JUN-2012	---	16-DEC-2012	----	21-JUN-2012	16-DEC-2012	✓
EG052G: Silica by Discrete Analyser							
Clear Plastic Bottle - Natural (EG052G) TTMB02	18-JUN-2012	---	16-JUL-2012	----	20-JUN-2012	16-JUL-2012	✓



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
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) TTMB02	18-JUN-2012	---	16-JUL-2012	----	20-JUN-2012	16-JUL-2012	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) TTMB02	18-JUN-2012	---	16-JUL-2012	----	22-JUN-2012	16-JUL-2012	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) S4MB01	19-JUN-2012	---	17-JUL-2012	----	22-JUN-2012	17-JUL-2012	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) TTMB02	18-JUN-2012	---	20-JUN-2012	----	20-JUN-2012	20-JUN-2012	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) TTMB02	18-JUN-2012	---	16-JUL-2012	----	22-JUN-2012	16-JUL-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) TTMB02	18-JUN-2012	25-JUN-2012	16-JUL-2012	✓	25-JUN-2012	16-JUL-2012	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) S4MB01	19-JUN-2012	25-JUN-2012	17-JUL-2012	✓	25-JUN-2012	17-JUL-2012	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) TTMB02	18-JUN-2012	---	20-JUN-2012	----	20-JUN-2012	20-JUN-2012	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005) TTMB02	18-JUN-2012	----	----	----	22-JUN-2012	16-JUL-2012	✓
Amber TOC Vial - Sulfuric Acid (EP005) S4MB01	19-JUN-2012	----	----	----	22-JUN-2012	17-JUL-2012	✓
EP033: C1 - C4 Hydrocarbon Gases							
Amber VOC Vial - Sulfuric Acid (EP033) TTMB02	18-JUN-2012	----	----	----	25-JUN-2012	02-JUL-2012	✓
Amber VOC Vial - Sulfuric Acid (EP033) S4MB01	19-JUN-2012	----	----	----	25-JUN-2012	03-JUL-2012	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft							
Amber Glass Bottle - Unpreserved (EP071) TTMB02	18-JUN-2012	21-JUN-2012	25-JUN-2012	✓	25-JUN-2012	31-JUL-2012	✓
Amber Glass Bottle - Unpreserved (EP071) S4MB01	19-JUN-2012	21-JUN-2012	26-JUN-2012	✓	25-JUN-2012	31-JUL-2012	✓
EP075(SIM)A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075(SIM)) TTMB02	18-JUN-2012	21-JUN-2012	25-JUN-2012	✓	25-JUN-2012	31-JUL-2012	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) S4MB01	19-JUN-2012	21-JUN-2012	26-JUN-2012	✓	25-JUN-2012	31-JUL-2012	✓



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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) TTMB02	18-JUN-2012	21-JUN-2012	25-JUN-2012	✓	25-JUN-2012	31-JUL-2012	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) S4MB01	19-JUN-2012	21-JUN-2012	26-JUN-2012	✓	25-JUN-2012	31-JUL-2012	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) TTMB02	18-JUN-2012	25-JUN-2012	02-JUL-2012	✓	25-JUN-2012	02-JUL-2012	✓
Amber VOC Vial - Sulfuric Acid (EP080) S4MB01	19-JUN-2012	25-JUN-2012	03-JUL-2012	✓	25-JUN-2012	03-JUL-2012	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080) TTMB02	18-JUN-2012	25-JUN-2012	02-JUL-2012	✓	25-JUN-2012	02-JUL-2012	✓
Amber VOC Vial - Sulfuric Acid (EP080) S4MB01	19-JUN-2012	25-JUN-2012	03-JUL-2012	✓	25-JUN-2012	03-JUL-2012	✓



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	Method	Count		Rate (%)			Quality Control Specification
		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
Ammonia as N by Discrete analyser	EK055G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	14	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	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	17	11.8	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	4	25.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	5	20.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	7	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	14	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	15	13.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	13	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	5	20.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	14	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	6	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	12	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	2	16	12.5	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
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	14	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	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	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	4	25.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	5	20.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	5	20.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	2	6	33.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	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	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	4	25.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	5	20.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	5	20.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	6	16.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	ALS QCS3 requirement
C1 - C4 Gases	EP033	1	19	5.3	5.0	✓	ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	14	7.1	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	5.9	5.0	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	5	20.0	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	15	6.7	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	7.7	5.0	✓	ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	5	20.0	5.0	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	14	7.1	5.0	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	12	8.3	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	16	6.3	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
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids	EA015	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids (High Level)	EA015H	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
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)
Major Anions - Dissolved	ED040F	WATER	APHA 21st ed., 3120. The 0.45um filtered samples are determined by ICP/AES for Sulfur and/or Silicon content and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um 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) Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Total Hardness is calculated based on APHA 21st ed., 2340 B. 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): Samples are 0.45 um filtered prior to analysis. 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.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. 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.
Silica (Reactive) by Discrete Analyser	EG052G	WATER	APHA 21st ed. 4500-SiO2 D: Under Acidic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TPH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Page : 9 of 10
Work Order : ES1215256
Client : PARSONS BRINCKERHOFF AUST P/L
Project : 2162406B



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



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

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	2800446-048	----	Copper	7440-50-8	111 %	87-111%	Recovery greater than upper control limit
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1215130-015	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride Discrete analyser	ES1215130-015	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG052G: Silica by Discrete Analyser	ES1215256-001	TTMB02	Reactive Silica	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP033: C1 - C4 Hydrocarbon Gases	ES1215290-001	Anonymous	Methane	74-82-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural TTMB02	----	----	----	20-JUN-2012	18-JUN-2012	2

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.



Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exist.

Summary of Sample(s) and Requested Analysis

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

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

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005P pH (PC)	WATER - EA010P Conductivity (PC)	WATER - EA015H Total Dissolved Solids - High Level	WATER - EG020F Dissolved Metals by ICPMS	WATER - EG052G Silica by Discrete Analyser	WATER - EK040-P Fluoride(PC)	WATER - EK055G Ammonia as N By Discrete Analyser	WATER - EK067G Total Phosphorus as P By Discrete Analyser
ES1215256-001	18-JUN-2012 13:00	TTMB02	✓	✓	✓	✓	✓	✓	✓	✓
ES1215256-002	19-JUN-2012 10:00	S4MB01				✓			✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EK071G Reactive Phosphorus by Discrete analyser	WATER - EP005 Total Organic Carbon (TOC)	WATER - EP033 C1 - C4 Gases in Water	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)	WATER - NT-04 Nitrite and Nitrate	WATER - W-24 TPH/BTEX/PAH/Phenols
ES1215256-001	18-JUN-2012 13:00	TTMB02	✓	✓	✓	✓	✓	✓	✓
ES1215256-002	19-JUN-2012 10:00	S4MB01		✓	✓				✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER**

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

Method		Due for extraction	Due for analysis	Samples Received		Instructions Received	
Client Sample ID(s)	Container			Date	Evaluation	Date	Evaluation
EA005-P: pH by PC Titrator							
TTMB02	Clear Plastic Bottle - Natural	18-JUN-2012	----	20-JUN-2012	✖	----	----



Requested Deliverables

MR JAMES DUGGLEBY

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

MS NINA PEARSE-HAWKINS

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

THE ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	apinvoices@pb.com.au
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Laboratory Nairr ALS Environmental
 Address: 277-288 Woodpark Road
 SMITHFIELD NSW 2164
 Phone Number: 02 8784 8500
 Contact Name: 02 8784 8555

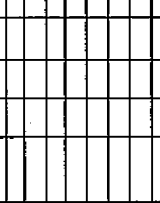
PB Job No.
 2162406

Results Expected By/On: 7 days
 James Duggleby
 Fax Results To: 02 9272 5101
 Phone Number: 9272 5248
 Email Results to: (j.duggleby@ph.com.au / j.duggleby@ph.com.au)
 Quotation Number: SY384709
 Invoice To: James Duggleby
 Head Office, Sydney

HIT

Sample ID	Date sampled	Time	Medium	Preservative Type	Filtered (x)	Containers	Cations (Na, K, Ca, Mg)	Anions (Alkalinity, SO ₄ , Cl, reactive silica)	Disolved Metals (Al, As, Ba, B, Be, Br, Cd, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, Sr, U, V, Zn)	Ammonia as N	Nitrate, nitrite	Flouride	Reactive Phosphorus as P	Total phosphorus as P	TOC	Gases C1-C4 + methane	BTEX/ TPH C6-C9	TPH C10-C38	PAH	Phenols	pH	EC	Total dissolved solids
JVM602	18/6/12	10:00					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SYMM601	17/6/12	10:00					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Environmental Division
 Sydney
 Work Order
ES1215256



Telephone : + 61-2-8784-8555

Remarks
 green bottle to going
 to monitoring for
 remaining
 analytes
 (SYMM601)

Relinquished By: N. Pearse-Hawkins
 Date: 18/6/12
 Company: PB
 Time: 10:12
 Signature: [Signature]

Received By (Name): [Signature]
 Date: 20-6-12
 Company: [Signature]
 Time: 08:45
 Signature: [Signature]

Parsons Brinckerhoff & Young Consultants
PB PARSONS BRINCKERHOFF
 Environmental and Geotechnical Services
 Comments: [Blank]
 George St
 SY NSW 2000

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

Environmental Division

CERTIFICATE OF ANALYSIS

<p>Work Order : ES1215391</p> <p>Client : PARSONS BRINCKERHOFF AUST P/L</p> <p>Contact : MS NINA PEARSE-HAWKINS</p> <p>Address : GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001</p> <p>E-mail : npearsehawkins@pb.com.au</p> <p>Telephone : +61 02 9272 5100</p> <p>Facsimile : +61 02 9272 5101</p> <p>Project : 2162406 B</p> <p>Order number : ----</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : ----</p> <p>Quote number : SY/394/09</p>	<p>Page : 1 of 7</p> <p>Laboratory : Environmental Division Sydney</p> <p>Contact : Loren Schiavon</p> <p>Address : 277-289 Woodpark Road Smithfield NSW Australia 2164</p> <p>E-mail : loren.schiavon@alsglobal.com</p> <p>Telephone : +61 2 8784 8503</p> <p>Facsimile : +61 2 8784 8500</p> <p>QC Level : NEPM 1999 Schedule B(3) and ALS QCS3 requirement</p> <p>Date Samples Received : 21-JUN-2012</p> <p>Issue Date : 28-JUN-2012</p> <p>No. of samples received : 2</p> <p>No. of samples analysed : 2</p>
---	--

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
- Surrogate Control Limits



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Edwandy Fadjar	Organic Coordinator	Sydney Organics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 insufficient sample for analysis.

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

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

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

LOR = Limit of reporting

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

- **EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.**



Analytical Results

Sub-Matrix: WATER

				Client sample ID					
				TTMB01	S4MB01	---	---	---	
				19-JUN-2012 13:00	20-JUN-2012 10:00	---	---	---	
				Client sampling date / time					
Compound	CAS Number	LOR	Unit	ES1215391-001	ES1215391-002	---	---	---	
EA005P: pH by PC Titrator									
pH Value	---	0.01	pH Unit	7.29	7.58	---	---	---	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	---	1	µS/cm	2040	4770	---	---	---	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	1070	3000	---	---	---	
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	434	267	---	---	---	
Total Alkalinity as CaCO3	---	1	mg/L	434	267	---	---	---	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	155	---	---	---	
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L	454	1330	---	---	---	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	75	199	---	---	---	
Magnesium	7439-95-4	1	mg/L	30	43	---	---	---	
Sodium	7440-23-5	1	mg/L	346	770	---	---	---	
Potassium	7440-09-7	1	mg/L	5	8	---	---	---	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.12	---	---	---	---	
Arsenic	7440-38-2	0.001	mg/L	0.001	---	---	---	---	
Beryllium	7440-41-7	0.001	mg/L	<0.001	---	---	---	---	
Barium	7440-39-3	0.001	mg/L	3.92	---	---	---	---	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	---	---	---	---	
Cobalt	7440-48-4	0.001	mg/L	<0.001	---	---	---	---	
Copper	7440-50-8	0.001	mg/L	<0.001	---	---	---	---	
Lead	7439-92-1	0.001	mg/L	<0.001	---	---	---	---	
Manganese	7439-96-5	0.001	mg/L	0.057	---	---	---	---	
Molybdenum	7439-98-7	0.001	mg/L	<0.001	---	---	---	---	
Nickel	7440-02-0	0.001	mg/L	0.005	---	---	---	---	
Selenium	7782-49-2	0.01	mg/L	<0.01	---	---	---	---	
Strontium	7440-24-6	0.001	mg/L	3.17	---	---	---	---	
Uranium	7440-61-1	0.001	mg/L	<0.001	---	---	---	---	
Vanadium	7440-62-2	0.01	mg/L	<0.01	---	---	---	---	
Zinc	7440-66-6	0.005	mg/L	0.035	---	---	---	---	



Analytical Results

Sub-Matrix: WATER

				Client sample ID					
				TTMB01	S4MB01	----	----	----	
				19-JUN-2012 13:00	20-JUN-2012 10:00	----	----	----	
				ES1215391-001	ES1215391-002	----	----	----	
Compound	CAS Number	LOR	Unit						
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L	<0.05	----	----	----	----	
Iron	7439-89-6	0.05	mg/L	0.87	----	----	----	----	
Bromine	7726-95-6	0.1	mg/L	0.7	----	----	----	----	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.10	mg/L	23.9	20.2	----	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.1	----	----	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	1.02	----	----	----	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.01	mg/L	<0.01	----	----	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	----	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	----	----	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.34	----	----	----	----	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	----	0.01	mg/L	0.10	----	----	----	----	
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L	21.5	46.1	----	----	----	
Total Cations	----	0.01	meq/L	21.4	47.2	----	----	----	
Ionic Balance	----	0.01	%	0.22	1.16	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	9	----	----	----	----	
EP033: C1 - C4 Hydrocarbon Gases									
Methane	74-82-8	10	µg/L	7570	----	----	----	----	
Ethene	74-85-1	10	µg/L	<10	----	----	----	----	
Ethane	74-84-0	10	µg/L	<10	----	----	----	----	
Propene	115-07-1	10	µg/L	<10	----	----	----	----	
Propane	74-98-6	10	µg/L	<10	----	----	----	----	
Butene	25167-67-3	10	µg/L	<10	----	----	----	----	
Butane	106-97-8	10	µg/L	<10	----	----	----	----	
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	1.0	µg/L	<1.0	----	----	----	----	



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				TTMB01	S4MB01	---	---	---
				19-JUN-2012 13:00	20-JUN-2012 10:00	---	---	---
Compound	CAS Number	LOR	Unit	ES1215391-001	ES1215391-002	---	---	---
EP075(SIM)A: Phenolic Compounds - Continued								
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	---	---	---	---
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	---	---	---	---
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	---	---	---	---
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	---	---	---	---
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	---	---	---	---
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	---	---	---	---
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	---	---	---	---
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	---	---	---	---
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	---	---	---	---
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	---	---	---	---
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	---	---	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	---	---	---	---
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	---	---	---	---
Acenaphthene	83-32-9	1.0	µg/L	<1.0	---	---	---	---
Fluorene	86-73-7	1.0	µg/L	<1.0	---	---	---	---
Phenanthrene	85-01-8	1.0	µg/L	<1.0	---	---	---	---
Anthracene	120-12-7	1.0	µg/L	<1.0	---	---	---	---
Fluoranthene	206-44-0	1.0	µg/L	<1.0	---	---	---	---
Pyrene	129-00-0	1.0	µg/L	<1.0	---	---	---	---
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	---	---	---	---
Chrysene	218-01-9	1.0	µg/L	<1.0	---	---	---	---
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	---	---	---	---
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	---	---	---	---
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	---	---	---	---
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	---	---	---	---
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	---	---	---	---
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	---	---	---	---
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	---	---	---	---
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	---	---	---	---
C10 - C14 Fraction	----	50	µg/L	<50	---	---	---	---
C15 - C28 Fraction	----	100	µg/L	<100	---	---	---	---
C29 - C36 Fraction	----	50	µg/L	<50	---	---	---	---
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	---	---	---	---

EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				TTMB01	S4MB01	---	---	---
				19-JUN-2012 13:00	20-JUN-2012 10:00	---	---	---
Compound	CAS Number	LOR	Unit	ES1215391-001	ES1215391-002	---	---	---
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft - Continued								
C6 - C10 Fraction	----	20	µg/L	<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	25.2	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	56.2	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	61.9	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	61.7	----	----	----	----
Anthracene-d10	1719-06-8	0.1	%	62.4	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	78.6	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	104	----	----	----	----
Toluene-D8	2037-26-5	0.1	%	104	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	100	----	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	64.1
2-Chlorophenol-D4	93951-73-6	11.3	122.9
2,4,6-Tribromophenol	118-79-6	11.7	144.0
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	19.9	122.8
Anthracene-d10	1719-06-8	23.3	125.8
4-Terphenyl-d14	1718-51-0	20.3	134.5
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: ES1215391	Page	: 1 of 16
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS NINA PEARSE-HAWKINS	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: npearsehawkins@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406 B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 21-JUN-2012
C-O-C number	: ----	Issue Date	: 28-JUN-2012
Sampler	: ----	No. of samples received	: 2
Order number	: ----	No. of samples analysed	: 2
Quote number	: SY/394/09		

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Edwandy Fadjar	Organic Coordinator	Sydney Organics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2368708)									
ES1215391-001	TTMB01	EA005-P: pH Value	----	0.01	pH Unit	7.29	7.30	0.1	0% - 20%
ES1215547-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	9.04	9.07	0.3	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2368707)									
ES1215391-001	TTMB01	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2040	2060	1.0	0% - 20%
ES1215547-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2290	2270	0.9	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2371477)									
ES1215391-001	TTMB01	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	1070	1070	0.4	0% - 20%
EW1201760-005	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	3150	3150	0.2	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2373600)									
ES1215264-001	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	5870	5920	0.8	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2368706)									
ES1215391-001	TTMB01	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	434	441	1.5	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	434	441	1.5	0% - 20%
ES1215547-001	Anonymous	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	238	254	6.7	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	646	635	1.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	884	890	0.7	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2368674)									
ES1215343-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
ES1215524-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	8260	8320	0.8	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2373664)									
ES1215391-002	S4MB01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	155	152	1.8	0% - 20%
ES1215429-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	8	8	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 2368677)									
ES1215391-001	TTMB01	ED045G: Chloride	16887-00-6	1	mg/L	454	451	0.5	0% - 20%
ES1215593-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	9	9	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 2373662)									
ES1215378-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	65	65	0.0	0% - 20%
ES1215420-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	37	37	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2368675)									
ES1215391-001	TTMB01	ED093F: Calcium	7440-70-2	1	mg/L	75	75	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	30	30	0.0	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 (%)
ED093F: Dissolved Major Cations (QC Lot: 2368675) - continued									
ES1215391-001	TTMB01	ED093F: Sodium	7440-23-5	1	mg/L	346	347	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.0	No Limit
ES1215593-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	6	5	0.0	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.0	No Limit
ED093F: Dissolved Major Cations (QC Lot: 2373659)									
ES1215213-017	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	22	23	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	5	6	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	18	18	0.0	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.0	No Limit
ES1215397-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	36	37	3.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	39	40	2.6	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	18	18	0.0	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2369415)									
ES1215391-001	TTMB01	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	3.92	3.84	1.9	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.057	0.054	4.7	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.035	0.037	4.1	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.12	0.12	0.0	0% - 50%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.87	0.83	4.8	0% - 50%
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	0.7	0.6	0.0	No Limit
ES1215459-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.009	0.009	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.040	0.042	5.0	0% - 20%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit



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: 2369415) - continued									
ES1215459-001	Anonymous	EG020A-F: Manganese	7439-96-5	0.001	mg/L	6.52	6.43	1.4	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.102	0.107	4.9	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.063	0.065	4.1	0% - 50%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.38	0.40	4.1	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.97	2.06	4.4	0% - 20%
EG020A-F: Bromine	7726-95-6	0.1	mg/L	0.5	0.5	0.0	No Limit		
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2369416)									
ES1215391-001	TTMB01	EG020B-F: Strontium	7440-24-6	0.001	mg/L	3.17	3.00	5.4	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 2368678)									
ES1215391-001	TTMB01	EG052G: Reactive Silica	----	0.10	mg/L	23.9	24.5	2.2	0% - 20%
EG052G: Silica by Discrete Analyser (QC Lot: 2373663)									
ES1215391-002	S4MB01	EG052G: Reactive Silica	----	0.10	mg/L	20.2	20.3	0.6	0% - 20%
EK040P: Fluoride by PC Titrator (QC Lot: 2368709)									
ES1215391-001	TTMB01	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2370343)									
ES1215340-006	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.10	<0.10	0.0	No Limit
ES1215512-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.08	0.08	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2368673)									
ES1215343-006	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0	No Limit
ES1215524-001	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	0.23	0.24	7.6	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2370342)									
ES1215340-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1215512-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.06	0.06	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2369399)									
ES1215277-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1215340-005	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	0.02	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2368676)									
ES1215391-001	TTMB01	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	0.10	0.10	0.0	0% - 50%
EP005: Total Organic Carbon (TOC) (QC Lot: 2370084)									
ES1215304-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	5	0.0	No Limit
ES1215332-004	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.0	No Limit
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2374810)									
EB1216351-001	Anonymous	EP033: Methane	74-82-8	10	µg/L	3380	3370	0.3	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 (%)
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2374810) - continued									
EB1216351-001	Anonymous	EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit
EM1206967-001	Anonymous	EP033: Methane	74-82-8	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 2374621)									
ES1215389-001	Anonymous	EP075(SIM): Phenol	108-95-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	<2.0	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2374621)									
ES1215389-001	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	0.0	No Limit



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 (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2374621) - continued									
ES1215389-001	Anonymous	EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2373093)									
ES1215084-029	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES1215327-009	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2374620)									
ES1215389-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2373093)									
ES1215084-029	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES1215327-009	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2374620)									
ES1215389-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP080: BTEXN (QC Lot: 2373093)									
ES1215084-029	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES1215327-009	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	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 Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Low			High	
EA010P: Conductivity by PC Titrator (QCLot: 2368707)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	103	92	116
EA015: Total Dissolved Solids (QCLot: 2371477)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	293 mg/L	93.3	70	130
EA015: Total Dissolved Solids (QCLot: 2373600)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	293 mg/L	98.5	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 2368706)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	84.7	75	107
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2368674)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	77	121
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2373664)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	77	121
ED045G: Chloride Discrete analyser (QCLot: 2368677)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	107	79	123
ED045G: Chloride Discrete analyser (QCLot: 2373662)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	99.8	79	123
ED093F: Dissolved Major Cations (QCLot: 2368675)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.9	88	110
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	90	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.9	81	107
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	104	89	109
ED093F: Dissolved Major Cations (QCLot: 2373659)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	91.2	88	110
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	91.2	90	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.2	81	107
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	103	89	109
EG020F: Dissolved Metals by ICP-MS (QCLot: 2369415)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	111	92	112
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.0	88	110
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	102	80	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.0	85	109
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.8	89	107
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	95.9	89	109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.0	87	111



Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2369415) - continued								
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	90	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.6	87	113
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	102	84	114
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.6	89	109
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	87.2	79	119
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	96.1	91	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.3	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	102	71	127
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	90.2	84	114
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2369416)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	96.4	88	112
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG052G: Silica by Discrete Analyser (QCLot: 2368678)								
EG052G: Reactive Silica	----	0.1	mg/L	<0.10	10.0 mg/L	98.5	72	124
EG052G: Silica by Discrete Analyser (QCLot: 2373663)								
EG052G: Reactive Silica	----	0.1	mg/L	<0.10	10.0 mg/L	98.6	72	124
EK040P: Fluoride by PC Titrator (QCLot: 2368709)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	99.6	71	121
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2370343)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1.00 mg/L	100	86	116
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2368673)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	106	78	128
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2370342)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	80	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2369399)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	96.4	67	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2368676)								
EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.50 mg/L	109	85	115
EP005: Total Organic Carbon (TOC) (QCLot: 2370084)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	78	114
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2374810)								
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	90.7	86	108
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	93.5	87	111
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	92.6	87	111
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	96.1	86	112
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	87.3	87	111



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2374810) - continued									
EP033: Butene	25167-67-3	20	µg/L	<20	99.61 µg/L	94.9	87	113	
EP033: Butane	106-97-8	20	µg/L	<20	102.18 µg/L	97.2	87	113	
EP075(SIM)A: Phenolic Compounds (QCLot: 2374621)									
EP075(SIM): Phenol	108-95-2	0.2	µg/L	----	5 µg/L	43.7	24.5	61.9	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Chlorophenol	95-57-8	0.2	µg/L	----	5 µg/L	69.0	63.8	110	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Methylphenol	95-48-7	0.2	µg/L	----	5 µg/L	73.6	55.9	112	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	0.4	µg/L	----	10 µg/L	61.3	42.5	114	
		2	µg/L	<2.0	----	----	----	----	
EP075(SIM): 2-Nitrophenol	88-75-5	0.2	µg/L	----	5 µg/L	77.4	62.7	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.2	µg/L	----	5 µg/L	78.9	59.9	112	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.2	µg/L	----	5 µg/L	66.8	59.3	122	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.2	µg/L	----	5 µg/L	79.6	64.3	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	0.2	µg/L	----	5 µg/L	88.8	63	119	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.2	µg/L	----	5 µg/L	70.6	58.7	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.2	µg/L	----	5 µg/L	71.9	51.2	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Pentachlorophenol	87-86-5	0.4	µg/L	----	10 µg/L	44.0	6.85	95.6	
		2	µg/L	<2.0	----	----	----	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2374621)									
EP075(SIM): Naphthalene	91-20-3	0.2	µg/L	----	5 µg/L	74.9	58.6	119	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Acenaphthylene	208-96-8	0.2	µg/L	----	5 µg/L	69.4	63.6	114	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Acenaphthene	83-32-9	0.2	µg/L	----	5 µg/L	69.3	62.2	113	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Fluorene	86-73-7	0.2	µg/L	----	5 µg/L	69.0	63.9	115	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Phenanthrene	85-01-8	0.2	µg/L	----	5 µg/L	70.8	62.6	116	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Anthracene	120-12-7	0.2	µg/L	----	5 µg/L	70.3	64.3	116	
		1	µg/L	<1.0	----	----	----	----	



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2374621) - continued									
EP075(SIM): Fluoranthene	206-44-0	0.2	µg/L	----	5 µg/L	75.0	63.6	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Pyrene	129-00-0	0.2	µg/L	----	5 µg/L	72.9	63.1	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benz(a)anthracene	56-55-3	0.2	µg/L	----	5 µg/L	68.3	64.1	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Chrysene	218-01-9	0.2	µg/L	----	5 µg/L	81.9	62.5	116	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.2	µg/L	----	5 µg/L	68.5	61.7	119	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.2	µg/L	----	5 µg/L	68.9	61.7	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.2	µg/L	----	5 µg/L	67.6	63.3	117	
		0.5	µg/L	<0.5	----	----	----	----	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.2	µg/L	----	5 µg/L	66.0	59.9	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	----	5 µg/L	71.0	61.2	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	----	5 µg/L	75.9	59.1	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	1	µg/L	<1.0	----	----	----	----	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2373093)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	96.6	75	127	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2374620)									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	200 µg/L	105	58.9	131	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	250 µg/L	115	73.9	138	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	200 µg/L	130	62.7	131	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2373093)									
EP080: C6 - C10 Fraction	----	20	µg/L	<20	310 µg/L	92.0	75	127	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2374620)									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	250 µg/L	70.4	58.9	131	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	350 µg/L	89.1	73.9	138	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----	
		50	µg/L	----	150 µg/L	113	62.7	131	
EP080: BTEXN (QCLot: 2373093)									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	118	70	124	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	115	66	132	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	96.2	70	120	



Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EP080: BTEXN (QCLot: 2373093) - continued								
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	90.8	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	88.3	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	89.8	70	124

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			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%) MS	Recovery Limits (%) Low High	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2368674)							
ES1215343-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	103	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2373664)							
ES1215391-002	S4MB01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride Discrete analyser (QCLot: 2368677)							
ES1215391-001	TTMB01	ED045G: Chloride	16887-00-6	250 mg/L	96.1	70	130
ED045G: Chloride Discrete analyser (QCLot: 2373662)							
ES1215378-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	113	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2369415)							
ES1215413-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	121	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	125	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	117	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	118	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	110	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	114	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	112	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	118	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	110	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	112	70	130
EG020A-F: Zinc	7440-66-6	0.2 mg/L	120	70	130		
EG052G: Silica by Discrete Analyser (QCLot: 2368678)							
ES1215391-001	TTMB01	EG052G: Reactive Silica	----	5.0 mg/L	# Not Determined	70	130
EG052G: Silica by Discrete Analyser (QCLot: 2373663)							
ES1215391-002	S4MB01	EG052G: Reactive Silica	----	5.0 mg/L	# Not Determined	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2368709)							



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EK040P: Fluoride by PC Titrator (QCLot: 2368709) - continued							
ES1215391-001	TTMB01	EK040P: Fluoride	16984-48-8	5.0 mg/L	108	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2370343)							
ES1215340-006	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	102	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2368673)							
ES1215343-006	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	102	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2370342)							
ES1215340-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	94.6	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2369399)							
ES1215277-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	106	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2368676)							
ES1215391-001	TTMB01	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	117	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 2370084)							
ES1215314-003	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	123	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2374810)							
EB1216351-002	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	# Not Determined	70	130
		EP033: Ethene	74-85-1	50.29 µg/L	92.9	70	130
		EP033: Ethane	74-84-0	54.43 µg/L	92.7	70	130
		EP033: Propene	115-07-1	73.97 µg/L	103	70	130
		EP033: Propane	74-98-6	78.28 µg/L	94.2	70	130
		EP033: Butene	25167-67-3	99.61 µg/L	109	70	130
		EP033: Butane	106-97-8	102.18 µg/L	111	70	130
EP075(SIM)A: Phenolic Compounds (QCLot: 2374621)							
ES1215389-001	Anonymous	EP075(SIM): Phenol	108-95-2	20 µg/L	31.9	20	130
		EP075(SIM): 2-Chlorophenol	95-57-8	20 µg/L	70.2	60	130
		EP075(SIM): 2-Nitrophenol	88-75-5	20 µg/L	74.3	60	130
		EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	20 µg/L	81.7	70	130
		EP075(SIM): Pentachlorophenol	87-86-5	20 µg/L	63.8	20	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2374621)							
ES1215389-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	20 µg/L	78.4	70	130
		EP075(SIM): Pyrene	129-00-0	20 µg/L	73.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2373093)							
ES1215084-029	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	110	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2374620)							
ES1215389-001	Anonymous	EP071: C10 - C14 Fraction	----	200 µg/L	105	74	150
		EP071: C15 - C28 Fraction	----	250 µg/L	120	77	153



Sub-Matrix: **WATER**

Laboratory sample ID				Matrix Spike (MS) Report				
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
					MS	Low	High	
Client sample ID	Method: Compound	CAS Number						
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2374620) - continued								
ES1215389-001	Anonymous	EP071: C29 - C36 Fraction	----	200 µg/L	105	67	153	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2373093)								
ES1215084-029	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	103	70	130	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2374620)								
ES1215389-001	Anonymous	EP071: >C10 - C16 Fraction	----	250 µg/L	84.0	74	150	
		EP071: >C16 - C34 Fraction	----	350 µg/L	117	77	153	
		EP071: >C34 - C40 Fraction	----	150 µg/L	100	67	153	
EP080: BTEXN (QCLot: 2373093)								
ES1215084-029	Anonymous	EP080: Benzene	71-43-2	25 µg/L	114	70	130	
		EP080: Toluene	108-88-3	25 µg/L	110	70	130	
		EP080: Ethylbenzene	100-41-4	25 µg/L	103	70	130	
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	100	70	130	
			106-42-3					
		EP080: ortho-Xylene	95-47-6	25 µg/L	104	70	130	
	91-20-3	25 µg/L	100	70	130			

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.

Sub-Matrix: **WATER**

Laboratory sample ID				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
					MS	MSD	Low	High	Value	Control Limit
Client sample ID	Method: Compound	CAS Number								
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2368674)										
ES1215343-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	103	----	70	130	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2373664)										
ES1215391-002	S4MB01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	----	70	130	----	----
ED045G: Chloride Discrete analyser (QCLot: 2368677)										
ES1215391-001	TTMB01	ED045G: Chloride	16887-00-6	250 mg/L	96.1	----	70	130	----	----
ED045G: Chloride Discrete analyser (QCLot: 2373662)										
ES1215378-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	113	----	70	130	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2369415)										
ES1215413-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	121	----	70	130	----	----
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	125	----	70	130	----	----
		EG020A-F: Barium	7440-39-3	0.2 mg/L	117	----	70	130	----	----
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	118	----	70	130	----	----
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	110	----	70	130	----	----



Sub-Matrix: WATER

					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
					MS	MSD	Low	High	Value	Control Limit
EG020F: Dissolved Metals by ICP-MS (QCLot: 2369415) - continued										
ES1215413-001	Anonymous	EG020A-F: Copper	7440-50-8	0.2 mg/L	114	----	70	130	----	----
		EG020A-F: Lead	7439-92-1	0.2 mg/L	112	----	70	130	----	----
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	118	----	70	130	----	----
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	110	----	70	130	----	----
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	112	----	70	130	----	----
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	120	----	70	130	----	----
EG052G: Silica by Discrete Analyser (QCLot: 2368678)										
ES1215391-001	TTMB01	EG052G: Reactive Silica	----	5.0 mg/L	# Not Determined	----	70	130	----	----
EG052G: Silica by Discrete Analyser (QCLot: 2373663)										
ES1215391-002	S4MB01	EG052G: Reactive Silica	----	5.0 mg/L	# Not Determined	----	70	130	----	----
EK040P: Fluoride by PC Titrator (QCLot: 2368709)										
ES1215391-001	TTMB01	EK040P: Fluoride	16984-48-8	5.0 mg/L	108	----	70	130	----	----
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2370343)										
ES1215340-006	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	102	----	70	130	----	----
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2368673)										
ES1215343-006	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	102	----	70	130	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2370342)										
ES1215340-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	94.6	----	70	130	----	----
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2369399)										
ES1215277-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	106	----	70	130	----	----
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2368676)										
ES1215391-001	TTMB01	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	117	----	70	130	----	----
EP005: Total Organic Carbon (TOC) (QCLot: 2370084)										
ES1215314-003	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	123	----	70	130	----	----
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2374810)										
EB1216351-002	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	# Not Determined	----	70	130	----	----
		EP033: Ethene	74-85-1	50.29 µg/L	92.9	----	70	130	----	----
		EP033: Ethane	74-84-0	54.43 µg/L	92.7	----	70	130	----	----
		EP033: Propene	115-07-1	73.97 µg/L	103	----	70	130	----	----
		EP033: Propane	74-98-6	78.28 µg/L	94.2	----	70	130	----	----
		EP033: Butene	25167-67-3	99.61 µg/L	109	----	70	130	----	----
		EP033: Butane	106-97-8	102.18 µg/L	111	----	70	130	----	----
EP075(SIM)A: Phenolic Compounds (QCLot: 2374621)										
ES1215389-001	Anonymous	EP075(SIM): Phenol	108-95-2	20 µg/L	31.9	----	20	130	----	----
		EP075(SIM): 2-Chlorophenol	95-57-8	20 µg/L	70.2	----	60	130	----	----
		EP075(SIM): 2-Nitrophenol	88-75-5	20 µg/L	74.3	----	60	130	----	----
		EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	20 µg/L	81.7	----	70	130	----	----



Sub-Matrix: WATER

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit
EP075(SIM)A: Phenolic Compounds (QCLot: 2374621) - continued										
ES1215389-001	Anonymous	EP075(SIM): Pentachlorophenol	87-86-5	20 µg/L	63.8	----	20	130	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2374621)										
ES1215389-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	20 µg/L	78.4	----	70	130	----	----
		EP075(SIM): Pyrene	129-00-0	20 µg/L	73.5	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2373093)										
ES1215084-029	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	110	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2374620)										
ES1215389-001	Anonymous	EP071: C10 - C14 Fraction	----	200 µg/L	105	----	74	150	----	----
		EP071: C15 - C28 Fraction	----	250 µg/L	120	----	77	153	----	----
		EP071: C29 - C36 Fraction	----	200 µg/L	105	----	67	153	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2373093)										
ES1215084-029	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	103	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2374620)										
ES1215389-001	Anonymous	EP071: >C10 - C16 Fraction	----	250 µg/L	84.0	----	74	150	----	----
		EP071: >C16 - C34 Fraction	----	350 µg/L	117	----	77	153	----	----
		EP071: >C34 - C40 Fraction	----	150 µg/L	100	----	67	153	----	----
EP080: BTEXN (QCLot: 2373093)										
ES1215084-029	Anonymous	EP080: Benzene	71-43-2	25 µg/L	114	----	70	130	----	----
		EP080: Toluene	108-88-3	25 µg/L	110	----	70	130	----	----
		EP080: Ethylbenzene	100-41-4	25 µg/L	103	----	70	130	----	----
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	100	----	70	130	----	----
			106-42-3							
		EP080: ortho-Xylene	95-47-6	25 µg/L	104	----	70	130	----	----
		EP080: Naphthalene	91-20-3	25 µg/L	100	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1215391	Page	: 1 of 11
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS NINA PEARSE-HAWKINS	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: npearsehawkins@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406 B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 21-JUN-2012
C-O-C number	: ----	Issue Date	: 28-JUN-2012
Sampler	: ----	No. of samples received	: 2
Order number	: ----	No. of samples analysed	: 2
Quote number	: SY/394/09		

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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) TTMB01	19-JUN-2012	---	19-JUN-2012	----	22-JUN-2012	19-JUN-2012	*
Clear Plastic Bottle - Natural (EA005-P) S4MB01	20-JUN-2012	---	20-JUN-2012	----	22-JUN-2012	20-JUN-2012	*
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) TTMB01	19-JUN-2012	---	17-JUL-2012	----	22-JUN-2012	17-JUL-2012	✓
Clear Plastic Bottle - Natural (EA010-P) S4MB01	20-JUN-2012	---	18-JUL-2012	----	22-JUN-2012	18-JUL-2012	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural (EA015) TTMB01	19-JUN-2012	----	----	----	25-JUN-2012	26-JUN-2012	✓
Clear Plastic Bottle - Natural (EA015) S4MB01	20-JUN-2012	----	----	----	26-JUN-2012	27-JUN-2012	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) TTMB01	19-JUN-2012	---	03-JUL-2012	----	22-JUN-2012	03-JUL-2012	✓
Clear Plastic Bottle - Natural (ED037-P) S4MB01	20-JUN-2012	---	04-JUL-2012	----	22-JUN-2012	04-JUL-2012	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) TTMB01	19-JUN-2012	---	17-JUL-2012	----	22-JUN-2012	17-JUL-2012	✓
Clear Plastic Bottle - Natural (ED041G) S4MB01	20-JUN-2012	---	18-JUL-2012	----	26-JUN-2012	18-JUL-2012	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural (ED045G) TTMB01	19-JUN-2012	---	17-JUL-2012	----	22-JUN-2012	17-JUL-2012	✓
Clear Plastic Bottle - Natural (ED045G) S4MB01	20-JUN-2012	---	18-JUL-2012	----	26-JUN-2012	18-JUL-2012	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) TTMB01	19-JUN-2012	---	26-JUN-2012	----	22-JUN-2012	26-JUN-2012	✓
Clear Plastic Bottle - Natural (ED093F) S4MB01	20-JUN-2012	---	27-JUN-2012	----	26-JUN-2012	27-JUN-2012	✓



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
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) TTMB01	19-JUN-2012	---	16-DEC-2012	----	25-JUN-2012	16-DEC-2012	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) TTMB01	19-JUN-2012	---	16-DEC-2012	----	25-JUN-2012	16-DEC-2012	✓
EG052G: Silica by Discrete Analyser							
Clear Plastic Bottle - Natural (EG052G) TTMB01	19-JUN-2012	---	17-JUL-2012	----	22-JUN-2012	17-JUL-2012	✓
Clear Plastic Bottle - Natural (EG052G) S4MB01	20-JUN-2012	---	18-JUL-2012	----	26-JUN-2012	18-JUL-2012	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) TTMB01	19-JUN-2012	---	17-JUL-2012	----	22-JUN-2012	17-JUL-2012	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) TTMB01	19-JUN-2012	---	17-JUL-2012	----	25-JUN-2012	17-JUL-2012	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) TTMB01	19-JUN-2012	---	21-JUN-2012	----	22-JUN-2012	21-JUN-2012	*
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) TTMB01	19-JUN-2012	---	17-JUL-2012	----	25-JUN-2012	17-JUL-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) TTMB01	19-JUN-2012	25-JUN-2012	17-JUL-2012	✓	25-JUN-2012	17-JUL-2012	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) TTMB01	19-JUN-2012	---	21-JUN-2012	----	22-JUN-2012	21-JUN-2012	*
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005) TTMB01	19-JUN-2012	----	----	----	25-JUN-2012	17-JUL-2012	✓
EP033: C1 - C4 Hydrocarbon Gases							
Amber VOC Vial - Sulfuric Acid (EP033) TTMB01	19-JUN-2012	----	----	----	27-JUN-2012	03-JUL-2012	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) TTMB01	19-JUN-2012	26-JUN-2012	26-JUN-2012	✓	27-JUN-2012	06-AUG-2012	✓
EP075(SIM)A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075(SIM)) TTMB01	19-JUN-2012	26-JUN-2012	26-JUN-2012	✓	28-JUN-2012	06-AUG-2012	✓



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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) TTMB01	19-JUN-2012	26-JUN-2012	26-JUN-2012	✓	28-JUN-2012	06-AUG-2012	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) TTMB01	19-JUN-2012	26-JUN-2012	03-JUL-2012	✓	26-JUN-2012	03-JUL-2012	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080) TTMB01	19-JUN-2012	26-JUN-2012	03-JUL-2012	✓	26-JUN-2012	03-JUL-2012	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	10	20.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	2	14	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	4	32	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	15	13.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	6	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	5	20.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	4	31	12.9	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	14	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	13	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	33.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	50.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	2	3	66.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	39	10.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	3	13	23.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatle Fraction	EP071	1	3	33.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	4	32	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	6	16.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	5	20.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	31	6.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	33.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	2	3	66.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	39	5.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	4	13	30.8	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
TPH - Semivolatile Fraction	EP071	1	3	33.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	32	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	6	16.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	5	20.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	31	6.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	7.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	33.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	2	3	66.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	39	5.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	2	13	15.4	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	3	33.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	14	7.1	5.0	✓	ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	32	6.3	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.0	5.0	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	5	20.0	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	14	7.1	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	13	7.7	5.0	✓	ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	33.3	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	50.0	5.0	✓	ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	2	3	66.7	5.0	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	39	5.1	5.0	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	3	33.3	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	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
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids	EA015	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
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- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um 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) Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Total Hardness is calculated based on APHA 21st ed., 2340 B. 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): Samples are 0.45 um filtered prior to analysis. 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.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. 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.
Silica (Reactive) by Discrete Analyser	EG052G	WATER	APHA 21st ed. 4500-SiO2 D: Under Acidic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Analytical Methods	Method	Matrix	Method Descriptions
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TPH - Semivolatle Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



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

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1215391-002	S4MB01	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG052G: Silica by Discrete Analyser	ES1215391-001	TTMB01	Reactive Silica	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG052G: Silica by Discrete Analyser	ES1215391-002	S4MB01	Reactive Silica	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP033: C1 - C4 Hydrocarbon Gases	EB1216351-002	Anonymous	Methane	74-82-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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

Matrix: **WATER**

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural TTMB01	----	----	----		22-JUN-2012	19-JUN-2012	3
Clear Plastic Bottle - Natural S4MB01	----	----	----		22-JUN-2012	20-JUN-2012	2
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural TTMB01	----	----	----		22-JUN-2012	21-JUN-2012	1
EK071G: Reactive Phosphorus as P by discrete analyser							



Matrix: **WATER**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK071G: Reactive Phosphorus as P by discrete analyser - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural TTMB01	----	----	----	22-JUN-2012	21-JUN-2012	1

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.**

CHAIN-OF-CUSTODY

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

PB Job No.
2162406

Results Expected By/On: 7 days
 James Duggieby
 Fax Results To: 02 8272 5701
 Fax Number: 9272 5248
 Email Results to: james.duggieby@pb.com.au / james@awkins@pb.com.au
 Quotation Number: SY/384/09
 Invoice To: James Duggieby Head Office, Sydney

Sample I.D	Date sampled	Time	Medium *	Preservative Type	Filtered (x)	Containers	Calcium (Na, K, Ca, Mg)	Anions (Alkalinity, SO4, Cl, reactive silica)	Dissolved Metals (Al, As, Ba, B, Be, Br, Cd, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, Sr, U, V, Zn)	Ammonia as N	Nitrate, nitrite	Fluoride	Reactive Phosphorus as P	Total phosphorus as P	TOC	Gases C1-C4 + methane	BTEX/TPH C6-C9	TPH C10-C36	PAH	Phenols	pH	EC	Total dissolved solids	
JIMBOI	19/6/12	10am					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SAMBOI	20/6/12	10am				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Environmental Division
 Sydney
 Work Order
ES1215391



Telephone : + 61-2-8784 8555

Relinquished By: N. Pearce-Hawkins
 Date: 20/6/12
 Company: PB
 Time: 11:30
 Signature:

Parsons Brinckerhoff & Young Co
PARSONS BRINCKERHOFF
 Environmental and Geotechnical Services

Comments: _____

Sampled By	Company	Signature	Remarks
N/PH	PB		Remaining battery sent on 19/6/12 for SAMBOI

Received By (Name): [Signature]
 Date: 21/6
 Company: PHS
 Time: 05:00
 Signature:

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

CERTIFICATE OF ANALYSIS

Work Order	: ES1215575	Page	: 1 of 7
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS NINA PEARSE-HAWKINS	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
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Project	: 2162406	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 22-JUN-2012
Sampler	: ----	Issue Date	: 29-JUN-2012
Site	: ----		
Quote number	: SY/394/09	No. of samples received	: 2
		No. of samples analysed	: 2

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
- Surrogate Control Limits



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Edwandy Fadjar	Organic Coordinator	Sydney Organics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics
Wisam Marassa	Inorganics Coordinator	Sydney 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 insufficient sample for analysis.

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

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

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

LOR = Limit of reporting

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

- **ED-093T: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.**
 - **EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.**
-



Analytical Results

Incorrect label, should be - S5MB03

Sub-Matrix: WATER				Client sample ID				
				QA2	S4MB03	----	----	----
				21-JUN-2012 15:00	21-JUN-2012 15:00	----	----	----
				ES1215575-001	ES1215575-002	----	----	----
Compound	CAS Number	LOR	Unit					
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.69	7.72	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	4790	4830	----	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	2790	2830	----	----	----
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	1040	1060	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	1040	1060	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	122	122	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	985	1010	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	100	101	----	----	----
Magnesium	7439-95-4	1	mg/L	108	109	----	----	----
Sodium	7440-23-5	1	mg/L	946	924	----	----	----
Potassium	7440-09-7	1	mg/L	17	16	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.01	0.03	----	----	----
Arsenic	7440-38-2	0.001	mg/L	0.007	0.007	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	----
Barium	7440-39-3	0.001	mg/L	0.331	0.335	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	0.144	0.143	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	0.001	0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	0.058	0.062	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Strontium	7440-24-6	0.001	mg/L	5.88	6.24	----	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	0.006	0.014	----	----	----



Analytical Results

Sub-Matrix: WATER

				Client sample ID	QA2	S4MB03			
				Client sampling date / time	21-JUN-2012 15:00	21-JUN-2012 15:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1215575-001	ES1215575-002				
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L	0.07	0.07	----	----	----	----
Iron	7439-89-6	0.05	mg/L	0.37	0.35	----	----	----	----
Bromine	7726-95-6	0.1	mg/L	2.3	2.4	----	----	----	----
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.10	mg/L	17.9	17.9	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	2.46	2.50	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.02	<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.02	<0.01	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.12	0.08	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	----	0.01	mg/L	0.08	0.08	----	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L	51.1	52.2	----	----	----	----
Total Cations	----	0.01	meq/L	55.5	54.6	----	----	----	----
Ionic Balance	----	0.01	%	4.06	2.22	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	<1	<1	----	----	----	----
EP033: C1 - C4 Hydrocarbon Gases									
Methane	74-82-8	10	µg/L	5590	5710	----	----	----	----
Ethene	74-85-1	10	µg/L	<10	<10	----	----	----	----
Ethane	74-84-0	10	µg/L	<10	<10	----	----	----	----
Propene	115-07-1	10	µg/L	<10	<10	----	----	----	----
Propane	74-98-6	10	µg/L	<10	<10	----	----	----	----
Butene	25167-67-3	10	µg/L	<10	<10	----	----	----	----
Butane	106-97-8	10	µg/L	<10	<10	----	----	----	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	1.0	µg/L	<1.0	<1.0	----	----	----	----



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	QA2	S4MB03	---	---	---
				21-JUN-2012 15:00	21-JUN-2012 15:00	---	---	---
				ES1215575-001	ES1215575-002	---	---	---
EP075(SIM)A: Phenolic Compounds - Continued								
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	---	---	---
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	---	---	---
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	<2.0	---	---	---
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	---	---	---
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	<1.0	---	---	---
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	---	---	---
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	---	---	---
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	---	---	---
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	---	---	---
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	---	---	---
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	---	---	---
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	---	---	---
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	---	---	---
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	---	---	---
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	---	---	---
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	---	---	---
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	---	---	---
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	---	---	---
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	---	---	---
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	---	---	---
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	---	---	---
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	<1.0	---	---	---
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	---	---	---
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	---	---	---
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	---	---	---
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	---	---	---
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	---	---	---
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	---	---	---
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	---	---	---
C10 - C14 Fraction	----	50	µg/L	<50	<50	---	---	---
C15 - C28 Fraction	----	100	µg/L	<100	<100	---	---	---
C29 - C36 Fraction	----	50	µg/L	<50	<50	---	---	---
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	---	---	---

EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft



Analytical Results

Sub-Matrix: WATER

				Client sample ID	QA2	S4MB03			
				Client sampling date / time	21-JUN-2012 15:00	21-JUN-2012 15:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1215575-001	ES1215575-002				
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft - Continued									
C6 - C10 Fraction	----	20	µg/L	<20	<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.1	%	16.3	21.0	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	40.2	50.6	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	61.2	61.3	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%	48.3	60.0	----	----	----	----
Anthracene-d10	1719-06-8	0.1	%	73.3	70.4	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	79.1	73.1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.1	%	125	130	----	----	----	----
Toluene-D8	2037-26-5	0.1	%	127	130	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	106	116	----	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	64.1
2-Chlorophenol-D4	93951-73-6	11.3	122.9
2,4,6-Tribromophenol	118-79-6	11.7	144.0
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	19.9	122.8
Anthracene-d10	1719-06-8	23.3	125.8
4-Terphenyl-d14	1718-51-0	20.3	134.5
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: ES1215575	Page	: 1 of 14
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS NINA PEARSE-HAWKINS	Contact	: Loren Schiavon
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Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 22-JUN-2012
Sampler	: ----	Issue Date	: 29-JUN-2012
Order number	: ----		
Quote number	: SY/394/09	No. of samples received	: 2
		No. of samples analysed	: 2

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Edwandy Fadjar	Organic Coordinator	Sydney Organics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics



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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 (%)
EA005P: pH by PC Titrator (QC Lot: 2368915)									
ES1215545-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.68	6.81	1.9	0% - 20%
ES1215566-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.54	7.54	0.0	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2368917)									
ES1215566-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	3890	3920	0.8	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2370324)									
ES1215455-001	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	13800	13600	1.4	0% - 20%
ES1215547-001	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	1410	1440	1.5	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2368914)									
ES1215521-006	Anonymous	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	18	16	9.2	0% - 50%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	18	16	9.2	0% - 50%
ES1215566-002	Anonymous	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	705	700	0.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	705	700	0.7	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2371416)									
ES1215460-021	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	133	133	0.0	0% - 20%
ES1215460-036	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	<10	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 2371415)									
ES1215460-021	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	130	131	0.0	0% - 20%
ES1215460-036	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	320	306	4.7	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2371414)									
ES1215460-021	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	72	73	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	38	38	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	111	115	3.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	78	82	5.4	0% - 20%
ES1215460-038	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	202	195	3.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	34	34	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	47	45	3.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	45	45	0.0	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2369416)									
ES1215391-001	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	3.17	3.00	5.4	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit



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: 2369417)									
ES1215501-011	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.078	0.082	5.3	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.328	0.356	8.2	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.06	0.06	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	16.8	16.2	3.7	0% - 20%
EG020A-F: Bromine	7726-95-6	0.1	mg/L	0.8	0.8	0.0	No Limit		
ES1215575-002	S4MB03	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.007	0.007	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.335	0.337	0.7	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.143	0.145	1.1	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.062	0.061	1.7	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.014	0.013	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.03	0.03	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.07	0.07	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.35	0.35	0.0	No Limit
EG020A-F: Bromine	7726-95-6	0.1	mg/L	2.4	2.4	0.0	0% - 20%		
EG052G: Silica by Discrete Analyser (QC Lot: 2371410)									
ES1215455-001	Anonymous	EG052G: Reactive Silica	----	0.10	mg/L	19.0	19.2	0.8	0% - 20%
ES1215455-010	Anonymous	EG052G: Reactive Silica	----	0.10	mg/L	14.2	14.0	1.1	0% - 20%
EK040P: Fluoride by PC Titrator (QC Lot: 2368916)									
ES1215566-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.3	0.3	0.0	No Limit
ES1215566-002	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.7	0.7	0.0	No Limit



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 (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2371875)									
ES1215545-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.06	83.5	No Limit
ES1215566-005	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.22	0.22	0.0	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2371408)									
ES1215455-001	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.10	<0.10	0.0	No Limit
ES1215455-010	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2371874)									
ES1215492-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.03	0.03	0.0	No Limit
ES1215549-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.22	0.22	4.5	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2371919)									
EP1205011-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.08	0.08	0.0	No Limit
ES1215439-008	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.10	0.10	0.0	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2371417)									
ES1215460-038	Anonymous	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	1.13	1.21	6.8	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 2374289)									
ES1215547-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	11	10	9.5	0% - 50%
ES1215575-002	S4MB03	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.0	No Limit
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2376430)									
EB1216003-001	Anonymous	EP033: Methane	74-82-8	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit
ES1215501-006	Anonymous	EP033: Methane	74-82-8	10	µg/L	2950	2910	1.3	0% - 20%
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2378143)									
EP1205098-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP1205105-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2378143)									
EP1205098-001	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP1205105-003	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 2378143)									
EP1205098-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit

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 Work Order : ES1215575
 Client : PARSONS BRINCKERHOFF AUST P/L
 Project : 2162406



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 (%)
EP080: BTEXN (QC Lot: 2378143) - continued									
EP1205098-001	Anonymous	EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
EP1205105-003	Anonymous	EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	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			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 2368917)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	102	92	116
EA015: Total Dissolved Solids (QCLot: 2370324)								
EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	<10	293 mg/L	99.0	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 2368914)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	94.5	75	107
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2371416)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	77	121
ED045G: Chloride Discrete analyser (QCLot: 2371415)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	106	79	123
ED093F: Dissolved Major Cations (QCLot: 2371414)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.6	88	110
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	# 121	90	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	# 111	81	107
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	# 120	89	109
EG020F: Dissolved Metals by ICP-MS (QCLot: 2369416)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	96.4	88	112
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2369417)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	99.8	92	112
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	107	88	110
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	100	80	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	101	85	109
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	103	89	107
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	102	89	109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	104	87	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	90	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	106	87	113
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	106	84	114
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	89	109
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.1	79	119
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.9	91	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	101	71	127



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2369417) - continued									
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.7	84	114	
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----	
EG052G: Silica by Discrete Analyser (QCLot: 2371410)									
EG052G: Reactive Silica	----	0.1	mg/L	<0.10	10.0 mg/L	100	72	124	
EK040P: Fluoride by PC Titrator (QCLot: 2368916)									
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	98.2	71	121	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2371875)									
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1.00 mg/L	96.8	86	116	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2371408)									
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	78	128	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2371874)									
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	113	80	130	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2371919)									
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	99.0	67	130	
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2371417)									
EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.50 mg/L	110	85	115	
EP005: Total Organic Carbon (TOC) (QCLot: 2374289)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	113	78	114	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2376430)									
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	99.2	86	108	
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	99.3	87	111	
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	97.8	87	111	
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	100	86	112	
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	92.8	87	111	
EP033: Butene	25167-67-3	20	µg/L	<20	99.61 µg/L	96.8	87	113	
EP033: Butane	106-97-8	20	µg/L	<20	102.18 µg/L	99.0	87	113	
EP075(SIM)A: Phenolic Compounds (QCLot: 2370802)									
EP075(SIM): Phenol	108-95-2	0.2	µg/L	----	5 µg/L	43.4	24.5	61.9	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Chlorophenol	95-57-8	0.2	µg/L	----	5 µg/L	69.8	63.8	110	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Methylphenol	95-48-7	0.2	µg/L	----	5 µg/L	72.5	55.9	112	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	0.4	µg/L	----	10 µg/L	64.2	42.5	114	
		2	µg/L	<2.0	----	----	----	----	
EP075(SIM): 2-Nitrophenol	88-75-5	0.2	µg/L	----	5 µg/L	65.9	62.7	117	
		1	µg/L	<1.0	----	----	----	----	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
EP075(SIM)A: Phenolic Compounds (QCLot: 2370802) - continued								
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.2	µg/L	----	5 µg/L	75.2	59.9	112
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.2	µg/L	----	5 µg/L	79.4	59.3	122
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.2	µg/L	----	5 µg/L	79.4	64.3	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	0.2	µg/L	----	5 µg/L	78.4	63	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.2	µg/L	----	5 µg/L	78.7	58.7	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.2	µg/L	----	5 µg/L	78.6	51.2	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pentachlorophenol	87-86-5	0.4	µg/L	----	10 µg/L	62.4	6.85	95.6
		2	µg/L	<2.0	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2370802)								
EP075(SIM): Naphthalene	91-20-3	0.2	µg/L	----	5 µg/L	79.5	58.6	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthylene	208-96-8	0.2	µg/L	----	5 µg/L	81.6	63.6	114
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthene	83-32-9	0.2	µg/L	----	5 µg/L	82.2	62.2	113
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluorene	86-73-7	0.2	µg/L	----	5 µg/L	83.1	63.9	115
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Phenanthrene	85-01-8	0.2	µg/L	----	5 µg/L	70.0	62.6	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Anthracene	120-12-7	0.2	µg/L	----	5 µg/L	71.2	64.3	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluoranthene	206-44-0	0.2	µg/L	----	5 µg/L	74.1	63.6	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pyrene	129-00-0	0.2	µg/L	----	5 µg/L	74.0	63.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benz(a)anthracene	56-55-3	0.2	µg/L	----	5 µg/L	86.7	64.1	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Chrysene	218-01-9	0.2	µg/L	----	5 µg/L	91.7	62.5	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.2	µg/L	----	5 µg/L	91.6	61.7	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.2	µg/L	----	5 µg/L	96.5	61.7	117
		1	µg/L	<1.0	----	----	----	----



Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
Method: Compound	CAS Number	LOR	Unit		Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EP075(SIM): Polynuclear Aromatic Hydrocarbons (QCLot: 2370802) - continued									
EP075(SIM): Benzo(a)pyrene	50-32-8	0.2	µg/L	----	5 µg/L	86.6	63.3	117	
		0.5	µg/L	<0.5	----	----	----	----	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.2	µg/L	----	5 µg/L	84.7	59.9	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	----	5 µg/L	84.8	61.2	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	----	5 µg/L	85.8	59.1	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	1	µg/L	<1.0	----	----	----	----	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2370801)									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	200 µg/L	76.8	58.9	131	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	250 µg/L	108	73.9	138	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	200 µg/L	112	62.7	131	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2378143)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	97.1	75	127	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2370801)									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	250 µg/L	80.5	58.9	131	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	350 µg/L	82.9	73.9	138	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----	
		50	µg/L	----	150 µg/L	105	62.7	131	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2378143)									
EP080: C6 - C10 Fraction	----	20	µg/L	<20	310 µg/L	96.4	75	127	
EP080: BTEXN (QCLot: 2378143)									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	92.6	70	124	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	129	66	132	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	88.9	70	120	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	92.8	69	121	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	93.8	72	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	76.4	70	124	

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			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2371416)							
ES1215460-021	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride Discrete analyser (QCLot: 2371415)							
ES1215460-021	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	113	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2369417)							
ES1215516-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	115	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	103	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	104	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	107	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	110	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	113	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	104	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	114	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	109	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	110	70	130
EG020A-F: Zinc	7440-66-6	0.2 mg/L	118	70	130		
EG052G: Silica by Discrete Analyser (QCLot: 2371410)							
ES1215455-001	Anonymous	EG052G: Reactive Silica	----	5.0 mg/L	83.5	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2368916)							
ES1215566-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	108	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2371875)							
ES1215545-002	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	75.7	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2371408)							
ES1215455-001	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	106	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2371874)							
ES1215492-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	94.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2371919)							
EP1205011-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	103	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2371417)							
ES1215460-038	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	85.9	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 2374289)							
ES1215547-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	122	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2376430)							
ES1215501-007	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	# Not Determined	70	130
		EP033: Ethene	74-85-1	50.29 µg/L	94.0	70	130
		EP033: Ethane	74-84-0	54.43 µg/L	93.3	70	130



Sub-Matrix: **WATER**

				Matrix Spike (MS) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)	
				Concentration	MS	Low	High	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2376430) - continued								
ES1215501-007	Anonymous	EP033: Propene	115-07-1	73.97 µg/L	94.8	70	130	
		EP033: Propane	74-98-6	78.28 µg/L	87.0	70	130	
		EP033: Butene	25167-67-3	99.61 µg/L	91.6	70	130	
		EP033: Butane	106-97-8	102.18 µg/L	93.8	70	130	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2378143)								
EP1205098-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	119	70	130	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2378143)								
EP1205098-001	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	117	70	130	
EP080: BTEXN (QCLot: 2378143)								
EP1205098-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	96.2	70	130	
		EP080: Toluene	108-88-3	25 µg/L	118	70	130	
		EP080: Ethylbenzene	100-41-4	25 µg/L	99.7	70	130	
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	91.5	70	130	
			106-42-3					
		EP080: ortho-Xylene	95-47-6	25 µg/L	98.4	70	130	
	EP080: Naphthalene	91-20-3	25 µg/L	91.4	70	130		

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.

Sub-Matrix: **WATER**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2371416)										
ES1215460-021	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	----	70	130	----	----
ED045G: Chloride Discrete analyser (QCLot: 2371415)										
ES1215460-021	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	113	----	70	130	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2369417)										
ES1215516-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	115	----	70	130	----	----
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	103	----	70	130	----	----
		EG020A-F: Barium	7440-39-3	0.2 mg/L	104	----	70	130	----	----
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	107	----	70	130	----	----
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	110	----	70	130	----	----
		EG020A-F: Copper	7440-50-8	0.2 mg/L	113	----	70	130	----	----
		EG020A-F: Lead	7439-92-1	0.2 mg/L	104	----	70	130	----	----
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	114	----	70	130	----	----
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	109	----	70	130	----	----



Sub-Matrix: WATER					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
						MS	MSD	Low	High	Value	Control Limit
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number								
EG020F: Dissolved Metals by ICP-MS (QCLot: 2369417) - continued											
ES1215516-001	Anonymous	EG020A-F: Vanadium	7440-62-2	0.2 mg/L	110	----	70	130	----	----	
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	118	----	70	130	----	----	
EG052G: Silica by Discrete Analyser (QCLot: 2371410)											
ES1215455-001	Anonymous	EG052G: Reactive Silica	----	5.0 mg/L	83.5	----	70	130	----	----	
EK040P: Fluoride by PC Titrator (QCLot: 2368916)											
ES1215566-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	108	----	70	130	----	----	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2371875)											
ES1215545-002	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	75.7	----	70	130	----	----	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2371408)											
ES1215455-001	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	106	----	70	130	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2371874)											
ES1215492-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	94.0	----	70	130	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2371919)											
EP1205011-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	103	----	70	130	----	----	
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2371417)											
ES1215460-038	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	85.9	----	70	130	----	----	
EP005: Total Organic Carbon (TOC) (QCLot: 2374289)											
ES1215547-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	122	----	70	130	----	----	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2376430)											
ES1215501-007	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	# Not Determined	----	70	130	----	----	
		EP033: Ethene	74-85-1	50.29 µg/L	94.0	----	70	130	----	----	
		EP033: Ethane	74-84-0	54.43 µg/L	93.3	----	70	130	----	----	
		EP033: Propene	115-07-1	73.97 µg/L	94.8	----	70	130	----	----	
		EP033: Propane	74-98-6	78.28 µg/L	87.0	----	70	130	----	----	
		EP033: Butene	25167-67-3	99.61 µg/L	91.6	----	70	130	----	----	
		EP033: Butane	106-97-8	102.18 µg/L	93.8	----	70	130	----	----	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2378143)											
EP1205098-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	119	----	70	130	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2378143)											
EP1205098-001	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	117	----	70	130	----	----	
EP080: BTEXN (QCLot: 2378143)											
EP1205098-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	96.2	----	70	130	----	----	
		EP080: Toluene	108-88-3	25 µg/L	118	----	70	130	----	----	
		EP080: Ethylbenzene	100-41-4	25 µg/L	99.7	----	70	130	----	----	
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	91.5	----	70	130	----	----	
		EP080: ortho-Xylene	106-42-3	25 µg/L	98.4	----	70	130	----	----	



Sub-Matrix: **WATER**

					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit
EP080: BTEXN (QCLot: 2378143) - continued										
EP1205098-001	Anonymous	EP080: Naphthalene	91-20-3	25 µg/L	91.4	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1215575	Page	: 1 of 9
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS NINA PEARSE-HAWKINS	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: npearsehawkins@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 22-JUN-2012
Sampler	: ----	Issue Date	: 29-JUN-2012
Order number	: ----		
Quote number	: SY/394/09	No. of samples received	: 2
		No. of samples analysed	: 2

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	
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) QA2,	S4MB03	21-JUN-2012	---	21-JUN-2012	----	22-JUN-2012	21-JUN-2012	*
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) QA2,	S4MB03	21-JUN-2012	---	19-JUL-2012	----	22-JUN-2012	19-JUL-2012	✓
EA015: Total Dissolved Solids								
Clear Plastic Bottle - Natural (EA015H) QA2,	S4MB03	21-JUN-2012	----	----	----	25-JUN-2012	28-JUN-2012	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) QA2,	S4MB03	21-JUN-2012	---	05-JUL-2012	----	22-JUN-2012	05-JUL-2012	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) QA2,	S4MB03	21-JUN-2012	---	19-JUL-2012	----	25-JUN-2012	19-JUL-2012	✓
ED045G: Chloride Discrete analyser								
Clear Plastic Bottle - Natural (ED045G) QA2,	S4MB03	21-JUN-2012	---	19-JUL-2012	----	25-JUN-2012	19-JUL-2012	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) QA2,	S4MB03	21-JUN-2012	---	28-JUN-2012	----	26-JUN-2012	28-JUN-2012	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) QA2,	S4MB03	21-JUN-2012	---	18-DEC-2012	----	25-JUN-2012	18-DEC-2012	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) QA2,	S4MB03	21-JUN-2012	---	18-DEC-2012	----	25-JUN-2012	18-DEC-2012	✓
EG052G: Silica by Discrete Analyser								
Clear Plastic Bottle - Natural (EG052G) QA2,	S4MB03	21-JUN-2012	---	19-JUL-2012	----	25-JUN-2012	19-JUL-2012	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) QA2,	S4MB03	21-JUN-2012	---	19-JUL-2012	----	22-JUN-2012	19-JUL-2012	✓



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	
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) QA2,	S4MB03	21-JUN-2012	---	19-JUL-2012	----	26-JUN-2012	19-JUL-2012	✓
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) QA2,	S4MB03	21-JUN-2012	---	23-JUN-2012	----	22-JUN-2012	23-JUN-2012	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) QA2,	S4MB03	21-JUN-2012	---	19-JUL-2012	----	26-JUN-2012	19-JUL-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) QA2,	S4MB03	21-JUN-2012	26-JUN-2012	19-JUL-2012	✓	26-JUN-2012	19-JUL-2012	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) QA2,	S4MB03	21-JUN-2012	---	23-JUN-2012	----	22-JUN-2012	23-JUN-2012	✓
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005) QA2,	S4MB03	21-JUN-2012	----	----	----	27-JUN-2012	19-JUL-2012	✓
EP033: C1 - C4 Hydrocarbon Gases								
Amber VOC Vial - Sulfuric Acid (EP033) QA2,	S4MB03	21-JUN-2012	---	----	----	28-JUN-2012	05-JUL-2012	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) QA2,	S4MB03	21-JUN-2012	25-JUN-2012	28-JUN-2012	✓	26-JUN-2012	04-AUG-2012	✓
EP075(SIM)A: Phenolic Compounds								
Amber Glass Bottle - Unpreserved (EP075(SIM)) QA2,	S4MB03	21-JUN-2012	25-JUN-2012	28-JUN-2012	✓	26-JUN-2012	04-AUG-2012	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM)) QA2,	S4MB03	21-JUN-2012	25-JUN-2012	28-JUN-2012	✓	26-JUN-2012	04-AUG-2012	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) QA2,	S4MB03	21-JUN-2012	28-JUN-2012	05-JUL-2012	✓	28-JUN-2012	05-JUL-2012	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080) QA2,	S4MB03	21-JUN-2012	28-JUN-2012	05-JUL-2012	✓	28-JUN-2012	05-JUL-2012	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	17	11.8	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	5	20.0	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
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	7	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	2	13	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	15	13.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	6	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	2	12	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	2	15	13.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	5	20.0	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
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	6	16.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	5	20.0	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
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	6	16.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	18	5.6	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	14	7.1	5.0	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	13	7.7	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	19	5.3	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	6	16.7	5.0	✓	ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	12	8.3	5.0	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	16	6.3	5.0	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	15	6.7	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
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids (High Level)	EA015H	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
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- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um 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) Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Total Hardness is calculated based on APHA 21st ed., 2340 B. 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): Samples are 0.45 um filtered prior to analysis. 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.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. 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.
Silica (Reactive) by Discrete Analyser	EG052G	WATER	APHA 21st ed. 4500-SiO2 D: Under Acidic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Analytical Methods	Method	Matrix	Method Descriptions
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TPH - Semivolatle Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



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

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	2808046-056	----	Magnesium	7439-95-4	121 %	90-110%	Recovery greater than upper control limit
ED093F: Dissolved Major Cations	2808046-056	----	Sodium	7440-23-5	111 %	81-107%	Recovery greater than upper control limit
ED093F: Dissolved Major Cations	2808046-056	----	Potassium	7440-09-7	120 %	89-109%	Recovery greater than upper control limit
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1215460-021	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP033: C1 - C4 Hydrocarbon Gases	ES1215501-007	Anonymous	Methane	74-82-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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

Matrix: **WATER**

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural QA2,	S4MB03	----	----	----	22-JUN-2012	21-JUN-2012	1

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.

Environmental Division

CERTIFICATE OF ANALYSIS

<p>Work Order : ES1216197</p> <p>Client : PARSONS BRINCKERHOFF AUST P/L</p> <p>Contact : MS NINA PEARSE-HAWKINS</p> <p>Address : GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001</p> <p>E-mail : npearsehawkins@pb.com.au</p> <p>Telephone : +61 02 9272 5100</p> <p>Facsimile : +61 02 9272 5101</p> <p>Project : 2162406B</p> <p>Order number : ----</p> <p>C-O-C number : ----</p> <p>Sampler : NPH</p> <p>Site : ----</p> <p>Quote number : SY/394/09</p>	<p>Page : 1 of 7</p> <p>Laboratory : Environmental Division Sydney</p> <p>Contact : Loren Schiavon</p> <p>Address : 277-289 Woodpark Road Smithfield NSW Australia 2164</p> <p>E-mail : loren.schiavon@alsglobal.com</p> <p>Telephone : +61 2 8784 8503</p> <p>Facsimile : +61 2 8784 8500</p> <p>QC Level : NEPM 1999 Schedule B(3) and ALS QCS3 requirement</p> <p>Date Samples Received : 29-JUN-2012</p> <p>Issue Date : 06-JUL-2012</p> <p>No. of samples received : 1</p> <p>No. of samples analysed : 1</p>
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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
- Surrogate Control Limits



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics
Raymond Commodor	Instrument Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 insufficient sample for analysis.

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

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

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

LOR = Limit of reporting

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

- **EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.**
-



Analytical Results

Sub-Matrix: **WATER**

			Client sample ID	TTMB03				
			Client sampling date / time	27-JUN-2012 15:00				
Compound	CAS Number	LOR	Unit	ES1216197-001				
EA005P: pH by PC Titrator								
pH Value		0.01	pH Unit	9.91				
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C		1	µS/cm	2690				
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	1410				
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	300				
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	116				
Total Alkalinity as CaCO3		1	mg/L	415				
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2				
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	620				
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	2				
Magnesium	7439-95-4	1	mg/L	3				
Sodium	7440-23-5	1	mg/L	600				
Potassium	7440-09-7	1	mg/L	7				
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.05				
Arsenic	7440-38-2	0.001	mg/L	0.002				
Beryllium	7440-41-7	0.001	mg/L	<0.001				
Barium	7440-39-3	0.001	mg/L	0.438				
Cadmium	7440-43-9	0.0001	mg/L	<0.0001				
Cobalt	7440-48-4	0.001	mg/L	<0.001				
Copper	7440-50-8	0.001	mg/L	0.003				
Lead	7439-92-1	0.001	mg/L	<0.001				
Manganese	7439-96-5	0.001	mg/L	0.004				
Molybdenum	7439-98-7	0.001	mg/L	0.003				
Nickel	7440-02-0	0.001	mg/L	<0.001				
Selenium	7782-49-2	0.01	mg/L	<0.01				
Strontium	7440-24-6	0.001	mg/L	0.413				
Uranium	7440-61-1	0.001	mg/L	<0.001				
Vanadium	7440-62-2	0.01	mg/L	<0.01				
Zinc	7440-66-6	0.005	mg/L	0.037				



Analytical Results

Sub-Matrix: **WATER**

				Client sample ID	TTMB03				
				Client sampling date / time	27-JUN-2012 15:00				
Compound	CAS Number	LOR	Unit		ES1216197-001				
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L		0.10				
Iron	7439-89-6	0.05	mg/L		<0.05				
Bromine	7726-95-6	0.1	mg/L		0.8				
EG052G: Silica by Discrete Analyser									
Reactive Silica		0.10	mg/L		6.06				
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		0.7				
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		2.53				
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N		0.01	mg/L		<0.01				
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01				
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N		0.01	mg/L		<0.01				
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P		0.01	mg/L		0.13				
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P		0.01	mg/L		<0.01				
EN055: Ionic Balance									
Total Anions		0.01	meq/L		25.8				
Total Cations		0.01	meq/L		26.6				
Ionic Balance		0.01	%		1.49				
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon		1	mg/L		22				
EP033: C1 - C4 Hydrocarbon Gases									
Methane	74-82-8	10	µg/L		54800				
Ethene	74-85-1	10	µg/L		<10				
Ethane	74-84-0	10	µg/L		<10				
Propene	115-07-1	10	µg/L		<10				
Propane	74-98-6	10	µg/L		<10				
Butene	25167-67-3	10	µg/L		<10				
Butane	106-97-8	10	µg/L		<10				
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	1.0	µg/L		<1.0				



Analytical Results

Sub-Matrix: WATER

Client sample ID

TTMB03

Client sampling date / time

27-JUN-2012 15:00

Compound	CAS Number	LOR	Unit	ES1216197-001				
EP075(SIM)A: Phenolic Compounds - Continued								
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	----	----	----	----
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	----	----	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	----	----	----	----
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	----	----	----	----
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	----	----	----	----
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	----	----	----	----
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	----	----	----	----
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	----	----	----	----
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	----	----	----	----
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	----	----	----	----
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1,2,3-cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (WHO)	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----



Analytical Results

Sub-Matrix: WATER

Client sample ID

TTMB03

Client sampling date / time

27-JUN-2012 15:00

Compound	CAS Number	LOR	Unit	ES1216197-001	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	20	µg/L	<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	19.4	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	39.8	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	54.7	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	37.8	----	----	----	----
Anthracene-d10	1719-06-8	0.1	%	45.4	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	49.0	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	98.1	----	----	----	----
Toluene-D8	2037-26-5	0.1	%	112	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	99.5	----	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	64.1
2-Chlorophenol-D4	93951-73-6	11.3	122.9
2,4,6-Tribromophenol	118-79-6	11.7	144.0
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	19.9	122.8
Anthracene-d10	1719-06-8	23.3	125.8
4-Terphenyl-d14	1718-51-0	20.3	134.5
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: ES1216197	Page	: 1 of 16
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS NINA PEARSE-HAWKINS	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: npearsehawkins@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 29-JUN-2012
Sampler	: NPH	Issue Date	: 06-JUL-2012
Order number	: ----		
Quote number	: SY/394/09	No. of samples received	: 1
		No. of samples analysed	: 1

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics
Raymond Commodor	Instrument Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2382848)									
ES1216142-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.05	8.06	0.1	0% - 20%
ES1216194-007	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.76	7.80	0.5	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2382847)									
ES1216142-005	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4200	4210	0.2	0% - 20%
ES1216194-007	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4610	4560	1.1	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2384740)									
ES1215947-001	Anonymous	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	3440	3260	5.3	0% - 20%
ES1216197-001	TTMB03	EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	1410	1420	0.4	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2382846)									
ES1216142-005	Anonymous	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	669	674	0.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	669	674	0.7	0% - 20%
ES1216194-007	Anonymous	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	515	512	0.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	515	512	0.6	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2381112)									
ES1216137-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	667	671	0.6	0% - 20%
ES1216151-009	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	82	82	0.0	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 2381111)									
ES1216137-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3150	3200	1.3	0% - 20%
ES1216151-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	405	405	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2381109)									
ES1216137-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	188	196	3.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	306	318	3.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2020	2060	2.1	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	12	12	0.0	0% - 50%
ES1216186-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	154	165	6.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1200	1300	7.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	16100	16800	4.1	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	346	357	3.0	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2383921)									
ES1216091-001	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	0.931	0.932	0.0	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit



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: 2383921) - continued									
ES1216091-011	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	0.980	1.03	4.9	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	0.002	0.002	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2383923)									
ES1216174-005	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	<0.1	0.0	No Limit		
ES1216278-006	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.004	0.005	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.010	0.008	14.5	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.82	0.84	3.0	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.30	0.29	0.0	No Limit
EG020A-F: Bromine	7726-95-6	0.1	mg/L	0.3	0.3	0.0	No Limit		
EG052G: Silica by Discrete Analyser (QC Lot: 2381114)									
ES1216150-001	Anonymous	EG052G: Reactive Silica	----	0.10	mg/L	22.7	22.8	0.3	0% - 20%
EK040P: Fluoride by PC Titrator (QC Lot: 2382849)									



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 (%)
EK040P: Fluoride by PC Titrator (QC Lot: 2382849) - continued									
ES1216197-001	TTMB03	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.7	0.7	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2383186)									
ES1216072-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.04	88.9	No Limit
ES1216250-005	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.06	32.9	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2381115)									
ES1216186-001	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1216229-008	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2383187)									
ES1216144-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.01	0.0	No Limit
ES1216250-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.07	1.08	0.0	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2387636)									
ES1216062-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.03	0.02	0.0	No Limit
ES1216151-006	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.18	1.14	4.0	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2381113)									
ES1216145-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	31.0	31.9	2.7	0% - 20%
EP005: Total Organic Carbon (TOC) (QC Lot: 2381999)									
ES1216174-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.0	No Limit
ES1216211-005	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	4	4	0.0	No Limit
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2388250)									
EB1217018-001	Anonymous	EP033: Methane	74-82-8	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit
EM1207338-003	Anonymous	EP033: Methane	74-82-8	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 2382540)									
ES1216048-026	Anonymous	EP075(SIM): Phenol	108-95-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	<1.0	0.0	No Limit



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 (%)
EP075(SIM)A: Phenolic Compounds (QC Lot: 2382540) - continued									
ES1216048-026	Anonymous	EP075(SIM): 2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	<2.0	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	0.0	No Limit
ES1215905-001	Anonymous	EP075(SIM): Phenol	108-95-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	<2.0	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	0.0	No Limit
		EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2382540)							
ES1216048-026	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1,2,3-cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		ES1215905-001	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
EP075(SIM): Naphthalene	91-20-3			1.0	µg/L	<1.0	<1.0	0.0	No Limit
EP075(SIM): Acenaphthylene	208-96-8			1.0	µg/L	<1.0	<1.0	0.0	No Limit
EP075(SIM): Acenaphthene	83-32-9			1.0	µg/L	<1.0	<1.0	0.0	No Limit



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 (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2382540) - continued									
ES1215905-001	Anonymous	EP075(SIM): Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	0.0	No Limit
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	0.0	No Limit		
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2381317)									
ES1215943-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	140	140	0.0	No Limit
ES1215943-011	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	970	1050	7.8	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2382541)									
ES1216048-026	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
ES1215905-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2381317)									
ES1215943-002	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	180	180	0.0	No Limit
ES1215943-011	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	960	1040	7.9	0% - 20%
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2382541)									
ES1216048-026	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
ES1215905-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
EP080: BTEXN (QC Lot: 2381317)									
ES1215943-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	5	5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	3	3	0.0	No Limit
		EP080: ortho-Xylene	106-42-3	2	µg/L	<2	<2	0.0	No Limit

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 Client : PARSONS BRINCKERHOFF AUST P/L
 Project : 2162406B



Sub-Matrix: **WATER**

Laboratory Duplicate (DUP) Report

<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD (%)</i>	<i>Recovery Limits (%)</i>
EP080: BTEXN (QC Lot: 2381317) - continued									
ES1215943-002	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	6	6	0.0	No Limit
ES1215943-011	Anonymous	EP080: Benzene	71-43-2	1	µg/L	29	30	0.0	0% - 20%
		EP080: Toluene	108-88-3	2	µg/L	3	<2	40.9	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	43	45	4.6	0% - 20%
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	10	9	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	3	2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	19	20	7.3	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 Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)
Method: Compound	CAS Number	LOR	Unit			LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 2382847)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	101	92	116
EA015: Total Dissolved Solids (QCLot: 2384740)								
EA015: Total Dissolved Solids @180°C	GIS-210-010	1	mg/L	<1	293 mg/L	98.8	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 2382846)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	92.9	75	107
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2381112)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	106	77	121
ED045G: Chloride Discrete analyser (QCLot: 2381111)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	99.7	79	123
ED093F: Dissolved Major Cations (QCLot: 2381109)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	106	88	110
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	107	90	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.9	81	107
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	100	89	109
EG020F: Dissolved Metals by ICP-MS (QCLot: 2383921)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	91.4	88	112
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2383923)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	100	92	112
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.8	88	110
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	97.7	80	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	95.9	85	109
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.3	89	107
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	95.9	89	109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.5	87	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.3	90	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.8	87	113
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	102	84	114
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.7	89	109
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	106	79	119
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	94.7	91	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.5	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	111	71	127



Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Result	Spike	Spike Recovery (%)	Recovery Limits (%)
				Concentration		LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2383923) - continued								
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.7	84	114
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG052G: Silica by Discrete Analyser (QCLot: 2381114)								
EG052G: Reactive Silica	----	0.1	mg/L	<0.10	10.0 mg/L	104	72	124
EK040P: Fluoride by PC Titrator (QCLot: 2382849)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	98.4	71	121
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2383186)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1.00 mg/L	100	86	116
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2381115)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	105	78	128
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2383187)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	80	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2387636)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	93.6	67	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2381113)								
EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.50 mg/L	106	85	115
EP005: Total Organic Carbon (TOC) (QCLot: 2381999)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	112	78	114
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2388250)								
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	100	86	108
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	102	87	111
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	100	87	111
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	103	86	112
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	94.5	87	111
EP033: Butene	25167-67-3	20	µg/L	<20	99.61 µg/L	101	87	113
EP033: Butane	106-97-8	20	µg/L	<20	102.18 µg/L	102	87	113
EP075(SIM)A: Phenolic Compounds (QCLot: 2382540)								
EP075(SIM): Phenol	108-95-2	0.2	µg/L	----	5 µg/L	32.6	24.5	61.9
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2-Chlorophenol	95-57-8	0.2	µg/L	----	5 µg/L	68.3	63.8	110
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2-Methylphenol	95-48-7	0.2	µg/L	----	5 µg/L	68.2	55.9	112
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	0.4	µg/L	----	10 µg/L	60.5	42.5	114
		2	µg/L	<2.0	----	----	----	----
EP075(SIM): 2-Nitrophenol	88-75-5	0.2	µg/L	----	5 µg/L	70.7	62.7	117
		1	µg/L	<1.0	----	----	----	----



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
EP075(SIM)A: Phenolic Compounds (QCLot: 2382540) - continued								
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.2	µg/L	----	5 µg/L	75.0	59.9	112
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.2	µg/L	----	5 µg/L	72.6	59.3	122
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.2	µg/L	----	5 µg/L	70.6	64.3	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	0.2	µg/L	----	5 µg/L	69.7	63	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.2	µg/L	----	5 µg/L	70.6	58.7	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.2	µg/L	----	5 µg/L	78.4	51.2	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pentachlorophenol	87-86-5	0.4	µg/L	----	10 µg/L	59.6	6.85	95.6
		2	µg/L	<2.0	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2382540)								
EP075(SIM): Naphthalene	91-20-3	0.2	µg/L	----	5 µg/L	65.3	58.6	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthylene	208-96-8	0.2	µg/L	----	5 µg/L	78.0	63.6	114
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthene	83-32-9	0.2	µg/L	----	5 µg/L	66.4	62.2	113
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluorene	86-73-7	0.2	µg/L	----	5 µg/L	65.3	63.9	115
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Phenanthrene	85-01-8	0.2	µg/L	----	5 µg/L	67.1	62.6	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Anthracene	120-12-7	0.2	µg/L	----	5 µg/L	68.6	64.3	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluoranthene	206-44-0	0.2	µg/L	----	5 µg/L	70.7	63.6	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pyrene	129-00-0	0.2	µg/L	----	5 µg/L	72.9	63.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benz(a)anthracene	56-55-3	0.2	µg/L	----	5 µg/L	73.5	64.1	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Chrysene	218-01-9	0.2	µg/L	----	5 µg/L	77.2	62.5	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.2	µg/L	----	5 µg/L	74.7	61.7	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.2	µg/L	----	5 µg/L	72.7	61.7	117
		1	µg/L	<1.0	----	----	----	----



Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Result	Spike	Spike Recovery (%)	Recovery Limits (%)
				Concentration		LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2382540) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.2	µg/L	----	5 µg/L	74.4	63.3	117
		0.5	µg/L	<0.5	----	----	----	----
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.2	µg/L	----	5 µg/L	68.7	59.9	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	----	5 µg/L	67.8	61.2	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	----	5 µg/L	73.0	59.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	1	µg/L	<1.0	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2381317)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	117	75	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2382541)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	200 µg/L	85.3	58.9	131
EP071: C15 - C28 Fraction	----	100	µg/L	<100	250 µg/L	110	73.9	138
EP071: C29 - C36 Fraction	----	50	µg/L	<50	200 µg/L	102	62.7	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2381317)								
EP080: C6 - C10 Fraction	----	20	µg/L	<20	310 µg/L	120	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2382541)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	250 µg/L	69.4	58.9	131
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	350 µg/L	83.7	73.9	138
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
		50	µg/L	----	150 µg/L	103	62.7	131
EP080: BTEXN (QCLot: 2381317)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	87.6	70	124
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	91.2	66	132
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	95.9	70	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	95.5	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	95.8	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	106	70	124

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			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2381112)							
ES1216137-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride Discrete analyser (QCLot: 2381111)							
ES1216137-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2383923)							
ES1216174-006	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	128	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	124	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	120	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	121	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	119	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	127	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	113	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	# Not Determined	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	114	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	128	70	130
EG020A-F: Zinc	7440-66-6	0.2 mg/L	116	70	130		
EG052G: Silica by Discrete Analyser (QCLot: 2381114)							
ES1216150-001	Anonymous	EG052G: Reactive Silica	----	5.0 mg/L	# Not Determined	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2382849)							
ES1216197-001	TTMB03	EK040P: Fluoride	16984-48-8	5.0 mg/L	106	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2383186)							
ES1216072-002	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	102	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2381115)							
ES1216186-001	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	83.4	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2383187)							
ES1216144-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	92.4	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2387636)							
ES1216062-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	98.2	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2381113)							
ES1216145-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	# Not Determined	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 2381999)							
ES1216174-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	97.3	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2388250)							
EB1217227-003	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	88.4	70	130
		EP033: Ethene	74-85-1	50.29 µg/L	91.8	70	130
		EP033: Ethane	74-84-0	54.43 µg/L	92.7	70	130



Sub-Matrix: WATER

Laboratory sample ID				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2388250) - continued							
EB1217227-003	Anonymous	EP033: Propene	115-07-1	73.97 µg/L	92.8	70	130
		EP033: Propane	74-98-6	78.28 µg/L	86.9	70	130
		EP033: Butene	25167-67-3	99.61 µg/L	92.2	70	130
		EP033: Butane	106-97-8	102.18 µg/L	95.9	70	130
EP075(SIM)A: Phenolic Compounds (QCLot: 2382540)							
ES1216048-027	Anonymous	EP075(SIM): Phenol	108-95-2	20 µg/L	30.6	20	130
		EP075(SIM): 2-Chlorophenol	95-57-8	20 µg/L	73.9	60	130
		EP075(SIM): 2-Nitrophenol	88-75-5	20 µg/L	70.4	60	130
		EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	20 µg/L	81.7	70	130
		EP075(SIM): Pentachlorophenol	87-86-5	20 µg/L	82.6	20	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2382540)							
ES1216048-027	Anonymous	EP075(SIM): Acenaphthene	83-32-9	20 µg/L	77.1	70	130
		EP075(SIM): Pyrene	129-00-0	20 µg/L	82.2	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2381317)							
ES1215943-002	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	119	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2382541)							
ES1216048-027	Anonymous	EP071: C10 - C14 Fraction	----	200 µg/L	106	74	150
		EP071: C15 - C28 Fraction	----	250 µg/L	137	77	153
		EP071: C29 - C36 Fraction	----	200 µg/L	105	67	153
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2381317)							
ES1215943-002	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	119	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2382541)							
ES1216048-027	Anonymous	EP071: >C10 - C16 Fraction	----	250 µg/L	86.0	74	150
		EP071: >C16 - C34 Fraction	----	350 µg/L	123	77	153
		EP071: >C34 - C40 Fraction	----	150 µg/L	98.8	67	153
EP080: BTEXN (QCLot: 2381317)							
ES1215943-002	Anonymous	EP080: Benzene	71-43-2	25 µg/L	87.2	70	130
		EP080: Toluene	108-88-3	25 µg/L	94.1	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	96.6	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	95.3	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	92.9	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	79.8	70	130

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.

Sub-Matrix: WATER

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
					MS	MSD	Low	High	Value	Control Limit
ED045G: Chloride Discrete analyser (QCLot: 2381111)										
ES1216137-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	----	70	130	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2381112)										
ES1216137-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	----	70	130	----	----
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2381113)										
ES1216145-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	# Not Determined	----	70	130	----	----
EG052G: Silica by Discrete Analyser (QCLot: 2381114)										
ES1216150-001	Anonymous	EG052G: Reactive Silica	----	5.0 mg/L	# Not Determined	----	70	130	----	----
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2381115)										
ES1216186-001	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	83.4	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2381317)										
ES1215943-002	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	119	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2381317)										
ES1215943-002	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	119	----	70	130	----	----
EP080: BTEXN (QCLot: 2381317)										
ES1215943-002	Anonymous	EP080: Benzene	71-43-2	25 µg/L	87.2	----	70	130	----	----
		EP080: Toluene	108-88-3	25 µg/L	94.1	----	70	130	----	----
		EP080: Ethylbenzene	100-41-4	25 µg/L	96.6	----	70	130	----	----
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	95.3	----	70	130	----	----
		EP080: ortho-Xylene	95-47-6	25 µg/L	92.9	----	70	130	----	----
		EP080: Naphthalene	91-20-3	25 µg/L	79.8	----	70	130	----	----
EP005: Total Organic Carbon (TOC) (QCLot: 2381999)										
ES1216174-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	97.3	----	70	130	----	----
EP075(SIM)A: Phenolic Compounds (QCLot: 2382540)										
ES1216048-027	Anonymous	EP075(SIM): Phenol	108-95-2	20 µg/L	30.6	----	20	130	----	----
		EP075(SIM): 2-Chlorophenol	95-57-8	20 µg/L	73.9	----	60	130	----	----
		EP075(SIM): 2-Nitrophenol	88-75-5	20 µg/L	70.4	----	60	130	----	----
		EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	20 µg/L	81.7	----	70	130	----	----
		EP075(SIM): Pentachlorophenol	87-86-5	20 µg/L	82.6	----	20	130	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2382540)										
ES1216048-027	Anonymous	EP075(SIM): Acenaphthene	83-32-9	20 µg/L	77.1	----	70	130	----	----
		EP075(SIM): Pyrene	129-00-0	20 µg/L	82.2	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2382541)										
ES1216048-027	Anonymous	EP071: C10 - C14 Fraction	----	200 µg/L	106	----	74	150	----	----
		EP071: C15 - C28 Fraction	----	250 µg/L	137	----	77	153	----	----



Sub-Matrix: WATER

					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
					MS	MSD	Low	High	Value	Control Limit
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2382541) - continued										
ES1216048-027	Anonymous	EP071: C29 - C36 Fraction	----	200 µg/L	105	----	67	153	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2382541)										
ES1216048-027	Anonymous	EP071: >C10 - C16 Fraction	----	250 µg/L	86.0	----	74	150	----	----
		EP071: >C16 - C34 Fraction	----	350 µg/L	123	----	77	153	----	----
		EP071: >C34 - C40 Fraction	----	150 µg/L	98.8	----	67	153	----	----
EK040P: Fluoride by PC Titrator (QCLot: 2382849)										
ES1216197-001	TTMB03	EK040P: Fluoride	16984-48-8	5.0 mg/L	106	----	70	130	----	----
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2383186)										
ES1216072-002	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	102	----	70	130	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2383187)										
ES1216144-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	92.4	----	70	130	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2383923)										
ES1216174-006	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	128	----	70	130	----	----
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	124	----	70	130	----	----
		EG020A-F: Barium	7440-39-3	0.2 mg/L	120	----	70	130	----	----
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	121	----	70	130	----	----
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	119	----	70	130	----	----
		EG020A-F: Copper	7440-50-8	0.2 mg/L	127	----	70	130	----	----
		EG020A-F: Lead	7439-92-1	0.2 mg/L	113	----	70	130	----	----
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	# Not Determined	----	70	130	----	----
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	114	----	70	130	----	----
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	128	----	70	130	----	----
EG020A-F: Zinc	7440-66-6	0.2 mg/L	116	----	70	130	----	----		
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2387636)										
ES1216062-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	98.2	----	70	130	----	----
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2388250)										
EB1217227-003	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	88.4	----	70	130	----	----
		EP033: Ethene	74-85-1	50.29 µg/L	91.8	----	70	130	----	----
		EP033: Ethane	74-84-0	54.43 µg/L	92.7	----	70	130	----	----
		EP033: Propene	115-07-1	73.97 µg/L	92.8	----	70	130	----	----
		EP033: Propane	74-98-6	78.28 µg/L	86.9	----	70	130	----	----
		EP033: Butene	25167-67-3	99.61 µg/L	92.2	----	70	130	----	----
		EP033: Butane	106-97-8	102.18 µg/L	95.9	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1216197	Page	: 1 of 10
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
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Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 29-JUN-2012
Sampler	: NPH	Issue Date	: 06-JUL-2012
Order number	: ----		
Quote number	: SY/394/09	No. of samples received	: 1
		No. of samples analysed	: 1

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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) TTMB03	27-JUN-2012	---	27-JUN-2012	----	02-JUL-2012	27-JUN-2012	*
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) TTMB03	27-JUN-2012	---	25-JUL-2012	----	02-JUL-2012	25-JUL-2012	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural (EA015) TTMB03	27-JUN-2012	----	----	----	03-JUL-2012	04-JUL-2012	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) TTMB03	27-JUN-2012	---	11-JUL-2012	----	02-JUL-2012	11-JUL-2012	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) TTMB03	27-JUN-2012	---	25-JUL-2012	----	02-JUL-2012	25-JUL-2012	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural (ED045G) TTMB03	27-JUN-2012	---	25-JUL-2012	----	02-JUL-2012	25-JUL-2012	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) TTMB03	27-JUN-2012	---	04-JUL-2012	----	02-JUL-2012	04-JUL-2012	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) TTMB03	27-JUN-2012	---	24-DEC-2012	----	03-JUL-2012	24-DEC-2012	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) TTMB03	27-JUN-2012	---	24-DEC-2012	----	03-JUL-2012	24-DEC-2012	✓
EG052G: Silica by Discrete Analyser							
Clear Plastic Bottle - Natural (EG052G) TTMB03	27-JUN-2012	---	25-JUL-2012	----	02-JUL-2012	25-JUL-2012	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) TTMB03	27-JUN-2012	---	25-JUL-2012	----	02-JUL-2012	25-JUL-2012	✓



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
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) TTMB03	27-JUN-2012	---	25-JUL-2012	----	03-JUL-2012	25-JUL-2012	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) TTMB03	27-JUN-2012	---	29-JUN-2012	----	29-JUN-2012	29-JUN-2012	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) TTMB03	27-JUN-2012	---	25-JUL-2012	----	03-JUL-2012	25-JUL-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) TTMB03	27-JUN-2012	05-JUL-2012	25-JUL-2012	✓	05-JUL-2012	25-JUL-2012	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) TTMB03	27-JUN-2012	---	29-JUN-2012	----	29-JUN-2012	29-JUN-2012	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005) TTMB03	27-JUN-2012	----	----	----	02-JUL-2012	25-JUL-2012	✓
EP033: C1 - C4 Hydrocarbon Gases							
Amber TOC Vial - Sulfuric Acid (EP033) TTMB03	27-JUN-2012	---	----	----	05-JUL-2012	11-JUL-2012	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) TTMB03	27-JUN-2012	02-JUL-2012	04-JUL-2012	✓	04-JUL-2012	12-AUG-2012	✓
EP075(SIM)A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075(SIM)) TTMB03	27-JUN-2012	02-JUL-2012	04-JUL-2012	✓	04-JUL-2012	12-AUG-2012	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) TTMB03	27-JUN-2012	02-JUL-2012	04-JUL-2012	✓	04-JUL-2012	12-AUG-2012	✓
EP080: BTEXN							
Amber TOC Vial - Sulfuric Acid (EP080) TTMB03	27-JUN-2012	04-JUL-2012	11-JUL-2012	✓	04-JUL-2012	11-JUL-2012	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber TOC Vial - Sulfuric Acid (EP080) TTMB03	27-JUN-2012	04-JUL-2012	11-JUL-2012	✓	04-JUL-2012	11-JUL-2012	✓



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	Method	Count		Rate (%)			Quality Control Specification
		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
Ammonia as N by Discrete analyser	EK055G	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	2	19	10.5	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
Conductivity by PC Titrator	EA010-P	2	11	18.2	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	1	100.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	50.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	8	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	2	17	11.8	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	2	15	13.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	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	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	19	5.3	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
Conductivity by PC Titrator	EA010-P	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	1	100.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	8	12.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	2	17	11.8	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
TPH - Semivolatile Fraction	EP071	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	1	100.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	8	12.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids	EA015	1	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	18	5.6	5.0	✓	ALS QCS3 requirement
C1 - C4 Gases	EP033	1	19	5.3	5.0	✓	ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	6.3	5.0	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	1	100.0	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	5.0	5.0	✓	ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	18	5.6	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	2	50.0	5.0	✓	ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	8	12.5	5.0	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	18	5.6	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	15	6.7	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	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
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids	EA015	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
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- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um 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) Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Total Hardness is calculated based on APHA 21st ed., 2340 B. 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): Samples are 0.45 um filtered prior to analysis. 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.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. 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.
Silica (Reactive) by Discrete Analyser	EG052G	WATER	APHA 21st ed. 4500-SiO2 D: Under Acidic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Analytical Methods	Method	Matrix	Method Descriptions
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TPH - Semivolatle Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

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Work Order : ES1216197
Client : PARSONS BRINCKERHOFF AUST P/L
Project : 2162406B



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



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

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1216137-001	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride Discrete analyser	ES1216137-001	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG020F: Dissolved Metals by ICP-MS	ES1216174-006	Anonymous	Manganese	7439-96-5	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG052G: Silica by Discrete Analyser	ES1216150-001	Anonymous	Reactive Silica	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK071G: Reactive Phosphorus as P by discrete analyser	ES1216145-001	Anonymous	Reactive Phosphorus as P	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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

Matrix: **WATER**

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural TTMB03		----	----	----	02-JUL-2012	27-JUN-2012	5

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.**
-

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.
2162406

Results Expected By/On: **7 days**
 James Duggieby
 Fax Results To: 02 9272 5101
 Phone Number: 9272 5248
 Email Results to: james.duggieby@pb.com.au / james@pb.com.au
 Quotation Number: **SY394709**
 Invoice To: James Duggieby
 Head Office, Sydney

Sample ID	Date sampled	Time	Medium *	Preservative Type	Filtered (x)	Containers	Cations (Na, K, Ca, Mg)	Anions (Alkalinity, SO4, Cl, reactive silica)	Dissolved Metals (Al, As, Ba, B, Be, Br, Cd, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, Sr, U, V, Zn)	Ammonia as N	Nitrate, nitrite	Fluoride	Reactive Phosphorus as P	Total phosphorus as P	TOC	Gases C1-C4 + methane	BTEX/TPH C6-C9	TPH C10-C36	PAH	Phenols	pH	EC	Total dissolved solids
TTM603	27/12/12	4A					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Sampled By	Company	Signature	Remarks
NJPH	PB		

Environmental Division
 Sydney
 Work Order
ES1216197

Telephone: +61-2-8784 8555

Relinquished By: N. Peapack-Hawkins
 Date: 29/12/12
 Company: PB
 Time: 15:00
 Signature:

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

Parsons Brinckerhoff & Young Consultants
PARSONS BRINCKERHOFF Pty Ltd
 Environmental and Geotechnical Services
 Comments:
 SY NSW 2000

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

Environmental Division

CERTIFICATE OF ANALYSIS

<p>Work Order : ES1217281</p> <p>Client : PARSONS BRINCKERHOFF AUST P/L</p> <p>Contact : MS NINA PEARSE-HAWKINS</p> <p>Address : GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001</p> <p>E-mail : npearsehawkins@pb.com.au</p> <p>Telephone : +61 02 9272 5100</p> <p>Facsimile : +61 02 9272 5101</p> <p>Project : 2162406B</p> <p>Order number : ----</p> <p>C-O-C number : ----</p> <p>Sampler : JM</p> <p>Site : ----</p> <p>Quote number : SY/394/09</p>	<p>Page : 1 of 7</p> <p>Laboratory : Environmental Division Sydney</p> <p>Contact : Loren Schiavon</p> <p>Address : 277-289 Woodpark Road Smithfield NSW Australia 2164</p> <p>E-mail : loren.schiavon@alsglobal.com</p> <p>Telephone : +61 2 8784 8503</p> <p>Facsimile : +61 2 8784 8500</p> <p>QC Level : NEPM 1999 Schedule B(3) and ALS QCS3 requirement</p> <p>Date Samples Received : 13-JUL-2012</p> <p>Issue Date : 20-JUL-2012</p> <p>No. of samples received : 2</p> <p>No. of samples analysed : 2</p>
--	--

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
- Surrogate Control Limits



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Raymond Commodor	Instrument Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 insufficient sample for analysis.

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

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

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

LOR = Limit of reporting

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

- **EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.**
- **EG020: LCS recoveries for some elements fall 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

				Client sample ID					
				TCMB02	S5MB02	----	----	----	
				Client sampling date / time	12-JUL-2012 08:00	11-JUL-2012 16:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1217281-001	ES1217281-002	----	----	----	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	9.00	8.43	----	----	----	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	2790	4280	----	----	----	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	1420	2440	----	----	----	
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	59	34	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	172	844	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	230	879	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	8	----	----	----	
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L	824	926	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	19	11	----	----	----	
Magnesium	7439-95-4	1	mg/L	41	6	----	----	----	
Sodium	7440-23-5	1	mg/L	530	986	----	----	----	
Potassium	7440-09-7	1	mg/L	9	7	----	----	----	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.02	0.07	----	----	----	
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	----	
Barium	7440-39-3	0.001	mg/L	1.17	1.38	----	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----	
Copper	7440-50-8	0.001	mg/L	0.002	<0.001	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----	
Manganese	7439-96-5	0.001	mg/L	0.004	0.037	----	----	----	
Molybdenum	7439-98-7	0.001	mg/L	0.002	0.002	----	----	----	
Nickel	7440-02-0	0.001	mg/L	0.002	0.003	----	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----	
Strontium	7440-24-6	0.001	mg/L	2.78	1.16	----	----	----	
Uranium	7440-61-1	0.001	mg/L	<0.001	0.001	----	----	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	----	
Zinc	7440-66-6	0.005	mg/L	0.033	0.032	----	----	----	



Analytical Results

Sub-Matrix: WATER

				Client sample ID					
				TCMB02	S5MB02	----	----	----	
				Client sampling date / time	12-JUL-2012 08:00	11-JUL-2012 16:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1217281-001	ES1217281-002	----	----	----	
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L	<0.05	0.09	----	----	----	
Iron	7439-89-6	0.05	mg/L	<0.05	0.25	----	----	----	
Bromine	7726-95-6	0.1	mg/L	0.8	1.7	----	----	----	
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.10	mg/L	4.93	16.4	----	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	0.6	----	----	----	
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	1.60	9.59	----	----	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	----	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	0.03	----	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.03	----	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.05	0.92	----	----	----	
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.46	----	----	----	
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L	27.9	43.8	----	----	----	
Total Cations	----	0.01	meq/L	27.6	44.1	----	----	----	
Ionic Balance	----	0.01	%	0.52	0.26	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	34	15	----	----	----	
EP033: C1 - C4 Hydrocarbon Gases									
Methane	74-82-8	10	µg/L	10800	24400	----	----	----	
Ethene	74-85-1	10	µg/L	<10	<10	----	----	----	
Ethane	74-84-0	10	µg/L	<10	<10	----	----	----	
Propene	115-07-1	10	µg/L	<10	<10	----	----	----	
Propane	74-98-6	10	µg/L	<10	23	----	----	----	
Butene	25167-67-3	10	µg/L	<10	<10	----	----	----	
Butane	106-97-8	10	µg/L	<10	<10	----	----	----	
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	1.0	µg/L	2.3	<1.0	----	----	----	



Analytical Results

Sub-Matrix: WATER

Client sample ID
 Client sampling date / time

Compound	CAS Number	LOR	Unit	TCMB02	S5MB02			
				12-JUL-2012 08:00	11-JUL-2012 16:00	----	----	----
				ES1217281-001	ES1217281-002	----	----	----
EP075(SIM)A: Phenolic Compounds - Continued								
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	----	----	----
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	----	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	188	----	----	----
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	----	----	----
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	6.6	----	----	----
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	----	----	----
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	----	----	----
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	----	----	----
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	----	----	----
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	----	----	----
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	----	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (WHO)	----	0.5	µg/L	<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	330	----	----	----
C15 - C28 Fraction	----	100	µg/L	1310	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	650	270	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	1960	600	----	----	----



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				TCMB02	S5MB02	----	----	----
				12-JUL-2012 08:00	11-JUL-2012 16:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1217281-001	ES1217281-002	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	20	µg/L	<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	360	----	----	----
>C16 - C34 Fraction	----	100	µg/L	1820	260	----	----	----
>C34 - C40 Fraction	----	100	µg/L	170	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	1990	620	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	2	----	----	----
Toluene	108-88-3	2	µg/L	14	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	14	2	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	20.3	16.6	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	45.2	46.8	----	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	80.4	76.5	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	43.2	40.2	----	----	----
Anthracene-d10	1719-06-8	0.1	%	60.5	53.8	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	59.3	61.0	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	103	102	----	----	----
Toluene-D8	2037-26-5	0.1	%	118	110	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	105	93.7	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	64.1
2-Chlorophenol-D4	93951-73-6	11.3	122.9
2,4,6-Tribromophenol	118-79-6	11.7	144.0
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	19.9	122.8
Anthracene-d10	1719-06-8	23.3	125.8
4-Terphenyl-d14	1718-51-0	20.3	134.5
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: ES1217281	Page	: 1 of 14
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS NINA PEARSE-HAWKINS	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: npearsehawkins@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 13-JUL-2012
Sampler	: JM	Issue Date	: 20-JUL-2012
Order number	: ----		
Quote number	: SY/394/09	No. of samples received	: 2
		No. of samples analysed	: 2

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Raymond Commodor	Instrument Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2401931)									
ES1217245-012	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.48	7.46	0.3	0% - 20%
ES1217281-002	S5MB02	EA005-P: pH Value	----	0.01	pH Unit	8.43	8.41	0.2	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2401930)									
ES1217245-012	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	?S/cm	213	212	0.0	0% - 20%
ES1217281-002	S5MB02	EA010-P: Electrical Conductivity @ 25°C	----	1	?S/cm	4280	4260	0.5	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2407731)									
ES1217227-002	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	3970	3870	2.6	0% - 20%
ES1217386-002	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	394	356	10.1	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2401932)									
ES1217245-012	Anonymous	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	67	68	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	67	68	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2403442)									
ES1217180-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	61	61	0.0	0% - 20%
ES1217180-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	5	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 2403441)									
ES1217180-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1800	1800	0.0	0% - 20%
ES1217180-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	927	922	0.5	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2403439)									
ES1217180-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	180	184	1.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	115	116	1.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	902	896	0.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	5	0.0	No Limit
ES1217180-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	327	323	1.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	52	52	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	830	824	0.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	9	9	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2403354)									
ES1216973-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit



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: 2403354) - continued									
ES1216973-001	Anonymous	EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.03	0.03	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	<0.1	0.0	No Limit		
ES1217308-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.011	0.011	0.0	0% - 50%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.031	0.030	0.0	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.11	0.11	0.0	0% - 50%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.24	0.25	0.0	No Limit
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	<0.1	0.0	No Limit		
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2403355)									
ES1216973-001	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	0.002	0.001	0.0	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 2403446)									
ES1217281-001	TCMB02	EG052G: Reactive Silica	----	0.10	mg/L	4.93	5.01	1.6	0% - 20%
EK040P: Fluoride by PC Titrator (QC Lot: 2401929)									
ES1217222-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2405571)									
ES1217032-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	107	111	3.7	0% - 20%
ES1217281-002	S5MB02	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	9.59	9.78	2.0	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2403440)									



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 (%)
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2403440) - continued									
ES1217180-001	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1217180-010	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2403447)									
ES1217281-002	S5MB02	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1217309-005	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	0.02	0.02	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2405569)									
ES1217032-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1217290-008	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.82	0.78	5.2	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2405811)									
ES1217032-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.02	1.00	2.0	0% - 20%
ES1217243-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.07	0.08	14.1	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2403445)									
ES1217281-001	TCMB02	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1217341-003	Anonymous	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 2401877)									
EP1205633-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	13	13	0.0	0% - 50%
ME1201160-004	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.0	No Limit
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2403521)									
EB1217992-001	Anonymous	EP033: Methane	74-82-8	10	?g/L	29	32	8.6	No Limit
		EP033: Ethene	74-85-1	10	?g/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	?g/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	?g/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	?g/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	?g/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	?g/L	<10	<10	0.0	No Limit
EB1218249-001	Anonymous	EP033: Methane	74-82-8	10	?g/L	<10	<10	0.0	No Limit
		EP033: Ethene	74-85-1	10	?g/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	?g/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	?g/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	?g/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	?g/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	?g/L	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2401878)									
ES1217193-001	Anonymous	EP071: C15 - C28 Fraction	----	100	?g/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	?g/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	?g/L	<50	<50	0.0	No Limit
ES1217193-005	Anonymous	EP071: C15 - C28 Fraction	----	100	?g/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	?g/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	?g/L	<50	<50	0.0	No Limit



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 (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2406348)									
ES1217290-001	Anonymous	EP080: C6 - C9 Fraction	----	20	?g/L	<20	<20	0.0	No Limit
ES1217290-003	Anonymous	EP080: C6 - C9 Fraction	----	20	?g/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2401878)									
ES1217193-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	?g/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	?g/L	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	?g/L	<100	<100	0.0	No Limit
ES1217193-005	Anonymous	EP071: >C10 - C16 Fraction	----	100	?g/L	<100	<100	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	?g/L	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	?g/L	<100	<100	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2406348)									
ES1217290-001	Anonymous	EP080: C6 - C10 Fraction	----	20	?g/L	<20	<20	0.0	No Limit
ES1217290-003	Anonymous	EP080: C6 - C10 Fraction	----	20	?g/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 2406348)									
ES1217290-001	Anonymous	EP080: Benzene	71-43-2	1	?g/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	?g/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	?g/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	?g/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	?g/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	?g/L	<5	<5	0.0	No Limit
ES1217290-003	Anonymous	EP080: Benzene	71-43-2	1	?g/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	?g/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	?g/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	?g/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	?g/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	?g/L	<5	<5	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			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 2401930)								
EA010-P: Electrical Conductivity @ 25°C	----	1	?S/cm	<1	2000 ?S/cm	101	92	116
EA015: Total Dissolved Solids (QCLot: 2407731)								
EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	<10	293 mg/L	88.7	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 2401932)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	92.7	75	107
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2403442)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	106	77	121
ED045G: Chloride Discrete analyser (QCLot: 2403441)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	104	79	123
ED093F: Dissolved Major Cations (QCLot: 2403439)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.1	88	110
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	90	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.3	81	107
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	103	89	109
EG020F: Dissolved Metals by ICP-MS (QCLot: 2403354)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	97.2	92	112
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	# 87.8	88	110
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	87.3	80	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	85.1	85	109
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	# 86.7	89	107
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	# 87.9	89	109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.2	87	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	# 87.5	90	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.6	87	113
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	107	84	114
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	89.7	89	109
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	114	79	119
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	91.6	91	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.9	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	80.7	71	127
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	89.8	84	114
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2403355)								



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2403355) - continued									
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	88.6	88	112	
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----	
EG052G: Silica by Discrete Analyser (QCLot: 2403446)									
EG052G: Reactive Silica	----	0.1	mg/L	<0.10	10.0 mg/L	102	72	124	
EK040P: Fluoride by PC Titrator (QCLot: 2401929)									
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	92.8	71	121	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2405571)									
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1.00 mg/L	102	86	116	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2403440)									
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	105	78	128	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2403447)									
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	105	78	128	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2405569)									
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	107	80	130	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2405811)									
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	84.7	67	130	
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2403445)									
EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.50 mg/L	102	85	115	
EP005: Total Organic Carbon (TOC) (QCLot: 2401877)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	108	78	114	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2403521)									
EP033: Methane	74-82-8	10	?g/L	<10	28.48 ?g/L	103	86	108	
EP033: Ethene	74-85-1	10	?g/L	<10	50.29 ?g/L	103	87	111	
EP033: Ethane	74-84-0	10	?g/L	<10	54.43 ?g/L	102	87	111	
EP033: Propene	115-07-1	10	?g/L	<10	73.97 ?g/L	103	86	112	
EP033: Propane	74-98-6	10	?g/L	<10	78.28 ?g/L	96.6	87	111	
EP033: Butene	25167-67-3	20	?g/L	<20	99.61 ?g/L	103	87	113	
EP033: Butane	106-97-8	20	?g/L	<20	102.18 ?g/L	106	87	113	
EP075(SIM)A: Phenolic Compounds (QCLot: 2401879)									
EP075(SIM): Phenol	108-95-2	0.2	?g/L	----	5 ?g/L	33.4	24.5	61.9	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 2-Chlorophenol	95-57-8	0.2	?g/L	----	5 ?g/L	69.2	63.8	110	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 2-Methylphenol	95-48-7	0.2	?g/L	----	5 ?g/L	65.9	55.9	112	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	0.4	?g/L	----	10 ?g/L	66.0	42.5	114	
		2	?g/L	<2.0	----	----	----	----	



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
EP075(SIM)A: Phenolic Compounds (QCLot: 2401879) - continued									
EP075(SIM): 2-Nitrophenol	88-75-5	0.2	?g/L	----	5 ?g/L	71.1	62.7	117	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.2	?g/L	----	5 ?g/L	70.2	59.9	112	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.2	?g/L	----	5 ?g/L	72.8	59.3	122	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.2	?g/L	----	5 ?g/L	70.9	64.3	118	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	0.2	?g/L	----	5 ?g/L	71.4	63	119	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.2	?g/L	----	5 ?g/L	75.0	58.7	118	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.2	?g/L	----	5 ?g/L	69.9	51.2	118	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Pentachlorophenol	87-86-5	0.4	?g/L	----	10 ?g/L	54.4	6.85	95.6	
		2	?g/L	<2.0	----	----	----	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2401879)									
EP075(SIM): Naphthalene	91-20-3	0.2	?g/L	----	5 ?g/L	77.0	58.6	119	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Acenaphthylene	208-96-8	0.2	?g/L	----	5 ?g/L	78.0	63.6	114	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Acenaphthene	83-32-9	0.2	?g/L	----	5 ?g/L	65.7	62.2	113	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Fluorene	86-73-7	0.2	?g/L	----	5 ?g/L	69.4	63.9	115	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Phenanthrene	85-01-8	0.2	?g/L	----	5 ?g/L	69.2	62.6	116	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Anthracene	120-12-7	0.2	?g/L	----	5 ?g/L	67.2	64.3	116	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Fluoranthene	206-44-0	0.2	?g/L	----	5 ?g/L	72.5	63.6	118	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Pyrene	129-00-0	0.2	?g/L	----	5 ?g/L	72.3	63.1	118	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Benz(a)anthracene	56-55-3	0.2	?g/L	----	5 ?g/L	72.0	64.1	117	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Chrysene	218-01-9	0.2	?g/L	----	5 ?g/L	74.9	62.5	116	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.2	?g/L	----	5 ?g/L	74.8	61.7	119	
		1	?g/L	<1.0	----	----	----	----	



Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2401879) - continued								
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.2	?g/L	----	5 ?g/L	75.5	61.7	117
		1	?g/L	<1.0	----	----	----	----
EP075(SIM): Benzo(a)pyrene	50-32-8	0.2	?g/L	----	5 ?g/L	70.4	63.3	117
		0.5	?g/L	<0.5	----	----	----	----
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.2	?g/L	----	5 ?g/L	67.5	59.9	118
		1	?g/L	<1.0	----	----	----	----
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.2	?g/L	----	5 ?g/L	69.1	61.2	117
		1	?g/L	<1.0	----	----	----	----
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.2	?g/L	----	5 ?g/L	71.1	59.1	118
		1	?g/L	<1.0	----	----	----	----
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	1	?g/L	<1.0	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2401878)								
EP071: C10 - C14 Fraction	----	50	?g/L	<50	200 ?g/L	78.0	58.9	131
EP071: C15 - C28 Fraction	----	100	?g/L	<100	250 ?g/L	110	73.9	138
EP071: C29 - C36 Fraction	----	50	?g/L	<50	200 ?g/L	79.5	62.7	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2406348)								
EP080: C6 - C9 Fraction	----	20	?g/L	<20	260 ?g/L	78.0	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2401878)								
EP071: >C10 - C16 Fraction	----	100	?g/L	<100	250 ?g/L	72.8	58.9	131
EP071: >C16 - C34 Fraction	----	100	?g/L	<100	350 ?g/L	88.0	73.9	138
EP071: >C34 - C40 Fraction	----	100	?g/L	<100	----	----	----	----
		50	?g/L	----	150 ?g/L	103	62.7	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2406348)								
EP080: C6 - C10 Fraction	----	20	?g/L	<20	310 ?g/L	83.3	75	127
EP080: BTEXN (QCLot: 2406348)								
EP080: Benzene	71-43-2	1	?g/L	<1	10 ?g/L	80.5	70	124
EP080: Toluene	108-88-3	2	?g/L	<2	10 ?g/L	76.3	66	132
EP080: Ethylbenzene	100-41-4	2	?g/L	<2	10 ?g/L	75.2	70	120
EP080: meta- & para-Xylene	108-38-3	2	?g/L	<2	10 ?g/L	75.0	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	?g/L	<2	10 ?g/L	75.4	72	122
EP080: Naphthalene	91-20-3	5	?g/L	<5	10 ?g/L	77.8	70	124

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 (%)



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2403442)							
ES1217180-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride Discrete analyser (QCLot: 2403441)							
ES1217180-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2403354)							
ES1216973-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	95.8	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	115	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	96.0	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	94.4	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	97.6	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	114	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	95.1	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	105	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	97.7	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	105	70	130
EG020A-F: Zinc	7440-66-6	0.2 mg/L	111	70	130		
EG052G: Silica by Discrete Analyser (QCLot: 2403446)							
ES1217281-001	TCMB02	EG052G: Reactive Silica	----	5.0 mg/L	94.9	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2401929)							
ES1217222-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	94.0	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2405571)							
ES1217032-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	# Not Determined	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2403440)							
ES1217180-001	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	109	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2403447)							
ES1217281-002	S5MB02	EK057G: Nitrite as N	----	0.5 mg/L	111	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2405569)							
ES1217032-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	83.6	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2405811)							
ES1217032-001	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	92.0	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2403445)							
ES1217281-001	TCMB02	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	122	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 2401877)							
ES1217221-001	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	105	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2403521)							
EB1217994-001	Anonymous	EP033: Methane	74-82-8	28.48 ?g/L	94.1	70	130



Sub-Matrix: WATER

Laboratory sample ID				Matrix Spike (MS) Report					
				Spike		Spike Recovery (%)		Recovery Limits (%)	
				Concentration	MS	Low	High		
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2403521) - continued									
EB1217994-001	Anonymous	EP033: Ethene	74-85-1	50.29 ?g/L	98.2	70	130		
		EP033: Ethane	74-84-0	54.43 ?g/L	97.3	70	130		
		EP033: Propene	115-07-1	73.97 ?g/L	97.9	70	130		
		EP033: Propane	74-98-6	78.28 ?g/L	92.2	70	130		
		EP033: Butene	25167-67-3	99.61 ?g/L	97.7	70	130		
		EP033: Butane	106-97-8	102.18 ?g/L	102	70	130		
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2401878)									
ES1217193-004	Anonymous	EP071: C10 - C14 Fraction	----	200 ?g/L	105	74	150		
		EP071: C15 - C28 Fraction	----	250 ?g/L	124	77	153		
		EP071: C29 - C36 Fraction	----	200 ?g/L	105	67	153		
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2406348)									
ES1217290-001	Anonymous	EP080: C6 - C9 Fraction	----	325 ?g/L	78.8	70	130		
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2401878)									
ES1217193-004	Anonymous	EP071: >C10 - C16 Fraction	----	250 ?g/L	84.0	74	150		
		EP071: >C16 - C34 Fraction	----	350 ?g/L	120	77	153		
		EP071: >C34 - C40 Fraction	----	150 ?g/L	100	67	153		
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2406348)									
ES1217290-001	Anonymous	EP080: C6 - C10 Fraction	----	375 ?g/L	81.2	70	130		
EP080: BTEXN (QCLot: 2406348)									
ES1217290-001	Anonymous	EP080: Benzene	71-43-2	25 ?g/L	80.8	70	130		
		EP080: Toluene	108-88-3	25 ?g/L	81.5	70	130		
		EP080: Ethylbenzene	100-41-4	25 ?g/L	81.0	70	130		
		EP080: meta- & para-Xylene	108-38-3	25 ?g/L	80.3	70	130		
			106-42-3						
		EP080: ortho-Xylene	95-47-6	25 ?g/L	81.1	70	130		
EP080: Naphthalene	91-20-3	25 ?g/L	76.8	70	130				

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.

Sub-Matrix: WATER

Laboratory sample ID				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report							
				Spike		Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit	
EP005: Total Organic Carbon (TOC) (QCLot: 2401877)											
ES1217221-001	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	105	----	70	130	----	----	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2401878)											



Sub-Matrix: WATER					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
						MS	MSD	Low	High	Value	Control Limit
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number								
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2401878) - continued											
ES1217193-004	Anonymous	EP071: C10 - C14 Fraction	----	200 ?g/L	105	----	74	150	----	----	
		EP071: C15 - C28 Fraction	----	250 ?g/L	124	----	77	153	----	----	
		EP071: C29 - C36 Fraction	----	200 ?g/L	105	----	67	153	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2401878)											
ES1217193-004	Anonymous	EP071: >C10 - C16 Fraction	----	250 ?g/L	84.0	----	74	150	----	----	
		EP071: >C16 - C34 Fraction	----	350 ?g/L	120	----	77	153	----	----	
		EP071: >C34 - C40 Fraction	----	150 ?g/L	100	----	67	153	----	----	
EK040P: Fluoride by PC Titrator (QCLot: 2401929)											
ES1217222-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	94.0	----	70	130	----	----	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2403354)											
ES1216973-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	95.8	----	70	130	----	----	
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	115	----	70	130	----	----	
		EG020A-F: Barium	7440-39-3	0.2 mg/L	96.0	----	70	130	----	----	
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	94.4	----	70	130	----	----	
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	97.6	----	70	130	----	----	
		EG020A-F: Copper	7440-50-8	0.2 mg/L	114	----	70	130	----	----	
		EG020A-F: Lead	7439-92-1	0.2 mg/L	95.1	----	70	130	----	----	
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	105	----	70	130	----	----	
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	97.7	----	70	130	----	----	
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	105	----	70	130	----	----	
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	111	----	70	130	----	----	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2403440)											
ES1217180-001	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	109	----	70	130	----	----	
ED045G: Chloride Discrete analyser (QCLot: 2403441)											
ES1217180-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	----	70	130	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2403442)											
ES1217180-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	----	70	130	----	----	
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2403445)											
ES1217281-001	TCMB02	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	122	----	70	130	----	----	
EG052G: Silica by Discrete Analyser (QCLot: 2403446)											
ES1217281-001	TCMB02	EG052G: Reactive Silica	----	5.0 mg/L	94.9	----	70	130	----	----	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2403447)											
ES1217281-002	S5MB02	EK057G: Nitrite as N	----	0.5 mg/L	111	----	70	130	----	----	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2403521)											
EB1217994-001	Anonymous	EP033: Methane	74-82-8	28.48 ?g/L	94.1	----	70	130	----	----	
		EP033: Ethene	74-85-1	50.29 ?g/L	98.2	----	70	130	----	----	
		EP033: Ethane	74-84-0	54.43 ?g/L	97.3	----	70	130	----	----	



Sub-Matrix: **WATER**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2403521) - continued										
EB1217994-001	Anonymous	EP033: Propene	115-07-1	73.97 ?g/L	97.9	----	70	130	----	----
		EP033: Propane	74-98-6	78.28 ?g/L	92.2	----	70	130	----	----
		EP033: Butene	25167-67-3	99.61 ?g/L	97.7	----	70	130	----	----
		EP033: Butane	106-97-8	102.18 ?g/L	102	----	70	130	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2405569)										
ES1217032-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	83.6	----	70	130	----	----
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2405571)										
ES1217032-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	# Not Determined	----	70	130	----	----
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2405811)										
ES1217032-001	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	92.0	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2406348)										
ES1217290-001	Anonymous	EP080: C6 - C9 Fraction	----	325 ?g/L	78.8	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2406348)										
ES1217290-001	Anonymous	EP080: C6 - C10 Fraction	----	375 ?g/L	81.2	----	70	130	----	----
EP080: BTEXN (QCLot: 2406348)										
ES1217290-001	Anonymous	EP080: Benzene	71-43-2	25 ?g/L	80.8	----	70	130	----	----
		EP080: Toluene	108-88-3	25 ?g/L	81.5	----	70	130	----	----
		EP080: Ethylbenzene	100-41-4	25 ?g/L	81.0	----	70	130	----	----
		EP080: meta- & para-Xylene	108-38-3	25 ?g/L	80.3	----	70	130	----	----
			106-42-3							
		EP080: ortho-Xylene	95-47-6	25 ?g/L	81.1	----	70	130	----	----
		EP080: Naphthalene	91-20-3	25 ?g/L	76.8	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1217281	Page	: 1 of 11
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS NINA PEARSE-HAWKINS	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: npearsehawkins@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 13-JUL-2012
Sampler	: JM	Issue Date	: 20-JUL-2012
Order number	: ----		
Quote number	: SY/394/09	No. of samples received	: 2
		No. of samples analysed	: 2

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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) S5MB02	11-JUL-2012	---	11-JUL-2012	----	13-JUL-2012	11-JUL-2012	*
Clear Plastic Bottle - Natural (EA005-P) TCMB02	12-JUL-2012	---	12-JUL-2012	----	13-JUL-2012	12-JUL-2012	*
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) S5MB02	11-JUL-2012	---	08-AUG-2012	----	13-JUL-2012	08-AUG-2012	✓
Clear Plastic Bottle - Natural (EA010-P) TCMB02	12-JUL-2012	---	09-AUG-2012	----	13-JUL-2012	09-AUG-2012	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural (EA015H) S5MB02	11-JUL-2012	----	----	----	18-JUL-2012	18-JUL-2012	✓
Clear Plastic Bottle - Natural (EA015H) TCMB02	12-JUL-2012	----	----	----	18-JUL-2012	19-JUL-2012	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) S5MB02	11-JUL-2012	---	25-JUL-2012	----	13-JUL-2012	25-JUL-2012	✓
Clear Plastic Bottle - Natural (ED037-P) TCMB02	12-JUL-2012	---	26-JUL-2012	----	13-JUL-2012	26-JUL-2012	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) S5MB02	11-JUL-2012	---	08-AUG-2012	----	16-JUL-2012	08-AUG-2012	✓
Clear Plastic Bottle - Natural (ED041G) TCMB02	12-JUL-2012	---	09-AUG-2012	----	16-JUL-2012	09-AUG-2012	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural (ED045G) S5MB02	11-JUL-2012	---	08-AUG-2012	----	16-JUL-2012	08-AUG-2012	✓
Clear Plastic Bottle - Natural (ED045G) TCMB02	12-JUL-2012	---	09-AUG-2012	----	16-JUL-2012	09-AUG-2012	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) S5MB02	11-JUL-2012	---	18-JUL-2012	----	16-JUL-2012	18-JUL-2012	✓
Clear Plastic Bottle - Natural (ED093F) TCMB02	12-JUL-2012	---	19-JUL-2012	----	16-JUL-2012	19-JUL-2012	✓



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
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) S5MB02	11-JUL-2012	---	07-JAN-2013	----	16-JUL-2012	07-JAN-2013	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) TCMB02	12-JUL-2012	---	08-JAN-2013	----	16-JUL-2012	08-JAN-2013	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) S5MB02	11-JUL-2012	---	07-JAN-2013	----	16-JUL-2012	07-JAN-2013	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) TCMB02	12-JUL-2012	---	08-JAN-2013	----	16-JUL-2012	08-JAN-2013	✓
EG052G: Silica by Discrete Analyser							
Clear Plastic Bottle - Natural (EG052G) S5MB02	11-JUL-2012	---	08-AUG-2012	----	16-JUL-2012	08-AUG-2012	✓
Clear Plastic Bottle - Natural (EG052G) TCMB02	12-JUL-2012	---	09-AUG-2012	----	16-JUL-2012	09-AUG-2012	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) S5MB02	11-JUL-2012	---	08-AUG-2012	----	13-JUL-2012	08-AUG-2012	✓
Clear Plastic Bottle - Natural (EK040P) TCMB02	12-JUL-2012	---	09-AUG-2012	----	13-JUL-2012	09-AUG-2012	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) S5MB02	11-JUL-2012	---	08-AUG-2012	----	17-JUL-2012	08-AUG-2012	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G) TCMB02	12-JUL-2012	---	09-AUG-2012	----	17-JUL-2012	09-AUG-2012	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) S5MB02	11-JUL-2012	---	13-JUL-2012	----	16-JUL-2012	13-JUL-2012	*✗
Clear Plastic Bottle - Natural (EK057G) TCMB02	12-JUL-2012	---	14-JUL-2012	----	16-JUL-2012	14-JUL-2012	*✗
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) S5MB02	11-JUL-2012	---	08-AUG-2012	----	17-JUL-2012	08-AUG-2012	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) TCMB02	12-JUL-2012	---	09-AUG-2012	----	17-JUL-2012	09-AUG-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) S5MB02	11-JUL-2012	17-JUL-2012	08-AUG-2012	✓	17-JUL-2012	08-AUG-2012	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G) TCMB02	12-JUL-2012	17-JUL-2012	09-AUG-2012	✓	17-JUL-2012	09-AUG-2012	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) S5MB02	11-JUL-2012	---	13-JUL-2012	----	13-JUL-2012	13-JUL-2012	✓
Clear Plastic Bottle - Natural (EK071G) TCMB02	12-JUL-2012	---	14-JUL-2012	----	13-JUL-2012	14-JUL-2012	✓



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
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005) S5MB02	11-JUL-2012	----	----	----	13-JUL-2012	08-AUG-2012	✓
Amber TOC Vial - Sulfuric Acid (EP005) TCMB02	12-JUL-2012	----	----	----	13-JUL-2012	09-AUG-2012	✓
EP033: C1 - C4 Hydrocarbon Gases							
Amber VOC Vial - Sulfuric Acid (EP033) S5MB02	11-JUL-2012	----	----	----	17-JUL-2012	25-JUL-2012	✓
Amber VOC Vial - Sulfuric Acid (EP033) TCMB02	12-JUL-2012	----	----	----	17-JUL-2012	26-JUL-2012	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) S5MB02	11-JUL-2012	13-JUL-2012	18-JUL-2012	✓	17-JUL-2012	22-AUG-2012	✓
Amber Glass Bottle - Unpreserved (EP071) TCMB02	12-JUL-2012	13-JUL-2012	19-JUL-2012	✓	17-JUL-2012	22-AUG-2012	✓
EP075(SIM)A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075(SIM)) S5MB02	11-JUL-2012	13-JUL-2012	18-JUL-2012	✓	17-JUL-2012	22-AUG-2012	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) TCMB02	12-JUL-2012	13-JUL-2012	19-JUL-2012	✓	17-JUL-2012	22-AUG-2012	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) S5MB02	11-JUL-2012	13-JUL-2012	18-JUL-2012	✓	17-JUL-2012	22-AUG-2012	✓
Amber Glass Bottle - Unpreserved (EP075(SIM)) TCMB02	12-JUL-2012	13-JUL-2012	19-JUL-2012	✓	17-JUL-2012	22-AUG-2012	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) S5MB02	11-JUL-2012	18-JUL-2012	25-JUL-2012	✓	18-JUL-2012	25-JUL-2012	✓
Amber VOC Vial - Sulfuric Acid (EP080) TCMB02	12-JUL-2012	18-JUL-2012	26-JUL-2012	✓	18-JUL-2012	26-JUL-2012	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft							
Amber VOC Vial - Sulfuric Acid (EP080) S5MB02	11-JUL-2012	18-JUL-2012	25-JUL-2012	✓	18-JUL-2012	25-JUL-2012	✓
Amber VOC Vial - Sulfuric Acid (EP080) TCMB02	12-JUL-2012	18-JUL-2012	26-JUL-2012	✓	18-JUL-2012	26-JUL-2012	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	1	2	50.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	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
Conductivity by PC Titrator	EA010-P	2	10	20.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	7	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	4	36	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	13	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	2	50.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	17	11.8	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	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	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	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
Conductivity by PC Titrator	EA010-P	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	36	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	8	12.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Control Samples (LCS) - Continued							
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	36	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	8	12.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	19	5.3	5.0	✓	ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.0	5.0	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	11.1	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	36	5.6	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	2	50.0	5.0	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	17	5.9	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	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
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids (High Level)	EA015H	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
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- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um 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) Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Total Hardness is calculated based on APHA 21st ed., 2340 B. 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): Samples are 0.45 um filtered prior to analysis. 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.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. 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.
Silica (Reactive) by Discrete Analyser	EG052G	WATER	APHA 21st ed. 4500-SiO2 D: Under Acidic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Analytical Methods	Method	Matrix	Method Descriptions
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TPH - Semivolatle Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



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

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	2847188-003	----	Arsenic	7440-38-2	87.8 %	88-110%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2847188-003	----	Cadmium	7440-43-9	86.7 %	89-107%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2847188-003	----	Cobalt	7440-48-4	87.9 %	89-109%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2847188-003	----	Lead	7439-92-1	87.5 %	90-110%	Recovery less than lower control limit
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1217180-001	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride Discrete analyser	ES1217180-001	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK055G: Ammonia as N by Discrete Analyser	ES1217032-001	Anonymous	Ammonia as N	7664-41-7	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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

Matrix: **WATER**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural S5MB02	----	----	----	13-JUL-2012	11-JUL-2012	2
Clear Plastic Bottle - Natural TCMB02	----	----	----	13-JUL-2012	12-JUL-2012	1
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural S5MB02	----	----	----	16-JUL-2012	13-JUL-2012	3



Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK057G: Nitrite as N by Discrete Analyser - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural TCMB02	----	----	----	16-JUL-2012	14-JUL-2012	2

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.**

CHAIN-OF-CUSTODY


Laboratory Narr 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.
 21624068

Results Expected By/On: 7 days
 James Duggaleby
 Fax Results To: 02 9272 5101
 Fax Number: 02 9272 5101
 Phone Number: 02 9272 5248
 Email Results to: j.duggaleby@pb.com.au /
 j.duggaleby@pb.com.au
 Quotation Number: 53039/09
 Invoice To: James Duggaleby
 Head Office, Sydney

Sample ID	Date sampled	Time	Medium *	Preservative Type	Filtered (x)	Containers	Callons (Na, K, Ca, Mg)	Anions (Alkalinity, SO4, Cl, reactive silica)	Dissolved Metals (Al, As, Ba, B, Be, Br, Cd, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, Sr, U, V, Zn)	Ammonia as N	Nitrate, nitrite	Flouride	Reactive Phosphorus as P	Total phosphorus as P	TOC	Gases C1-C4 + methane	BTEX/TPH C6-C9	TPH C10-C36	PAH	Phenols	pH	EC	Total dissolved solids	Remarks
JCM802	12.7.12	0800	M				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
SSM802	11.7.12	1600	M				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
URGENT																								
Received By (Name): Date: Company: Time: Signature:																								
Received By (Name): Date: Company: Time: Signature:																								

Environmental Division
 Sydney
 Work Order
ES1217281



Telephone : +61-2-8784 8555

Parsons Brinckerhoff & Young Consultants
PARSONS BRINCKERHOFF
 Environmental and Geotechnical Services
 Comments:
 Legend: S = Soil, W = Water, F = Filter
 T = Tube

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: ES1217665	Page	: 1 of 3
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS WENDY MCLEAN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: wmclean@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406A	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 18-JUL-2012
Sampler	: NPH/SM	Issue Date	: 24-JUL-2012
Site	: ----		
Quote number	: SY/394/09	No. of samples received	: 1
		No. of samples analysed	: 1

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



WORLD RECOGNISED
ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Pabi Subba	Senior Organic Chemist	Sydney Organics



General Comments

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

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

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

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

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

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

LOR = Limit of reporting

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



Analytical Results

Sub-Matrix: **WATER**

Client sample ID

TTMB03

Client sampling date / time

12-JUL-2012 15:00

Compound	CAS Number	LOR	Unit	ES1217665-001	----	----	----	----
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	50400	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: ES1217665	Page	: 1 of 4
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS WENDY MCLEAN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: wmclean@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406A	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 18-JUL-2012
C-O-C number	: ----	Issue Date	: 24-JUL-2012
Sampler	: NPH/SM	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1
Quote number	: SY/394/09		

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



WORLD RECOGNISED
ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Pabi Subba	Senior Organic Chemist	Sydney Organics



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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2409860)									
ES1217649-005	Anonymous	EP033: Methane	74-82-8	10	µg/L	<10	<10	0.0	No Limit
ES1217739-013	Anonymous	EP033: Methane	74-82-8	10	µg/L	<10	<10	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			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit			LCS	Low	High
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2409860)								
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	98.0	86	108

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 Concentration	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number		MS	Low	High
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2409860)							
ES1217649-009	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	99.7	70	130

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.

Sub-Matrix: WATER

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number		MS	MSD	Low	High	Value	Control Limit
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2409860)										
ES1217649-009	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	99.7	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1217665	Page	: 1 of 5
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MS WENDY MCLEAN	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: wmclean@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406A	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 18-JUL-2012
Sampler	: NPH/SM	Issue Date	: 24-JUL-2012
Order number	: ----		
Quote number	: SY/394/09	No. of samples received	: 1
		No. of samples analysed	: 1

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
EP033: C1 - C4 Hydrocarbon Gases							
Amber VOC Vial - Sulfuric Acid (EP033) TTMB03	12-JUL-2012	----	----	----	19-JUL-2012	26-JUL-2012	✓



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(when) 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	Analytical Methods	Method	Count		Rate (%)			Quality Control Specification
			QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)								
C1 - C4 Gases		EP033	2	14	14.3	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)								
C1 - C4 Gases		EP033	1	14	7.1	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)								
C1 - C4 Gases		EP033	1	14	7.1	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)								
C1 - C4 Gases		EP033	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 Methods	Method	Matrix	Method Descriptions
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.



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.
-



CHAIN OF CUSTODY

ALS Laboratory, please tick ->

Sydney: 277 Woodpark Rd, Smithfield NSW 2176
Ph: 02 8724 8555 Email: sydney@alsenviro.com
 Newcastle: 15 Beaumont Rd, Warneck NSW 2304
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Ph: 08 8339 0590 Email: adelaide@alsenviro.com

Perth: 10 Hedley Way, Malaga WA 6090
Ph: 08 9209 7855 Email: perth@alsenviro.com
 Launceston: 27 Wallington St, Launceston TAS 7250
Ph: 03 6331 2198 Email: launceston@alsenviro.com

CLIENT: AGL Energy

OFFICE: SYDNEY

PROJECT: 2162406A

ORDER NUMBER:

PROJECT MANAGER: James Duggleby

SAMPLER: NPH / SM

COC emailed to ALS? (YES / NO)

Email reports to (will default to PM if no other addresses are listed): vince@als.com.au

Email invoices to (will default to PM if no other addresses are listed): jduggleby@als.com.au

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS: Standard TAT (List due date):

(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: SY39409

CONTACT PH: 9272 5248 / 0423 850 834

CONTRACT PH: 9272 5248 / 0423 850 834

SAMPLER MOBILE: 0424471578

EDD FORMAT (or default):

RELINQUISHED BY:

DATE/TIME:

COC SEQUENCE NUMBER (grid#)

COO: 1 2 3 4 5 6 7

OR: 1 2 3 4 5 6 7

RECEIVED BY: *sep*

DATE/TIME: 18/7/12 1600

RELINQUISHED BY:

DATE/TIME:

FOR LABORATORY USE ONLY (Grid#)

Y/N

Y/N

Y/N

Y/N


Y/N

Y/N

Y/N

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	ANALYSIS REQUIRED INCLUDING SUITES (NB: Suite Codes must be listed to attract auto prices) (When Metals are required, specify Total (unfiltered and acids required) or Dissolved (filtered and acids required))	Additional Information
	TTM303	19/7/2012	w			Dissolved metals (Al, As, Ba, B, Be, Br, Cd, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, Sr, U, V, Zn)	
			w			Anions (Alkalinity, SO4, Cl)	
			w			Cations (Na, K, Ca, Mg)	
			w			Dissolved silica	
			w			NO2 + NO3 + Ammonia	
			w			Total phosphorus	
			w			Reactive phosphorus	
			w			Total organic carbon	
			w			Electrical conductivity	
			w			Total dissolved solids	
			w			Methane	X
			w			TPH (C6-C36)	
			w			BTEX	
			w			PAH & Phenols	
TOTAL					0		

Environmental Division
Sydney
Work Order
ES1217665



Telephone : + 61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide Preserved Plastic; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airtight Unpreserved Plastic
 V = VOA Via HCl Preserved V8 = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulphur Preserved; AV = Airtight Unpreserved Vial; SG = Sulphur Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Specimen bottle; SP = Sulphur Preserved Plastic; F = Formaldehyde Preserved Glass
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Substrate Soils; B = Unpreserved Bag

CERTIFICATE OF ANALYSIS

Work Order	: ES1128136	Page	: 1 of 7
Amendment	: 1		
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Client Services
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 9272 5101	Facsimile	: +61-2-8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 20-DEC-2011
Sampler	: NPH	Issue Date	: 05-JAN-2012
Site	: ----		
Quote number	: SY/349/11	No. of samples received	: 1
		No. of samples analysed	: 1

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
- Surrogate Control 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
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Edwandy Fadjjar	Organic Coordinator	Sydney Organics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics
Wisam Marassa	Inorganics Coordinator	Sydney 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 insufficient sample for analysis.

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

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

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

LOR = Limit of reporting

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

- **EG020-: 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**
 - **EP080: Results for sample TTBB07 has been confirmed by re-analysis.**
 - **This report has been amended as a result of a request to change sample identification numbers (IDs) received by ALS from James Duggleby on 05/01/2012. All analysis results are as per the previous report.**
-



Analytical Results

Sub-Matrix: **WATER**

			Client sample ID	TTPB01				
			Client sampling date / time	19-DEC-2011 15:00				
Compound	CAS Number	LOR	Unit	ES1128136-001				
EA005P: pH by PC Titrator								
pH Value		0.01	pH Unit	7.98				
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C		1	µS/cm	2460				
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	564				
Total Alkalinity as CaCO3		1	mg/L	564				
ED040F: Dissolved Major Anions								
Silicon	7440-21-3	0.05	mg/L	15.3				
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	20				
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	640				
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	162				
Magnesium	7439-95-4	1	mg/L	52				
Sodium	7440-23-5	1	mg/L	340				
Potassium	7440-09-7	1	mg/L	5				
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01				
Arsenic	7440-38-2	0.001	mg/L	<0.001				
Beryllium	7440-41-7	0.001	mg/L	<0.001				
Barium	7440-39-3	0.001	mg/L	2.29				
Cadmium	7440-43-9	0.0001	mg/L	<0.0001				
Cobalt	7440-48-4	0.001	mg/L	<0.001				
Copper	7440-50-8	0.001	mg/L	0.002				
Lead	7439-92-1	0.001	mg/L	<0.001				
Manganese	7439-96-5	0.001	mg/L	0.191				
Molybdenum	7439-98-7	0.001	mg/L	<0.001				
Nickel	7440-02-0	0.001	mg/L	0.002				
Selenium	7782-49-2	0.01	mg/L	<0.01				
Strontium	7440-24-6	0.001	mg/L	3.10				
Uranium	7440-61-1	0.001	mg/L	<0.001				
Vanadium	7440-62-2	0.01	mg/L	<0.01				
Zinc	7440-66-6	0.005	mg/L	0.056				



Analytical Results

Sub-Matrix: **WATER**

				Client sample ID	TTPB01				
				Client sampling date / time	19-DEC-2011 15:00				
Compound	CAS Number	LOR	Unit	ES1128136-001					
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L	<0.05					
Iron	7439-89-6	0.05	mg/L	9.42					
Bromine	7726-95-6	0.1	mg/L	0.8					
EG052F: Dissolved Silica by ICPAES									
Silica	7631-86-9	0.1	mg/L	32.8					
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.69					
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N		0.01	mg/L	<0.01					
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.01					
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N		0.01	mg/L	0.01					
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P		0.01	mg/L	0.34					
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P		0.01	mg/L	<0.01					
EN055: Ionic Balance									
Total Anions		0.01	meq/L	29.7					
Total Cations		0.01	meq/L	27.3					
Ionic Balance		0.01	%	4.31					
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon		1	mg/L	3					
EP033: C1 - C4 Hydrocarbon Gases									
Methane	74-82-8	10	µg/L	1210					
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	1.0	µg/L	<1.0					
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0					
2-Methylphenol	95-48-7	1.0	µg/L	<1.0					
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0					
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0					
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0					
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0					
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0					
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0					



Analytical Results

Sub-Matrix: WATER

				Client sample ID	TTPB01				
				Client sampling date / time	19-DEC-2011 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1128136-001	----	----	----	----	----
EP075(SIM)A: Phenolic Compounds - Continued									
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	----	----	----	----	----
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	----	----	----	----	----
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	----	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----	----
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	----	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft									
C6 - C10 Fraction	----	20	µg/L	<20	----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	----	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	<1	----	----	----	----	----



Analytical Results

Sub-Matrix: **WATER**

Client sample ID

Client sampling date / time

				TTPB01	----	----	----	----
				19-DEC-2011 15:00	----	----	----	----
<i>Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	ES1128136-001	----	----	----	----
EP080: BTEXN - Continued								
Toluene	108-88-3	2	µg/L	8	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	8	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	39.1	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	95.2	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	107	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	110	----	----	----	----
Anthracene-d10	1719-06-8	0.1	%	102	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	117	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	125	----	----	----	----
Toluene-D8	2037-26-5	0.1	%	103	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	94.4	----	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	64.1
2-Chlorophenol-D4	93951-73-6	11.3	122.9
2,4,6-Tribromophenol	118-79-6	11.7	144.0
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	19.9	122.8
Anthracene-d10	1719-06-8	23.3	125.8
4-Terphenyl-d14	1718-51-0	20.3	134.5
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: ES1128136	Page	: 1 of 11
Amendment	: 1		
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Client Services
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 9272 5101	Facsimile	: +61-2-8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 20-DEC-2011
Sampler	: NPH	Issue Date	: 05-JAN-2012
Order number	: ----		
Quote number	: SY/349/11	No. of samples received	: 1
		No. of samples analysed	: 1

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Edwandy Fadjjar	Organic Coordinator	Sydney Organics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics
Wisam Marassa	Inorganics Coordinator	Sydney 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 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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2102095)									
EP1109015-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.92	6.96	0.6	0% - 20%
ES1127929-009	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.65	8.65	0.0	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2102096)									
ES1127929-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	290	273	5.7	0% - 20%
ES1127929-010	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1720	1720	0.2	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2102097)									
ES1128136-001	TTPB01	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	595	602	1.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	595	602	1.2	0% - 20%
ES1128181-003	Anonymous	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	70	70	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	70	70	0.0	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 2100883)									
ES1128136-001	TTPB01	ED040F: Silicon	7440-21-3	0.05	mg/L	15.3	15.7	2.6	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2100882)									
ES1128133-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	12	12	0.0	0% - 50%
EW1103883-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	2	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 2100881)									
ES1128133-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	19	19	0.0	0% - 50%
EW1103883-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	20	22	9.2	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2100880)									
ES1128133-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	16	16	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	10	10	0.0	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.0	No Limit
EW1103883-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	7	7	0.0	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2107672)									
ES1128136-001	TTPB01	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit



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: 2107672) - continued									
ES1128136-001	TTPB01	EG020A-F: Barium	7440-39-3	0.001	mg/L	2.29	2.30	0.3	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.191	0.189	1.2	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.056	0.053	5.2	0% - 50%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	9.42	9.26	1.7	0% - 20%
EG020A-F: Bromine	7726-95-6	0.1	mg/L	0.8	0.7	0.0	No Limit		
EW1103883-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0005	0.0005	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.001	0.002	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.080	0.081	0.0	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.018	0.019	0.0	0% - 50%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.033	0.033	0.0	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.018	0.018	0.0	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.758	0.768	1.3	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.20	0.20	0.0	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.63	0.63	0.0	0% - 50%
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	<0.1	0.0	No Limit		
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2107673)									
ES1128136-001	TTPB01	EG020B-F: Strontium	7440-24-6	0.001	mg/L	3.10	2.99	3.5	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EW1103883-003	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2100761)									
ES1128037-005	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.05	60.2	No Limit
ES1128090-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	7.68	7.49	2.4	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2100879)									

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 Work Order : ES1128136 Amendment 1
 Client : PARSONS BRINCKERHOFF AUST P/L
 Project : 2162406B



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 (%)	
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2100879) - continued										
ES1128092-001	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit	
EW1103883-003	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2100762)										
ES1128037-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.01	0.0	No Limit	
EW1103888-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	1.20	1.23	2.8	0% - 20%	
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2112906)										
ES1128051-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	6.21	6.23	0.4	0% - 20%	
ES1128189-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.09	0.09	0.0	No Limit	
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2100884)										
ES1128136-001	TTPB01	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit	
EP005: Total Organic Carbon (TOC) (QC Lot: 2105891)										
EW1103909-007	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	7	6	15.4	No Limit	
ES1128365-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.0	No Limit	
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2107529)										
EB1127794-002	Anonymous	EP033: Methane	74-82-8	10	µg/L	948	948	0.0	0% - 20%	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2105184)										
ES1127943-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit	
ES1128235-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2105184)										
ES1127943-001	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit	
ES1128235-001	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit	
EP080: BTEXN (QC Lot: 2105184)										
ES1127943-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit	
		EP080: Toluene	108-88-3	2	µg/L	<5	<5	0.0	No Limit	
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit	
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit	
			106-42-3							
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit	
ES1128235-001	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit	
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit	
		EP080: Toluene	108-88-3	2	µg/L	<5	<5	0.0	No Limit	
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit	
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit	
			106-42-3							
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit	
EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	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 Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)
Method: Compound	CAS Number	LOR	Unit				LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 2102096)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	103	92	116
ED037P: Alkalinity by PC Titrator (QCLot: 2102097)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	86.3	75	107
ED040F: Dissolved Major Anions (QCLot: 2100883)								
ED040F: Silicon	7440-21-3	0.05	mg/L	<0.05	5 mg/L	97.7	85	121
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2100882)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	95.4	77	121
ED045G: Chloride Discrete analyser (QCLot: 2100881)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	106	79	123
ED093F: Dissolved Major Cations (QCLot: 2100880)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	93.8	88	110
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.6	90	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	97.0	81	107
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	89	109
EG020F: Dissolved Metals by ICP-MS (QCLot: 2107672)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	93.2	92	112
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	90.8	88	110
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.3	80	114
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	90.0	85	109
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	89.6	89	107
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	93.0	89	109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	89.4	87	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.8	90	110
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.3	87	113
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	92.8	84	114
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.7	89	109
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	86.6	79	119
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	# 75.4	91	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	86.7	85	115
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	98.2	71	127
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.3	84	114
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2107673)								



Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			LCS	Low	High
EK020F: Dissolved Metals by ICP-MS (QCLot: 2107673) - continued								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	91.7	88	112
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2100761)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1.00 mg/L	96.1	86	116
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2100879)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	78	128
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2100762)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.96 mg/L	94.9	80	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2112906)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	87.6	67	109
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2100884)								
EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.50 mg/L	102	85	115
EP005: Total Organic Carbon (TOC) (QCLot: 2105891)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	99.0	78	114
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2107529)								
EP033: Methane	74-82-8	10	µg/L	<10	27.92 µg/L	103	86	108
EP075(SIM)A: Phenolic Compounds (QCLot: 2108480)								
EP075(SIM): Phenol	108-95-2	0.2	µg/L	----	20 µg/L	46.4	24.5	61.9
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2-Chlorophenol	95-57-8	0.2	µg/L	----	20 µg/L	84.1	63.8	110
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2-Methylphenol	95-48-7	0.2	µg/L	----	20 µg/L	85.5	55.9	112
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	0.4	µg/L	----	40 µg/L	83.0	42.5	114
		2	µg/L	<2.0	----	----	----	----
EP075(SIM): 2-Nitrophenol	88-75-5	0.2	µg/L	----	20 µg/L	91.3	62.7	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.2	µg/L	----	20 µg/L	90.8	59.9	112
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.2	µg/L	----	20 µg/L	89.7	59.3	122
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.2	µg/L	----	20 µg/L	90.9	64.3	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	0.2	µg/L	----	20 µg/L	93.0	63	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.2	µg/L	----	20 µg/L	90.0	58.7	118
		1	µg/L	<1.0	----	----	----	----



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
EP075(SIM)A: Phenolic Compounds (QCLot: 2108480) - continued								
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.2	µg/L	----	20 µg/L	93.1	51.2	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pentachlorophenol	87-86-5	0.4	µg/L	----	40 µg/L	50.5	6.85	95.6
		2	µg/L	<2.0	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2108480)								
EP075(SIM): Naphthalene	91-20-3	0.2	µg/L	----	20 µg/L	97.6	58.6	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthylene	208-96-8	0.2	µg/L	----	20 µg/L	95.7	63.6	114
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthene	83-32-9	0.2	µg/L	----	20 µg/L	97.0	62.2	113
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluorene	86-73-7	0.2	µg/L	----	20 µg/L	97.4	63.9	115
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Phenanthrene	85-01-8	0.2	µg/L	----	20 µg/L	102	62.6	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Anthracene	120-12-7	0.2	µg/L	----	20 µg/L	94.4	64.3	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluoranthene	206-44-0	0.2	µg/L	----	20 µg/L	92.1	63.6	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pyrene	129-00-0	0.2	µg/L	----	20 µg/L	95.6	63.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benz(a)anthracene	56-55-3	0.2	µg/L	----	20 µg/L	101	64.1	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Chrysene	218-01-9	0.2	µg/L	----	20 µg/L	101	62.5	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.2	µg/L	----	20 µg/L	87.7	61.7	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.2	µg/L	----	20 µg/L	93.9	61.7	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(a)pyrene	50-32-8	0.2	µg/L	----	20 µg/L	91.1	63.3	117
		0.5	µg/L	<0.5	----	----	----	----
EP075(SIM): Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	----	20 µg/L	92.8	59.9	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	----	20 µg/L	89.8	61.2	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	----	20 µg/L	83.1	59.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	1	µg/L	<1.0	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2105184)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	123	75	127



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2108479)									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	200 µg/L	124	58.9	131	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	250 µg/L	126	73.9	138	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	200 µg/L	128	62.7	131	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2105184)									
EP080: C6 - C10 Fraction	----	20	µg/L	<20	310 µg/L	127	75	127	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2108479)									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	250 µg/L	120	58.9	131	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	350 µg/L	96.0	73.9	138	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----	
		50	µg/L	----	150 µg/L	118	62.7	131	
EP080: BTEXN (QCLot: 2105184)									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	93.5	70	124	
EP080: Toluene	108-88-3	2	µg/L	----	10 µg/L	76.1	66	132	
		5	µg/L	<5	----	----	----	----	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	86.1	70	120	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	84.9	69	121	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	87.2	72	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	92.9	70	124	



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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2100882)							
ES1128133-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	88.5	70	130
ED045G: Chloride Discrete analyser (QCLot: 2100881)							
ES1128133-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	116	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2107672)							
ES1128152-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	83.7	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	76.9	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	77.8	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	72.8	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	78.9	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	74.8	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	72.6	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	73.4	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	77.5	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	79.9	70	130
EG020A-F: Zinc	7440-66-6	0.2 mg/L	73.9	70	130		
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2100761)							
ES1128037-005	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	89.7	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2100879)							
ES1128092-001	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	97.6	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2100762)							
ES1128037-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	104	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2112906)							
ES1128051-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	# Not Determined	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2100884)							
ES1128136-001	TTPB01	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	95.0	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 2105891)							
EW1103909-008	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	113	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2107529)							
EM1114446-001	Anonymous	EP033: Methane	74-82-8	27.92 µg/L	100	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2105184)							
ES1127943-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	116	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2105184)							
ES1127943-001	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	129	70	130



Sub-Matrix: WATER

				<i>Matrix Spike (MS) Report</i>			
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>Spike</i>	<i>Spike Recovery (%)</i>	<i>Recovery Limits (%)</i>	
				<i>Concentration</i>	<i>MS</i>	<i>Low</i>	<i>High</i>
EP080: BTEXN (QCLot: 2105184)							
ES1127943-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	105	70	130
		EP080: Toluene	108-88-3	25 µg/L	120	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	104	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	97.8	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	97.3	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	97.6	70	130

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1128136	Page	: 1 of 8
Amendment	: 1		
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Client Services
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 9272 5101	Facsimile	: +61-2-8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 20-DEC-2011
Sampler	: NPH	Issue Date	: 05-JAN-2012
Order number	: ----		
Quote number	: SY/349/11	No. of samples received	: 1
		No. of samples analysed	: 1

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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) TTPB01	19-DEC-2011	---	19-DEC-2011	----	21-DEC-2011	19-DEC-2011	*
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) TTPB01	19-DEC-2011	---	16-JAN-2012	----	21-DEC-2011	16-JAN-2012	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) TTPB01	19-DEC-2011	---	02-JAN-2012	----	21-DEC-2011	02-JAN-2012	✓
ED040F: Dissolved Major Anions							
Clear Plastic Bottle - Natural (ED040F) TTPB01	19-DEC-2011	---	16-JAN-2012	----	21-DEC-2011	16-JAN-2012	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) TTPB01	19-DEC-2011	---	16-JAN-2012	----	21-DEC-2011	16-JAN-2012	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural (ED045G) TTPB01	19-DEC-2011	---	16-JAN-2012	----	21-DEC-2011	16-JAN-2012	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) TTPB01	19-DEC-2011	---	26-DEC-2011	----	21-DEC-2011	26-DEC-2011	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) TTPB01	19-DEC-2011	---	16-JUN-2012	----	28-DEC-2011	16-JUN-2012	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) TTPB01	19-DEC-2011	---	16-JUN-2012	----	28-DEC-2011	16-JUN-2012	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) TTPB01	19-DEC-2011	---	16-JAN-2012	----	21-DEC-2011	16-JAN-2012	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) TTPB01	19-DEC-2011	---	21-DEC-2011	----	21-DEC-2011	21-DEC-2011	✓



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
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) TTPB01	19-DEC-2011	---	16-JAN-2012	----	21-DEC-2011	16-JAN-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) TTPB01	19-DEC-2011	04-JAN-2012	16-JAN-2012	✓	04-JAN-2012	16-JAN-2012	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) TTPB01	19-DEC-2011	---	21-DEC-2011	----	21-DEC-2011	21-DEC-2011	✓
EP005: Total Organic Carbon (TOC)							
Clear Plastic Bottle - Natural (EP005) TTPB01	19-DEC-2011	----	----	----	23-DEC-2011	16-JAN-2012	✓
EP033: C1 - C4 Hydrocarbon Gases							
Amber VOC Vial - H2SO4 for C1 - C4 Gases (EP033) TTPB01	19-DEC-2011	----	----	----	28-DEC-2011	02-JAN-2012	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft							
Amber Glass Bottle - Unpreserved (EP071) TTPB01	19-DEC-2011	23-DEC-2011	26-DEC-2011	✓	30-DEC-2011	06-FEB-2012	✓
EP075(SIM)A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075(SIM)) TTPB01	19-DEC-2011	23-DEC-2011	26-DEC-2011	✓	30-DEC-2011	06-FEB-2012	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) TTPB01	19-DEC-2011	23-DEC-2011	26-DEC-2011	✓	30-DEC-2011	06-FEB-2012	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) TTPB01	19-DEC-2011	23-DEC-2011	02-JAN-2012	✓	23-DEC-2011	02-JAN-2012	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080) TTPB01	19-DEC-2011	23-DEC-2011	02-JAN-2012	✓	23-DEC-2011	02-JAN-2012	✓



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	Method	Count		Rate (%)			Quality Control Specification
		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
Ammonia as N by Discrete analyser	EK055G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	10	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
Conductivity by PC Titrator	EA010-P	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	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	9	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	12	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	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	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	10	10.0	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
Conductivity by PC Titrator	EA010-P	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	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	4	25.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatle Fraction	EP071	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
Chloride by Discrete Analyser	ED045G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	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	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	4	25.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	ALS QCS3 requirement
C1 - C4 Gases	EP033	1	10	10.0	5.0	✓	ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.6	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	18	5.6	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	11.1	5.0	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	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
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
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)
Major Anions - Dissolved	ED040F	WATER	APHA 21st ed., 3120. The 0.45um filtered samples are determined by ICP/AES for Sulfur and/or Silicon content and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um 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) Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Total Hardness is calculated based on APHA 21st ed., 2340 B. 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): Samples are 0.45 um filtered prior to analysis. 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.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. 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.
Silica (Total Dissolved) by ICPAES	EG052F	WATER	APHA 21st ed., 4500-SiO2. Silica (Total) determined by calculation from Silicon by ICPAES.
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Analytical Methods	Method	Matrix	Method Descriptions
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TPH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



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

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	2494382-003	----	Vanadium	7440-62-2	75.4 %	91-109%	Recovery less than lower control limit
Matrix Spike (MS) Recoveries							
EK067G: Total Phosphorus as P by Discrete Analyser	ES1128051-001	Anonymous	Total Phosphorus as P	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural TTPB01	----	----	----	21-DEC-2011	19-DEC-2011	2

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.

CERTIFICATE OF ANALYSIS

Work Order	: ES1128510	Page	: 1 of 7
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 28-DEC-2011
Sampler	: PH	Issue Date	: 10-JAN-2012
Site	: ----		
Quote number	: SY/394/09	No. of samples received	: 1
		No. of samples analysed	: 1

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
- Surrogate Control 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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Edwardy Fadjar	Organic Coordinator	Sydney Organics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics
Wisam Marassa	Inorganics Coordinator	Sydney 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 insufficient sample for analysis.

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

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

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

LOR = Limit of reporting

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

- **EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.**
- **EG020: LCS recoveries for particular element(s) fall outside ALS Dynamic control limit, however, they are within the acceptance criteria based on ALS DQO. No further action is required.**
- **EP080: Level of reporting raised for toluene due to ambient background levels in the laboratory.**



Analytical Results

Sub-Matrix: **WATER**

			Client sample ID	TTPB02	---	---	---	---
			Client sampling date / time	23-DEC-2011 06:00	---	---	---	---
Compound	CAS Number	LOR	Unit	ES1128510-001	---	---	---	---
EA005P: pH by PC Titrator								
pH Value	---	0.01	pH Unit	6.58	---	---	---	---
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	---	1	µS/cm	2190	---	---	---	---
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	1630	---	---	---	---
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	329	---	---	---	---
Total Alkalinity as CaCO3	---	1	mg/L	329	---	---	---	---
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	30	---	---	---	---
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	688	---	---	---	---
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	148	---	---	---	---
Magnesium	7439-95-4	1	mg/L	52	---	---	---	---
Sodium	7440-23-5	1	mg/L	320	---	---	---	---
Potassium	7440-09-7	1	mg/L	5	---	---	---	---
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	---	---	---	---
Arsenic	7440-38-2	0.001	mg/L	<0.001	---	---	---	---
Beryllium	7440-41-7	0.001	mg/L	<0.001	---	---	---	---
Barium	7440-39-3	0.001	mg/L	2.25	---	---	---	---
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	---	---	---	---
Cobalt	7440-48-4	0.001	mg/L	<0.001	---	---	---	---
Copper	7440-50-8	0.001	mg/L	<0.001	---	---	---	---
Lead	7439-92-1	0.001	mg/L	<0.001	---	---	---	---
Manganese	7439-96-5	0.001	mg/L	0.137	---	---	---	---
Molybdenum	7439-98-7	0.001	mg/L	<0.001	---	---	---	---
Nickel	7440-02-0	0.001	mg/L	<0.001	---	---	---	---
Selenium	7782-49-2	0.01	mg/L	<0.01	---	---	---	---
Strontium	7440-24-6	0.001	mg/L	2.98	---	---	---	---
Uranium	7440-61-1	0.001	mg/L	<0.001	---	---	---	---
Vanadium	7440-62-2	0.01	mg/L	<0.01	---	---	---	---
Zinc	7440-66-6	0.005	mg/L	0.041	---	---	---	---



Analytical Results

Sub-Matrix: **WATER**

			Client sample ID	TTPB02				
			Client sampling date / time	23-DEC-2011 06:00				
Compound	CAS Number	LOR	Unit	ES1128510-001				
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	<0.05				
Iron	7439-89-6	0.05	mg/L	3.40				
Bromine	7726-95-6	0.1	mg/L	0.7				
EG052F: Dissolved Silica by ICPAES								
Silica	7631-86-9	0.1	mg/L	35.1				
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	1.44				
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N		0.01	mg/L	<0.01				
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01				
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N		0.01	mg/L	<0.01				
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P		0.01	mg/L	0.38				
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P		0.01	mg/L	<0.01				
EN055: Ionic Balance								
Total Anions		0.01	meq/L	26.6				
Total Cations		0.01	meq/L	25.7				
Ionic Balance		0.01	%	1.70				
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon		1	mg/L	5				
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	972				
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	<1.0				
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0				
2-Methylphenol	95-48-7	1.0	µg/L	<1.0				
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0				
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0				
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0				
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0				
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0				
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0				



Analytical Results

Sub-Matrix: WATER

				Client sample ID	TTPB02				
				Client sampling date / time	23-DEC-2011 06:00				
Compound	CAS Number	LOR	Unit	ES1128510-001					
EP075(SIM)A: Phenolic Compounds - Continued									
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0					
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0					
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L	<1.0					
Acenaphthylene	208-96-8	1.0	µg/L	<1.0					
Acenaphthene	83-32-9	1.0	µg/L	<1.0					
Fluorene	86-73-7	1.0	µg/L	<1.0					
Phenanthrene	85-01-8	1.0	µg/L	<1.0					
Anthracene	120-12-7	1.0	µg/L	<1.0					
Fluoranthene	206-44-0	1.0	µg/L	<1.0					
Pyrene	129-00-0	1.0	µg/L	<1.0					
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0					
Chrysene	218-01-9	1.0	µg/L	<1.0					
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0					
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0					
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5					
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0					
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0					
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0					
^ Sum of polycyclic aromatic hydrocarbons		0.5	µg/L	<0.5					
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction		20	µg/L	<20					
C10 - C14 Fraction		50	µg/L	<50					
C15 - C28 Fraction		100	µg/L	<100					
C29 - C36 Fraction		50	µg/L	<50					
^ C10 - C36 Fraction (sum)		50	µg/L	<50					
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft									
C6 - C10 Fraction		20	µg/L	<20					
^ C6 - C10 Fraction minus BTEX (F1)		20	µg/L	<20					
>C10 - C16 Fraction		100	µg/L	<100					
>C16 - C34 Fraction		100	µg/L	<100					
>C34 - C40 Fraction		100	µg/L	<100					
^ >C10 - C40 Fraction (sum)		100	µg/L	<100					
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	<1					



Analytical Results

Sub-Matrix: **WATER**

Client sample ID

TTPB02

Client sampling date / time

23-DEC-2011 06:00

Compound	CAS Number	LOR	Unit	ES1128510-001	----	----	----	----
EP080: BTEXN - Continued								
Toluene	108-88-3	2	µg/L	<5	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	25.0	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	62.8	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	75.7	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	66.9	----	----	----	----
Anthracene-d10	1719-06-8	0.1	%	62.0	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	64.9	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	106	----	----	----	----
Toluene-D8	2037-26-5	0.1	%	104	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	102	----	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	64.1
2-Chlorophenol-D4	93951-73-6	11.3	122.9
2,4,6-Tribromophenol	118-79-6	11.7	144.0
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	19.9	122.8
Anthracene-d10	1719-06-8	23.3	125.8
4-Terphenyl-d14	1718-51-0	20.3	134.5
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: ES1128510	Page	: 1 of 11
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 28-DEC-2011
C-O-C number	: ----	Issue Date	: 10-JAN-2012
Sampler	: PH	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1
Quote number	: SY/394/09		

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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Edwandy Fadjar	Organic Coordinator	Sydney Organics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics
Wisam Marassa	Inorganics Coordinator	Sydney 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 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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2109072)									
ES1128507-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.24	7.25	0.1	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2109074)									
ES1128510-001	TTPB02	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2190	2510	13.8	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2111104)									
ES1128273-001	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	25100	25800	2.8	0% - 20%
ES1128557-001	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	30000	29200	2.7	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2109073)									
ES1128510-001	TTPB02	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	329	330	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	329	330	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2110177)									
ES1128376-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	45	44	2.4	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 2110176)									
ES1128376-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	419	422	0.9	0% - 20%
ES1128566-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	21	21	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2110175)									
ES1128375-010	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	60	59	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	73	72	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	310	304	2.1	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.0	No Limit
ES1128566-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	1	1	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	11	11	0.0	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2112455)									
ES1128510-001	TTPB02	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	2.25	2.28	1.1	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.137	0.137	0.0	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit



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: 2112455) - continued									
ES1128510-001	TTPB02	EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.041	0.041	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	3.40	3.39	0.0	0% - 20%
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	0.7	0.8	0.0	No Limit
ES1128623-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.026	0.026	0.0	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.120	0.119	0.0	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.028	0.028	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.22	0.22	0.0	No Limit
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2112456)									
ES1128510-001	TTPB02	EG020B-F: Strontium	7440-24-6	0.001	mg/L	2.98	3.04	2.0	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2111445)									
ES1128491-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.06	0.0	No Limit
ES1128521-004	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.03	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2110171)									
EN1104407-001	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1128375-008	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	0.77	0.76	0.0	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2111444)									
ES1128491-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	2.14	2.10	2.0	0% - 20%
ES1128521-012	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2115753)									
ES1128273-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.10	55.3	0% - 50%

Page : 5 of 11
 Work Order : ES1128510
 Client : PARSONS BRINCKERHOFF AUST P/L
 Project : 2162406B



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 (%)
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2115753) - continued									
ES1128504-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.34	0.34	0.0	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2110178)									
ES1128510-001	TTPB02	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 2110138)									
ES1128260-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	9	11	20.0	0% - 50%
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2109941)									
EB1128134-001	Anonymous	EP033: Methane	74-82-8	10	µg/L	10	10	0.0	No Limit
EB1128203-004	Anonymous	EP033: Methane	74-82-8	10	µg/L	2090	2090	0.0	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2109546)									
ES1128362-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES1128366-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2109546)									
ES1128362-001	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES1128366-001	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 2109546)									
ES1128362-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<5	<5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES1128366-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<5	<5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	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 Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit				LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 2109074)									
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	106	92	116	
EA015: Total Dissolved Solids (QCLot: 2111104)									
EA015H: Total Dissolved Solids @180°C	GIS-210-010	5	mg/L	<5	293 mg/L	94.2	70	130	
ED037P: Alkalinity by PC Titrator (QCLot: 2109073)									
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	96.7	75	107	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2110177)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	77	121	
ED045G: Chloride Discrete analyser (QCLot: 2110176)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	106	79	123	
ED093F: Dissolved Major Cations (QCLot: 2110175)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.8	88	110	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	90	110	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	97.8	81	107	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.1	89	109	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2112455)									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	# 84.9	92	112	
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	# 81.6	88	110	
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	82.7	80	114	
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	# 84.3	85	109	
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	# 80.4	89	107	
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	# 84.2	89	109	
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	# 84.4	87	111	
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	# 88.2	90	110	
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	# 84.6	87	113	
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	93.8	84	114	
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	# 85.2	89	109	
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	82.7	79	119	
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	# 71.0	91	109	
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	# 80.3	85	115	
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	89.2	71	127	
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	86.4	84	114	
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2112456)									



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EK020F: Dissolved Metals by ICP-MS (QCLot: 2112456) - continued									
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	# 81.5	88	112	
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2111445)									
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1.00 mg/L	96.9	86	116	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2110171)									
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	96.8	78	128	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2111444)									
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.4	80	130	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2115753)									
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	93.8	67	109	
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2110178)									
EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.50 mg/L	99.7	85	115	
EP005: Total Organic Carbon (TOC) (QCLot: 2110138)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	102	78	114	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2109941)									
EP033: Methane	74-82-8	10	µg/L	<10	27.92 µg/L	105	86	108	
EP075(SIM)A: Phenolic Compounds (QCLot: 2109836)									
EP075(SIM): Phenol	108-95-2	0.2	µg/L	----	20 µg/L	59.0	24.5	61.9	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Chlorophenol	95-57-8	0.2	µg/L	----	20 µg/L	93.1	63.8	110	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Methylphenol	95-48-7	0.2	µg/L	----	20 µg/L	68.8	55.9	112	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	0.4	µg/L	----	40 µg/L	55.5	42.5	114	
		2	µg/L	<2.0	----	----	----	----	
EP075(SIM): 2-Nitrophenol	88-75-5	0.2	µg/L	----	20 µg/L	78.3	62.7	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.2	µg/L	----	20 µg/L	# 42.1	59.9	112	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.2	µg/L	----	20 µg/L	92.9	59.3	122	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.2	µg/L	----	20 µg/L	93.4	64.3	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	0.2	µg/L	----	20 µg/L	86.5	63	119	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.2	µg/L	----	20 µg/L	76.7	58.7	118	
		1	µg/L	<1.0	----	----	----	----	



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
EP075(SIM)A: Phenolic Compounds (QCLot: 2109836) - continued								
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.2	µg/L	----	20 µg/L	86.3	51.2	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pentachlorophenol	87-86-5	0.4	µg/L	----	40 µg/L	60.0	6.85	95.6
		2	µg/L	<2.0	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2109836)								
EP075(SIM): Naphthalene	91-20-3	0.2	µg/L	----	20 µg/L	103	58.6	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthylene	208-96-8	0.2	µg/L	----	20 µg/L	93.8	63.6	114
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthene	83-32-9	0.2	µg/L	----	20 µg/L	97.1	62.2	113
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluorene	86-73-7	0.2	µg/L	----	20 µg/L	98.4	63.9	115
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Phenanthrene	85-01-8	0.2	µg/L	----	20 µg/L	94.4	62.6	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Anthracene	120-12-7	0.2	µg/L	----	20 µg/L	91.1	64.3	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluoranthene	206-44-0	0.2	µg/L	----	20 µg/L	102	63.6	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pyrene	129-00-0	0.2	µg/L	----	20 µg/L	102	63.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benz(a)anthracene	56-55-3	0.2	µg/L	----	20 µg/L	88.7	64.1	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Chrysene	218-01-9	0.2	µg/L	----	20 µg/L	93.2	62.5	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.2	µg/L	----	20 µg/L	88.2	61.7	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.2	µg/L	----	20 µg/L	94.5	61.7	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(a)pyrene	50-32-8	0.2	µg/L	----	20 µg/L	88.3	63.3	117
		0.5	µg/L	<0.5	----	----	----	----
EP075(SIM): Indeno(1,2,3-cd)pyrene	193-39-5	0.2	µg/L	----	20 µg/L	86.1	59.9	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	----	20 µg/L	83.0	61.2	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	----	20 µg/L	85.2	59.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	1	µg/L	<1.0	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2109546)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	83.6	75	127



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2109835)									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	200 µg/L	116	58.9	131	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	250 µg/L	118	73.9	138	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	200 µg/L	116	62.7	131	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2109546)									
EP080: C6 - C10 Fraction	----	20	µg/L	<20	310 µg/L	86.8	75	127	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2109835)									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	250 µg/L	118	58.9	131	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	350 µg/L	91.1	73.9	138	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----	
		50	µg/L	----	150 µg/L	114	62.7	131	
EP080: BTEXN (QCLot: 2109546)									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	90.5	70	124	
EP080: Toluene	108-88-3	2	µg/L	----	10 µg/L	96.0	66	132	
		5	µg/L	<5	----	----	----	----	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	79.4	70	120	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	76.4	69	121	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	82.0	72	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	99.0	70	124	



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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2110177)							
ES1128376-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride Discrete analyser (QCLot: 2110176)							
ES1128376-005	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	99.5	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2112455)							
ES1128510-001	TTPB02	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	96.5	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	88.7	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	# Not Determined	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	91.0	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	92.1	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	89.2	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	84.9	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	85.0	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	89.6	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	94.1	70	130
EG020A-F: Zinc	7440-66-6	0.2 mg/L	88.0	70	130		
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2111445)							
ES1128491-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	102	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2110171)							
EN1104407-001	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	99.0	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2111444)							
ES1128491-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2115753)							
ES1128273-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	102	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2110178)							
ES1128510-001	TTPB02	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	99.9	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 2110138)							
ES1128260-002	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	122	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2109941)							
EB1128203-003	Anonymous	EP033: Methane	74-82-8	27.92 µg/L	# Not Determined	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2109546)							
ES1128362-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	106	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2109546)							
ES1128362-001	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	110	70	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report				
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)		
					MS	Low	High	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number					
EP080: BTEXN (QCLot: 2109546)								
ES1128362-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	99.9	70	130	
		EP080: Toluene	108-88-3	25 µg/L	103	70	130	
		EP080: Ethylbenzene	100-41-4	25 µg/L	97.7	70	130	
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	93.1	70	130	
			106-42-3					
		EP080: ortho-Xylene	95-47-6	25 µg/L	96.2	70	130	
		EP080: Naphthalene	91-20-3	25 µg/L	74.7	70	130	

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1128510	Page	: 1 of 9
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 28-DEC-2011
Sampler	: PH	Issue Date	: 10-JAN-2012
Order number	: ----		
Quote number	: SY/394/09	No. of samples received	: 1
		No. of samples analysed	: 1

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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) TTPB02	23-DEC-2011	---	23-DEC-2011	----	28-DEC-2011	23-DEC-2011	*
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) TTPB02	23-DEC-2011	---	20-JAN-2012	----	29-DEC-2011	20-JAN-2012	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural (EA015H) TTPB02	23-DEC-2011	----	----	----	30-DEC-2011	30-DEC-2011	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) TTPB02	23-DEC-2011	---	06-JAN-2012	----	29-DEC-2011	06-JAN-2012	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) TTPB02	23-DEC-2011	---	20-JAN-2012	----	29-DEC-2011	20-JAN-2012	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural (ED045G) TTPB02	23-DEC-2011	---	20-JAN-2012	----	29-DEC-2011	20-JAN-2012	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) TTPB02	23-DEC-2011	---	30-DEC-2011	----	29-DEC-2011	30-DEC-2011	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) TTPB02	23-DEC-2011	---	20-JUN-2012	----	03-JAN-2012	20-JUN-2012	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) TTPB02	23-DEC-2011	---	20-JUN-2012	----	03-JAN-2012	20-JUN-2012	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) TTPB02	23-DEC-2011	---	20-JAN-2012	----	30-DEC-2011	20-JAN-2012	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) TTPB02	23-DEC-2011	---	25-DEC-2011	----	29-DEC-2011	25-DEC-2011	*



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
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) TTPB02	23-DEC-2011	---	20-JAN-2012	----	30-DEC-2011	20-JAN-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) TTPB02	23-DEC-2011	06-JAN-2012	20-JAN-2012	✓	06-JAN-2012	20-JAN-2012	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) TTPB02	23-DEC-2011	---	25-DEC-2011	----	29-DEC-2011	25-DEC-2011	*
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005) TTPB02	23-DEC-2011	----	----	----	29-DEC-2011	20-JAN-2012	✓
EP033: C1 - C4 Hydrocarbon Gases							
Amber VOC Vial - H2SO4 for C1 - C4 Gases (EP033) TTPB02	23-DEC-2011	----	----	----	29-DEC-2011	06-JAN-2012	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) TTPB02	23-DEC-2011	29-DEC-2011	30-DEC-2011	✓	30-DEC-2011	07-FEB-2012	✓
EP075(SIM)A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075(SIM)) TTPB02	23-DEC-2011	29-DEC-2011	30-DEC-2011	✓	30-DEC-2011	07-FEB-2012	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) TTPB02	23-DEC-2011	29-DEC-2011	30-DEC-2011	✓	30-DEC-2011	07-FEB-2012	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) TTPB02	23-DEC-2011	29-DEC-2011	06-JAN-2012	✓	29-DEC-2011	06-JAN-2012	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft							
Amber VOC Vial - Sulfuric Acid (EP080) TTPB02	23-DEC-2011	29-DEC-2011	06-JAN-2012	✓	29-DEC-2011	06-JAN-2012	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	1	4	25.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	2	16	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	11	18.2	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	1	100.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	13	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	10	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	2	15	13.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	1	6	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	12.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	4	25.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	10	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	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	1	4	25.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	11	18.2	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	1	100.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	12.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	4	25.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	1	100.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	12.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	4	25.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	ALS QCS3 requirement
C1 - C4 Gases	EP033	1	16	6.3	5.0	✓	ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	11	9.1	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	13	7.7	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	8	12.5	5.0	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	4	25.0	5.0	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	10	10.0	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	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
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids (High Level)	EA015H	WATER	APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
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)
Major Anions - Dissolved	ED040F	WATER	APHA 21st ed., 3120. The 0.45um filtered samples are determined by ICP/AES for Sulfur and/or Silcon content and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um 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) Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Total Hardness is calculated based on APHA 21st ed., 2340 B. 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): Samples are 0.45 um filtered prior to analysis. 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.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. 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.
Silica (Total Dissolved) by ICPAES	EG052F	WATER	APHA 21st ed., 4500-SiO2. Silica (Total) determined by calculation from Silicon by ICPAES.
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Analytical Methods	Method	Matrix	Method Descriptions
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TPH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



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

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	2500460-003	----	Aluminium	7429-90-5	84.9 %	92-112%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2500460-003	----	Arsenic	7440-38-2	81.6 %	88-110%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2500460-003	----	Barium	7440-39-3	84.3 %	85-109%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2500460-003	----	Cadmium	7440-43-9	80.4 %	89-107%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2500460-003	----	Cobalt	7440-48-4	84.2 %	89-109%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2500460-003	----	Copper	7440-50-8	84.4 %	87-111%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2500460-003	----	Lead	7439-92-1	88.2 %	90-110%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2500460-003	----	Manganese	7439-96-5	84.6 %	87-113%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2500460-003	----	Nickel	7440-02-0	85.2 %	89-109%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2500460-003	----	Vanadium	7440-62-2	71.0 %	91-109%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2500460-003	----	Zinc	7440-66-6	80.3 %	85-115%	Recovery less than lower control limit
EG020F: Dissolved Metals by ICP-MS	2500460-003	----	Strontium	7440-24-6	81.5 %	88-112%	Recovery less than lower control limit
EP075(SIM)A: Phenolic Compounds	2496811-007	----	2,4-Dimethylphenol	105-67-9	42.1 %	59.9-112%	Recovery less than lower control limit
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1128376-005	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG020F: Dissolved Metals by ICP-MS	ES1128510-001	TTPB02	Barium	7440-39-3	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	ES1128491-001	Anonymous	Nitrite + Nitrate as N	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP033: C1 - C4 Hydrocarbon Gases	EB1128203-003	Anonymous	Methane	74-82-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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



Matrix: **WATER**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural TTPB02	----	----	----	28-DEC-2011	23-DEC-2011	5
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural TTPB02	----	----	----	29-DEC-2011	25-DEC-2011	4
EK071G: Reactive Phosphorus as P by discrete analyser						
Clear Plastic Bottle - Natural TTPB02	----	----	----	29-DEC-2011	25-DEC-2011	4

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.**

CERTIFICATE OF ANALYSIS

Work Order	: ES1224679	Page	: 1 of 11
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 17-OCT-2012
Sampler	: AM	Issue Date	: 24-OCT-2012
Site	: ----		
Quote number	: SY/394/09	No. of samples received	: 7
		No. of samples analysed	: 7

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
- Surrogate Control Limits



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Raymond Commodor	Instrument Chemist	Sydney Inorganics
Sanjeshni Jyoti Mala	Senior Chemist Volatile	Sydney Organics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics
Wisam Marassa	Inorganics Coordinator	Sydney 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 insufficient sample for analysis.

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

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

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

LOR = Limit of reporting

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

- **ED041G: LOR raised for Sulfate on various samples due to sample matrix.**
 - **EP080: Result for sample S5MB02 has been confirmed by re-analysis.**
-



Analytical Results

Sub-Matrix: WATER

Client sample ID
 Client sampling date / time

				S4MB01	S4MB02	S4MB03	S5MB01	S5MB02
				15-OCT-2012 16:00	15-OCT-2012 16:00	15-OCT-2012 16:00	15-OCT-2012 16:00	15-OCT-2012 16:00
Compound	CAS Number	LOR	Unit	ES1224679-001	ES1224679-002	ES1224679-003	ES1224679-004	ES1224679-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.71	7.73	8.07	7.61	8.34
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	5010	2350	3370	8100	4300
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	2850	1260	1710	5680	2340
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	16
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	328	130	265	1650	838
Total Alkalinity as CaCO3	----	1	mg/L	328	130	265	1650	854
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	196	<10	<10	1490	<10
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	1320	694	922	1210	901
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	202	64	14	231	10
Magnesium	7439-95-4	1	mg/L	44	21	4	104	6
Sodium	7440-23-5	1	mg/L	777	376	715	1560	944
Potassium	7440-09-7	1	mg/L	8	4	4	42	8
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.01	0.01	0.01
Arsenic	7440-38-2	0.001	mg/L	0.003	<0.001	<0.001	0.015	0.002
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L	0.599	4.06	1.74	0.133	2.00
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.231	0.042	0.016	0.113	0.018
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.001
Nickel	7440-02-0	0.001	mg/L	0.003	<0.001	<0.001	0.025	0.002
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	0.01	<0.01
Strontium	7440-24-6	0.001	mg/L	20.6	8.81	1.71	17.9	1.40
Uranium	7440-61-1	0.001	mg/L	0.002	<0.001	<0.001	<0.001	0.001
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.010	0.011	0.008	0.017	0.005



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	S4MB01	S4MB02	S4MB03	S5MB01	S5MB02
				15-OCT-2012 16:00	15-OCT-2012 16:00	15-OCT-2012 16:00	15-OCT-2012 16:00	15-OCT-2012 16:00
				ES1224679-001	ES1224679-002	ES1224679-003	ES1224679-004	ES1224679-005
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	0.12	<0.05	<0.05	0.52	0.08
Iron	7439-89-6	0.05	mg/L	0.20	0.07	<0.05	0.07	<0.05
Bromine	7726-95-6	0.1	mg/L	2.3	0.9	1.3	3.5	1.7
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.10	mg/L	23.8	14.2	12.8	35.9	17.3
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.6	0.2	<0.1	0.2	0.6
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	1.68	1.66	0.88	10.0	3.17
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.01	<0.01	0.02	0.02	0.02
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.01	0.02	0.02	0.02
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.19	0.20	0.06	1.00	0.82
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	<0.01	0.65	0.56
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	47.9	22.2	31.3	98.1	42.5
Total Cations	----	0.01	meq/L	47.7	21.4	32.2	89.0	42.3
Ionic Balance	----	0.01	%	0.18	1.83	1.43	4.89	0.30
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	32	6	4	307	<1
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	4460	6960	43500	4690	26800
Ethene	74-85-1	10	µg/L	<10	<10	<10	<10	<10
Ethane	74-84-0	10	µg/L	<10	<10	<10	<10	<10
Propene	115-07-1	10	µg/L	<10	<10	<10	<10	<10
Propane	74-98-6	10	µg/L	<10	<10	<10	<10	25
Butene	25167-67-3	10	µg/L	<10	<10	<10	<10	<10
Butane	106-97-8	10	µg/L	<10	<10	<10	<10	<10
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	<1.0	<1.0	<1.0	1.1	<1.0



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	S4MB01	S4MB02	S4MB03	S5MB01	S5MB02
				15-OCT-2012 16:00	15-OCT-2012 16:00	15-OCT-2012 16:00	15-OCT-2012 16:00	15-OCT-2012 16:00
				ES1224679-001	ES1224679-002	ES1224679-003	ES1224679-004	ES1224679-005
EP075(SIM)A: Phenolic Compounds - Continued								
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	<1.0	1.0	<1.0
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	<2.0	<2.0	6.7	<2.0
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	<1.0	<1.0	7.4	<1.0
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (WHO)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	60
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	1860	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	70	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	1930	60



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	S4MB01	S4MB02	S4MB03	S5MB01	S5MB02
				15-OCT-2012 16:00	15-OCT-2012 16:00	15-OCT-2012 16:00	15-OCT-2012 16:00	15-OCT-2012 16:00
				ES1224679-001	ES1224679-002	ES1224679-003	ES1224679-004	ES1224679-005
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	240	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	1650	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	1890	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	2
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	----
^ Sum of BTEX	----	1	µg/L	----	----	----	----	<1
^ Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	25.2	27.5	27.9	29.1	26.5
2-Chlorophenol-D4	93951-73-6	0.1	%	52.4	55.5	56.5	55.1	54.0
2,4,6-Tribromophenol	118-79-6	0.1	%	65.3	59.4	64.8	76.2	68.7
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	55.8	58.8	62.1	59.0	63.9
Anthracene-d10	1719-06-8	0.1	%	75.2	75.4	67.5	70.8	70.2
4-Terphenyl-d14	1718-51-0	0.1	%	72.7	68.3	80.4	61.8	78.1
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	127	114	109	114	110
Toluene-D8	2037-26-5	0.1	%	120	120	112	117	113
4-Bromofluorobenzene	460-00-4	0.1	%	98.2	127	123	99.2	124



Analytical Results

Sub-Matrix: WATER

				Client sample ID					
				S5MB03	TTMB03	----	----	----	
				Client sampling date / time	15-OCT-2012 16:00	15-OCT-2012 16:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1224679-006	ES1224679-007	----	----	----	
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit	7.57	10.7	----	----	----	
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm	5340	2930	----	----	----	
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	2910	1460	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	34	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	461	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1020	<1	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	1020	495	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	230	<10	----	----	----	
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L	1120	627	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	99	<1	----	----	----	
Magnesium	7439-95-4	1	mg/L	110	<1	----	----	----	
Sodium	7440-23-5	1	mg/L	891	604	----	----	----	
Potassium	7440-09-7	1	mg/L	10	5	----	----	----	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	----	----	----	
Arsenic	7440-38-2	0.001	mg/L	0.022	0.003	----	----	----	
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	----	
Barium	7440-39-3	0.001	mg/L	0.159	0.358	----	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----	
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----	
Copper	7440-50-8	0.001	mg/L	0.001	0.002	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----	
Manganese	7439-96-5	0.001	mg/L	0.151	<0.001	----	----	----	
Molybdenum	7439-98-7	0.001	mg/L	0.002	0.004	----	----	----	
Nickel	7440-02-0	0.001	mg/L	0.005	0.001	----	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----	
Strontium	7440-24-6	0.001	mg/L	5.36	0.292	----	----	----	
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	----	----	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	----	
Zinc	7440-66-6	0.005	mg/L	0.029	0.095	----	----	----	



Analytical Results

Sub-Matrix: WATER

				Client sample ID	S5MB03	TTMB03			
				Client sampling date / time	15-OCT-2012 16:00	15-OCT-2012 16:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1224679-006	ES1224679-007				
EG020F: Dissolved Metals by ICP-MS - Continued									
Boron	7440-42-8	0.05	mg/L	0.05	0.07	----	----	----	----
Iron	7439-89-6	0.05	mg/L	0.28	<0.05	----	----	----	----
Bromine	7726-95-6	0.1	mg/L	2.1	0.7	----	----	----	----
EG052G: Silica by Discrete Analyser									
Reactive Silica	----	0.10	mg/L	17.5	13.6	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	0.2	0.9	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	1.96	4.00	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	0.03	0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	0.03	0.01	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.15	0.07	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	----	0.01	mg/L	0.06	0.05	----	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L	56.8	27.6	----	----	----	----
Total Cations	----	0.01	meq/L	53.0	26.4	----	----	----	----
Ionic Balance	----	0.01	%	3.45	2.22	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	<1	25	----	----	----	----
EP033: C1 - C4 Hydrocarbon Gases									
Methane	74-82-8	10	µg/L	291	51200	----	----	----	----
Ethene	74-85-1	10	µg/L	<10	<10	----	----	----	----
Ethane	74-84-0	10	µg/L	<10	<10	----	----	----	----
Propene	115-07-1	10	µg/L	<10	<10	----	----	----	----
Propane	74-98-6	10	µg/L	<10	<10	----	----	----	----
Butene	25167-67-3	10	µg/L	<10	<10	----	----	----	----
Butane	106-97-8	10	µg/L	<10	<10	----	----	----	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	1.0	µg/L	<1.0	9.4	----	----	----	----



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	S5MB03	TTMB03			
				15-OCT-2012 16:00	15-OCT-2012 16:00	----	----	----
				ES1224679-006	ES1224679-007	----	----	----
EP075(SIM)A: Phenolic Compounds - Continued								
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	----	----	----
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	----	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	<2.0	----	----	----
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	----	----	----
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	<1.0	----	----	----
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	----	----	----
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	----	----	----
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	----	----	----
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	----	----	----
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	----	----	----
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	----	----	----
Indeno(1,2,3-cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	----	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (WHO)	----	0.5	µg/L	<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	120	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	120	----	----	----



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				S5MB03	TTMB03	----	----	----
				15-OCT-2012 16:00	15-OCT-2012 16:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1224679-006	ES1224679-007	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	20	µg/L	<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	100	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	30.3	19.8	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	62.3	51.6	----	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	63.3	58.9	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	66.8	67.4	----	----	----
Anthracene-d10	1719-06-8	0.1	%	61.3	78.0	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	75.7	72.4	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	117	136	----	----	----
Toluene-D8	2037-26-5	0.1	%	118	116	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	124	102	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	64.1
2-Chlorophenol-D4	93951-73-6	11.3	122.9
2,4,6-Tribromophenol	118-79-6	11.7	144.0
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	19.9	122.8
Anthracene-d10	1719-06-8	23.3	125.8
4-Terphenyl-d14	1718-51-0	20.3	134.5
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

<p>Work Order : ES1224679</p> <p>Client : PARSONS BRINCKERHOFF AUST P/L</p> <p>Contact : MR JAMES DUGGLEBY</p> <p>Address : GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001</p> <p>E-mail : jduggleby@pb.com.au</p> <p>Telephone : +61 02 9272 5100</p> <p>Facsimile : +61 02 9272 5101</p> <p>Project : 2162406B</p> <p>Site : ----</p> <p>C-O-C number : ----</p> <p>Sampler : AM</p> <p>Order number : ----</p> <p>Quote number : SY/394/09</p>	<p>Page : 1 of 14</p> <p>Laboratory : Environmental Division Sydney</p> <p>Contact : Loren Schiavon</p> <p>Address : 277-289 Woodpark Road Smithfield NSW Australia 2164</p> <p>E-mail : loren.schiavon@alsglobal.com</p> <p>Telephone : +61 2 8784 8503</p> <p>Facsimile : +61 2 8784 8500</p> <p>QC Level : NEPM 1999 Schedule B(3) and ALS QCS3 requirement</p> <p>Date Samples Received : 17-OCT-2012</p> <p>Issue Date : 24-OCT-2012</p> <p>No. of samples received : 7</p> <p>No. of samples analysed : 7</p>
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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Raymond Commodor	Instrument Chemist	Sydney Inorganics
Sanjeshni Jyoti Mala	Senior Chemist Volatile	Sydney Organics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics
Wisam Marassa	Inorganics Coordinator	Sydney 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 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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2551575)									
ES1224679-001	S4MB01	EA005-P: pH Value	----	0.01	pH Unit	7.71	7.69	0.2	0% - 20%
ES1224699-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.10	7.74	4.5	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2551574)									
ES1224679-001	S4MB01	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	5010	5010	0.0	0% - 20%
ES1224699-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	285	285	0.0	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2558778)									
ES1224582-001	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	296	306	3.3	0% - 20%
ES1224608-001	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	3150	3170	0.4	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2551573)									
ES1224679-001	S4MB01	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	328	324	1.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	328	324	1.1	0% - 20%
ES1224699-001	Anonymous	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	77	78	1.5	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	77	78	1.5	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2551580)									
ES1224634-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	18	18	0.0	0% - 50%
ES1224634-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	51	51	0.0	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 2551579)									
ES1224634-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	39	39	0.0	0% - 20%
ES1224634-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	43	42	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2551589)									
ES1224679-001	S4MB01	ED093F: Calcium	7440-70-2	1	mg/L	202	199	1.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	44	45	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	777	775	0.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	8	8	0.0	No Limit
ES1224767-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	32	31	3.4	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	18	18	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	56	56	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2552792)									
ES1224674-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.0	No Limit



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: 2552792) - continued									
ES1224674-004	Anonymous	EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.134	0.114	16.1	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.049	0.042	17.1	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.035	0.032	10.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.366	0.303	18.8	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.10	<0.10	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.10	<0.10	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.10	<0.10	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.50	<0.50	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.50	<0.50	0.0	No Limit
EG020A-F: Bromine	7726-95-6	0.1	mg/L	48.8	40.2	19.2	0% - 20%		
ES1224679-001	S4MB01	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.599	0.606	1.2	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.231	0.232	0.4	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.010	0.020	62.4	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020A-F: Boron	7440-42-8	0.05	mg/L	0.12	0.13	0.0	No Limit		
EG020A-F: Iron	7439-89-6	0.05	mg/L	0.20	0.21	0.0	No Limit		
EG020A-F: Bromine	7726-95-6	0.1	mg/L	2.3	2.3	0.0	0% - 20%		
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2552795)									
ES1224679-001	S4MB01	EG020B-F: Strontium	7440-24-6	0.001	mg/L	20.6	20.7	0.7	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	0.002	0.002	0.0	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 2551591)									
ES1224679-001	S4MB01	EG052G: Reactive Silica	----	0.10	mg/L	23.8	24.2	1.5	0% - 20%
EK040P: Fluoride by PC Titrator (QC Lot: 2551576)									
ES1224679-001	S4MB01	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.6	0.5	0.0	No Limit
ES1224700-002	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit



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 (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2552902)									
ES1224679-001	S4MB01	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.68	1.67	0.8	0% - 20%
ES1224699-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.03	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2551585)									
ES1224670-007	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1224679-006	S5MB03	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2552900)									
ES1224679-001	S4MB01	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.01	0.0	No Limit
ES1224699-003	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.01	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2553710)									
ES1224678-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	4.20	4.09	2.5	0% - 20%
ES1224735-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	0.02	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2551584)									
ES1224658-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	7.42	8.01	7.7	0% - 20%
ES1224679-006	S5MB03	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 2552627)									
ES1224668-002	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	<1	2	66.7	No Limit
ES1224670-002	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 2552628)									
ES1224679-002	S4MB02	EP005: Total Organic Carbon	----	1	mg/L	6	6	0.0	No Limit
ES1224692-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	6	18.2	No Limit
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2555093)									
EM1212009-001	Anonymous	EP033: Methane	74-82-8	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit
EM1212212-007	Anonymous	EP033: Methane	74-82-8	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2552963)									
ES1224553-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES1224679-003	S4MB03	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2552963)									

Page : 6 of 14
 Work Order : ES1224679
 Client : PARSONS BRINCKERHOFF AUST P/L
 Project : 2162406B



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 (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2552963) - continued									
ES1224553-003	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES1224679-003	S4MB03	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 2552963)									
ES1224553-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES1224679-003	S4MB03	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	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			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EA010P: Conductivity by PC Titrator (QCLot: 2551574)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	106	96	110
EA015: Total Dissolved Solids (QCLot: 2558778)								
EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	<10	293 mg/L	99.2	71	119
ED037P: Alkalinity by PC Titrator (QCLot: 2551573)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	91.3	74	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2551580)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	107	84	124
ED045G: Chloride Discrete analyser (QCLot: 2551579)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	106	84	122
ED093F: Dissolved Major Cations (QCLot: 2551589)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	90.5	85	111
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	92.1	87	111
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	91.9	79	109
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.9	86	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2552792)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	98.7	79	119
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	80	118
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	99.0	76	120
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	98.2	81	113
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.8	82	114
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	102	78	116
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	101	79	115
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	85.4	81	113
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.8	80	114
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	90.7	77	119
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	80	116
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.5	74	126
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	94.7	70	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	75	121
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	96.3	71	127
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.2	78	116
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2552795)								



Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
Method: Compound	CAS Number	LOR	Unit		Result	Spike	Spike Recovery (%)		Recovery Limits (%)
				Concentration		LCS	Low	High	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2552795) - continued									
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	102	78	116	
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----	
EG052G: Silica by Discrete Analyser (QCLot: 2551591)									
EG052G: Reactive Silica	----	0.1	mg/L	<0.10	5 mg/L	105	90	120	
EK040P: Fluoride by PC Titrator (QCLot: 2551576)									
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	95.6	79	117	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2552902)									
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1.00 mg/L	95.8	89	113	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2551585)									
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.5	87	119	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2552900)									
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	86	124	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2553710)									
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	86.3	70	130	
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2551584)									
EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.50 mg/L	108	86	124	
EP005: Total Organic Carbon (TOC) (QCLot: 2552627)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	104	81	119	
EP005: Total Organic Carbon (TOC) (QCLot: 2552628)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	102	81	119	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2555093)									
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	90.2	86	108	
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	99.8	87	111	
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	101	87	111	
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	99.2	86	112	
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	100	87	111	
EP033: Butene	25167-67-3	20	µg/L	<20	99.61 µg/L	98.2	87	113	
EP033: Butane	106-97-8	20	µg/L	<20	102.18 µg/L	99.1	87	113	
EP075(SIM)A: Phenolic Compounds (QCLot: 2551634)									
EP075(SIM): Phenol	108-95-2	0.2	µg/L	----	5 µg/L	31.4	24.5	61.9	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Chlorophenol	95-57-8	0.2	µg/L	----	5 µg/L	66.5	63.8	110	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Methylphenol	95-48-7	0.2	µg/L	----	5 µg/L	65.6	55.9	112	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	0.4	µg/L	----	10 µg/L	59.7	42.5	114	
		2	µg/L	<2.0	----	----	----	----	



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
EP075(SIM)A: Phenolic Compounds (QCLot: 2551634) - continued									
EP075(SIM): 2-Nitrophenol	88-75-5	0.2	µg/L	----	5 µg/L	82.4	62.7	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.2	µg/L	----	5 µg/L	69.3	59.9	112	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.2	µg/L	----	5 µg/L	68.8	59.3	122	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.2	µg/L	----	5 µg/L	73.4	64.3	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	0.2	µg/L	----	5 µg/L	79.9	63	119	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.2	µg/L	----	5 µg/L	65.8	58.7	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.2	µg/L	----	5 µg/L	69.2	51.2	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Pentachlorophenol	87-86-5	0.4	µg/L	----	10 µg/L	58.0	6.85	95.6	
		2	µg/L	<2.0	----	----	----	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2551634)									
EP075(SIM): Naphthalene	91-20-3	0.2	µg/L	----	5 µg/L	71.2	58.6	119	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Acenaphthylene	208-96-8	0.2	µg/L	----	5 µg/L	68.0	63.6	114	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Acenaphthene	83-32-9	0.2	µg/L	----	5 µg/L	77.3	62.2	113	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Fluorene	86-73-7	0.2	µg/L	----	5 µg/L	77.6	63.9	115	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Phenanthrene	85-01-8	0.2	µg/L	----	5 µg/L	91.2	62.6	116	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Anthracene	120-12-7	0.2	µg/L	----	5 µg/L	96.4	64.3	116	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Fluoranthene	206-44-0	0.2	µg/L	----	5 µg/L	92.2	63.6	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Pyrene	129-00-0	0.2	µg/L	----	5 µg/L	87.1	63.1	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benz(a)anthracene	56-55-3	0.2	µg/L	----	5 µg/L	69.6	64.1	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Chrysene	218-01-9	0.2	µg/L	----	5 µg/L	74.3	62.5	116	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.2	µg/L	----	5 µg/L	73.0	61.7	119	
		1	µg/L	<1.0	----	----	----	----	



Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2551634) - continued								
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.2	µg/L	----	5 µg/L	81.4	61.7	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(a)pyrene	50-32-8	0.2	µg/L	----	5 µg/L	70.2	63.3	117
		0.5	µg/L	<0.5	----	----	----	----
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.2	µg/L	----	5 µg/L	73.9	59.9	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	----	5 µg/L	71.1	61.2	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	----	5 µg/L	79.0	59.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	1	µg/L	<1.0	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2551633)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	93.5	58.9	131
EP071: C15 - C28 Fraction	----	100	µg/L	<100	2500 µg/L	117	73.9	138
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	100	62.7	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2552963)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	106	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2551633)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	73.2	58.9	131
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	90.8	73.9	138
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
		50	µg/L	----	1500 µg/L	101	62.7	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2552963)								
EP080: C6 - C10 Fraction	----	20	µg/L	<20	310 µg/L	104	75	127
EP080: BTEXN (QCLot: 2552963)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	91.3	70	124
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	107	66	132
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	97.6	70	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	95.4	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	90.0	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	102	70	124

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 (%)



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2551580)							
ES1224634-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	97.5	70	130
ED045G: Chloride Discrete analyser (QCLot: 2551579)							
ES1224634-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	105	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2552792)							
ES1224674-005	Anonymous	EG020A-F: Arsenic	7440-38-2	2 mg/L	99.8	70	130
		EG020A-F: Beryllium	7440-41-7	2 mg/L	86.6	70	130
		EG020A-F: Barium	7440-39-3	2 mg/L	103	70	130
		EG020A-F: Cadmium	7440-43-9	.5 mg/L	90.4	70	130
		EG020A-F: Cobalt	7440-48-4	2 mg/L	96.2	70	130
		EG020A-F: Copper	7440-50-8	2 mg/L	98.2	70	130
		EG020A-F: Lead	7439-92-1	2 mg/L	89.1	70	130
		EG020A-F: Manganese	7439-96-5	2 mg/L	88.4	70	130
		EG020A-F: Nickel	7440-02-0	2 mg/L	87.6	70	130
		EG020A-F: Vanadium	7440-62-2	2 mg/L	98.7	70	130
EG020A-F: Zinc	7440-66-6	2 mg/L	88.7	70	130		
EG052G: Silica by Discrete Analyser (QCLot: 2551591)							
ES1224679-001	S4MB01	EG052G: Reactive Silica	----	5.0 mg/L	# Not Determined	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2551576)							
ES1224679-001	S4MB01	EK040P: Fluoride	16984-48-8	5.0 mg/L	109	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2552902)							
ES1224679-001	S4MB01	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	97.8	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2551585)							
ES1224670-007	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	106	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2552900)							
ES1224679-001	S4MB01	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	88.8	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2553710)							
ES1224678-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	# Not Determined	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2551584)							
ES1224658-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	# Not Determined	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 2552627)							
ES1224668-001	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	104	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 2552628)							
ES1224679-003	S4MB03	EP005: Total Organic Carbon	----	100 mg/L	116	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2555093)							
ES1224679-001	S4MB01	EP033: Methane	74-82-8	28.48 µg/L	# Not Determined	70	130



Sub-Matrix: **WATER**

Laboratory sample ID				Matrix Spike (MS) Report					
				Spike		Spike Recovery (%)		Recovery Limits (%)	
				Concentration	MS	Low	High		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number						
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2555093) - continued									
ES1224679-001	S4MB01	EP033: Ethene	74-85-1	50.29 µg/L	103	70	130		
		EP033: Ethane	74-84-0	54.43 µg/L	104	70	130		
		EP033: Propene	115-07-1	73.97 µg/L	102	70	130		
		EP033: Propane	74-98-6	78.28 µg/L	103	70	130		
		EP033: Butene	25167-67-3	99.61 µg/L	103	70	130		
		EP033: Butane	106-97-8	102.18 µg/L	104	70	130		
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2552963)									
ES1224553-003	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	115	70	130		
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2552963)									
ES1224553-003	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	113	70	130		
EP080: BTEXN (QCLot: 2552963)									
ES1224553-003	Anonymous	EP080: Benzene	71-43-2	25 µg/L	90.1	70	130		
		EP080: Toluene	108-88-3	25 µg/L	104	70	130		
		EP080: Ethylbenzene	100-41-4	25 µg/L	97.1	70	130		
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	107	70	130		
			106-42-3						
		EP080: ortho-Xylene	95-47-6	25 µg/L	102	70	130		
	EP080: Naphthalene	91-20-3	25 µg/L	105	70	130			

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.

Sub-Matrix: **WATER**

Laboratory sample ID				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report							
				Spike		Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number								
EK040P: Fluoride by PC Titrator (QCLot: 2551576)											
ES1224679-001	S4MB01	EK040P: Fluoride	16984-48-8	5.0 mg/L	109	----	70	130	----	----	
ED045G: Chloride Discrete analyser (QCLot: 2551579)											
ES1224634-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	105	----	70	130	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2551580)											
ES1224634-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	97.5	----	70	130	----	----	
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2551584)											
ES1224658-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	# Not Determined	----	70	130	----	----	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2551585)											
ES1224670-007	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	106	----	70	130	----	----	
EG052G: Silica by Discrete Analyser (QCLot: 2551591)											



Sub-Matrix: WATER				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report							
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)		
					MS	MSD	Low	High	Value	Control Limit	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number								
EG052G: Silica by Discrete Analyser (QCLot: 2551591) - continued											
ES1224679-001	S4MB01	EG052G: Reactive Silica	----	5.0 mg/L	# Not Determined	----	70	130	----	----	
EP005: Total Organic Carbon (TOC) (QCLot: 2552627)											
ES1224668-001	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	104	----	70	130	----	----	
EP005: Total Organic Carbon (TOC) (QCLot: 2552628)											
ES1224679-003	S4MB03	EP005: Total Organic Carbon	----	100 mg/L	116	----	70	130	----	----	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2552792)											
ES1224674-005	Anonymous	EG020A-F: Arsenic	7440-38-2	2 mg/L	99.8	----	70	130	----	----	
		EG020A-F: Beryllium	7440-41-7	2 mg/L	86.6	----	70	130	----	----	
		EG020A-F: Barium	7440-39-3	2 mg/L	103	----	70	130	----	----	
		EG020A-F: Cadmium	7440-43-9	.5 mg/L	90.4	----	70	130	----	----	
		EG020A-F: Cobalt	7440-48-4	2 mg/L	96.2	----	70	130	----	----	
		EG020A-F: Copper	7440-50-8	2 mg/L	98.2	----	70	130	----	----	
		EG020A-F: Lead	7439-92-1	2 mg/L	89.1	----	70	130	----	----	
		EG020A-F: Manganese	7439-96-5	2 mg/L	88.4	----	70	130	----	----	
		EG020A-F: Nickel	7440-02-0	2 mg/L	87.6	----	70	130	----	----	
		EG020A-F: Vanadium	7440-62-2	2 mg/L	98.7	----	70	130	----	----	
EG020A-F: Zinc	7440-66-6	2 mg/L	88.7	----	70	130	----	----			
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2552900)											
ES1224679-001	S4MB01	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	88.8	----	70	130	----	----	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2552902)											
ES1224679-001	S4MB01	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	97.8	----	70	130	----	----	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2552963)											
ES1224553-003	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	115	----	70	130	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2552963)											
ES1224553-003	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	113	----	70	130	----	----	
EP080: BTEXN (QCLot: 2552963)											
ES1224553-003	Anonymous	EP080: Benzene	71-43-2	25 µg/L	90.1	----	70	130	----	----	
		EP080: Toluene	108-88-3	25 µg/L	104	----	70	130	----	----	
		EP080: Ethylbenzene	100-41-4	25 µg/L	97.1	----	70	130	----	----	
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	107	----	70	130	----	----	
			106-42-3								
		EP080: ortho-Xylene	95-47-6	25 µg/L	102	----	70	130	----	----	
EP080: Naphthalene	91-20-3	25 µg/L	105	----	70	130	----	----			
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2553710)											
ES1224678-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	# Not Determined	----	70	130	----	----	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2555093)											
ES1224679-001	S4MB01	EP033: Methane	74-82-8	28.48 µg/L	# Not Determined	----	70	130	----	----	

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 Work Order : ES1224679
 Client : PARSONS BRINCKERHOFF AUST P/L
 Project : 2162406B



Sub-Matrix: **WATER**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2555093) - continued										
ES1224679-001	S4MB01	EP033: Ethene	74-85-1	50.29 µg/L	103	----	70	130	----	----
		EP033: Ethane	74-84-0	54.43 µg/L	104	----	70	130	----	----
		EP033: Propene	115-07-1	73.97 µg/L	102	----	70	130	----	----
		EP033: Propane	74-98-6	78.28 µg/L	103	----	70	130	----	----
		EP033: Butene	25167-67-3	99.61 µg/L	103	----	70	130	----	----
		EP033: Butane	106-97-8	102.18 µg/L	104	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1224679	Page	: 1 of 12
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 17-OCT-2012
C-O-C number	: ----	Issue Date	: 24-OCT-2012
Sampler	: AM	No. of samples received	: 7
Order number	: ----	No. of samples analysed	: 7
Quote number	: SY/394/09		

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	
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03,	15-OCT-2012	---	15-OCT-2012	----	17-OCT-2012	15-OCT-2012	*
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03,	15-OCT-2012	---	12-NOV-2012	----	17-OCT-2012	12-NOV-2012	✓
EA015: Total Dissolved Solids								
Clear Plastic Bottle - Natural (EA015H) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03,	15-OCT-2012	---	22-OCT-2012	----	22-OCT-2012	22-OCT-2012	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03,	15-OCT-2012	---	29-OCT-2012	----	17-OCT-2012	29-OCT-2012	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03,	15-OCT-2012	---	12-NOV-2012	----	17-OCT-2012	12-NOV-2012	✓
ED045G: Chloride Discrete analyser								
Clear Plastic Bottle - Natural (ED045G) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03,	15-OCT-2012	---	12-NOV-2012	----	17-OCT-2012	12-NOV-2012	✓



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 (ED093F) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	---	22-OCT-2012	----	17-OCT-2012	22-OCT-2012	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	---	13-APR-2013	----	18-OCT-2012	13-APR-2013	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	---	13-APR-2013	----	18-OCT-2012	13-APR-2013	✓
EG052G: Silica by Discrete Analyser								
Clear Plastic Bottle - Natural (EG052G) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	---	12-NOV-2012	----	17-OCT-2012	12-NOV-2012	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	---	12-NOV-2012	----	17-OCT-2012	12-NOV-2012	✓
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	---	12-NOV-2012	----	18-OCT-2012	12-NOV-2012	✓
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	---	17-OCT-2012	----	17-OCT-2012	17-OCT-2012	✓



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	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	---	12-NOV-2012	----	18-OCT-2012	12-NOV-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	19-OCT-2012	12-NOV-2012	✓	19-OCT-2012	12-NOV-2012	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	---	17-OCT-2012	----	17-OCT-2012	17-OCT-2012	✓
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	----	----	----	18-OCT-2012	12-NOV-2012	✓
EP033: C1 - C4 Hydrocarbon Gases								
Amber VOC Vial - Sulfuric Acid (EP033) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	----	----	----	19-OCT-2012	29-OCT-2012	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	18-OCT-2012	22-OCT-2012	✓	18-OCT-2012	27-NOV-2012	✓
EP075(SIM)A: Phenolic Compounds								
Amber Glass Bottle - Unpreserved (EP075(SIM)) S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03	15-OCT-2012	18-OCT-2012	22-OCT-2012	✓	18-OCT-2012	27-NOV-2012	✓



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	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03,	15-OCT-2012	18-OCT-2012	22-OCT-2012	✓	18-OCT-2012	27-NOV-2012	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03,	15-OCT-2012	19-OCT-2012	29-OCT-2012	✓	19-OCT-2012	29-OCT-2012	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)								
S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03,	15-OCT-2012	19-OCT-2012	29-OCT-2012	✓	19-OCT-2012	29-OCT-2012	✓



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	Method	Count		Rate (%)			Quality Control Specification
		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
Ammonia as N by Discrete analyser	EK055G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	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	11	18.2	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	9	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	2	13	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	11	18.2	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	15	13.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	7	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	4	34	11.8	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	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	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	18	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	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	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	34	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	15.0	15.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	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	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	34	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.0	5.0	✓	ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	18	5.6	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	11	9.1	5.0	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	13	7.7	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	19	5.3	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	15	6.7	5.0	✓	ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	7	14.3	5.0	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	5.6	5.0	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	2	34	5.9	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	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
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids (High Level)	EA015H	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
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- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um 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) Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Hardness parameters are calculated based on APHA 21st ed., 2340 B. 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): Samples are 0.45 um filtered prior to analysis. 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.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. 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.
Silica (Reactive) by Discrete Analyser	EG052G	WATER	APHA 21st ed. 4500-SiO2 D: Under Acidic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Analytical Methods	Method	Matrix	Method Descriptions
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TPH - Semivolatle Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

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Work Order : ES1224679
Client : PARSONS BRINCKERHOFF AUST P/L
Project : 2162406B



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.



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

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EG052G: Silica by Discrete Analyser	ES1224679-001	S4MB01	Reactive Silica	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK067G: Total Phosphorus as P by Discrete Analyser	ES1224678-001	Anonymous	Total Phosphorus as P	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK071G: Reactive Phosphorus as P by discrete analyser	ES1224658-001	Anonymous	Reactive Phosphorus as P	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP033: C1 - C4 Hydrocarbon Gases	ES1224679-001	S4MB01	Methane	74-82-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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

Matrix: **WATER**

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural	S4MB01, S4MB03, S5MB02, TTMB03	S4MB02, S5MB01, S5MB03,	----	----	17-OCT-2012	15-OCT-2012	2

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.**
-

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

PB Job No. 2162406B

Results Expected By/On: 7 days
 James Duggleby
 Fax Results To: James Duggleby
 02 9272 8101
 Phone Number: 9272 8248
 Email Results to: jduggleby@pbs.com.au /
 ops@ashdown@pbs.com.au
 Quotation Number: SY/394/09
 Invoice To: Head Office, Sydney
 James Duggleby

Analysis Required

Sample I.D	Date sampled	Time	Medium *	Cations (Na, K, Ca, Mg)	Anions (Alkalinity, SO4, Cl, reactive silica)	Disolved Metals (Al, As, Ba, B, Be, Br, Cd, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, Sr, U, V, Zn)	Ammonia as N	Nitrate, nitrite	Flouride	Reactive Phosphorus as P	Total phosphorus as P	TOC	Gases C1-C4 + methane	BTX/ TPH C6-C9	TPH C10-C36	PAH	Phenols	pH	EC	Total dissolved solids	Remarks
SAMB01	15/10/12		w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
SAMB02			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
SAMB03			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
SSMB01			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
SSMB02			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
SSMB03			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
TTMB03			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
			w	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	

HIT

Environmental Division
 Sydney
 Work Order
ES1224679



Telephone : +61-2-8784 8555

Received By (Name): FRANK
 Date: 17-10-12
 Company: ALS
 Time: 08:55
 Signature: [Signature]

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

PARSONS BRINCKERHOFF

Parsons Brinckerhoff
 Ernst & Young Centre L27
 L 27, 680 George St
 SYDNEY NSW 2000

CERTIFICATE OF ANALYSIS

Work Order	: ES1224788	Page	: 1 of 11
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 17-OCT-2012
Sampler	: ----	Issue Date	: 24-OCT-2012
Site	: ----		
Quote number	: SY/394/09	No. of samples received	: 9
		No. of samples analysed	: 9

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
- Surrogate Control Limits



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Phalak Inthaksono	Laboratory Manager - Organics	Sydney Organics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 insufficient sample for analysis.

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

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

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

LOR = Limit of reporting

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

- **ED041G:LOR raised for Sulfate analysis on sample ID(TCMB04) due to sample matrix.**
- **EG020: 'Bromine' quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.**
- **EP075(SIM):- Result of sample (Client ID: TCMB02) has been confirmed by re-extraction and re-analysis.**
- **Sample TRIP SPIKE contains volatile compounds spiked into the sample containers prior to dispatch from the laboratory. BTEX compounds spiked at 20 ug/L.**



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	TCMB04	TCMB02	TCMB01	TTMB02	TTMB01
				16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00
				ES1224788-001	ES1224788-002	ES1224788-003	ES1224788-004	ES1224788-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	11.7	9.46	7.62	7.46	7.53
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	4780	2850	3140	2390	2010
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	2100	1450	1860	1330	1200
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	329	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	412	103	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	122	293	351	434
Total Alkalinity as CaCO3	----	1	mg/L	741	225	293	351	434
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	<1	27	18	<1
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	735	840	876	576	420
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	5	10	184	155	77
Magnesium	7439-95-4	1	mg/L	<1	38	66	47	31
Sodium	7440-23-5	1	mg/L	826	602	354	247	358
Potassium	7440-09-7	1	mg/L	70	11	6	5	5
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	3.77	0.02	<0.01	<0.01	<0.01
Arsenic	7440-38-2	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L	0.182	0.984	3.23	0.617	3.10
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.001	0.002	0.002
Lead	7439-92-1	0.001	mg/L	0.062	0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	<0.001	0.001	0.127	0.124	0.043
Molybdenum	7439-98-7	0.001	mg/L	0.006	0.002	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	0.003	<0.001	0.002	0.008	0.002
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	7440-24-6	0.001	mg/L	0.605	2.67	11.6	2.88	2.38
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.832	0.062	0.026	0.187	0.138



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	TCMB04	TCMB02	TCMB01	TTMB02	TTMB01
				16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00
				ES1224788-001	ES1224788-002	ES1224788-003	ES1224788-004	ES1224788-005
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	0.07	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	1.30	1.49	0.45
Bromine	7726-95-6	0.1	mg/L	1.5	1.0	0.9	0.8	0.7
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.10	mg/L	17.5	2.86	19.7	30.3	27.9
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.6	0.2	<0.1	<0.1	0.1
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	2.84	1.36	1.38	0.43	0.65
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.01	<0.01	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.02	<0.01	<0.01	<0.01	<0.01
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.17	0.09	0.11	0.18	0.96
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	----	0.01	mg/L	0.06	<0.01	<0.01	<0.01	0.11
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	35.5	28.2	31.1	23.6	20.5
Total Cations	----	0.01	meq/L	38.0	30.1	30.2	22.5	22.1
Ionic Balance	----	0.01	%	3.27	3.24	1.56	2.51	3.68
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	41	40	4	4	<1
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	10900	10600	162	13	4430
Ethene	74-85-1	10	µg/L	<10	<10	<10	<10	<10
Ethane	74-84-0	10	µg/L	<10	<10	<10	<10	<10
Propene	115-07-1	10	µg/L	<10	<10	<10	<10	<10
Propane	74-98-6	10	µg/L	<10	<10	<10	<10	<10
Butene	25167-67-3	10	µg/L	<10	<10	<10	<10	<10
Butane	106-97-8	10	µg/L	<10	<10	<10	<10	<10
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	<1.0	4.4	<1.0	<1.0	<1.0



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	TCMB04	TCMB02	TCMB01	TTMB02	TTMB01
				16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00
				ES1224788-001	ES1224788-002	ES1224788-003	ES1224788-004	ES1224788-005
EP075(SIM)A: Phenolic Compounds - Continued								
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (WHO)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	260	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	100	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	360	<50	<50	<50



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	TCMB04	TCMB02	TCMB01	TTMB02	TTMB01
				16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00
				ES1224788-001	ES1224788-002	ES1224788-003	ES1224788-004	ES1224788-005
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	310	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	310	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	14	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	14	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	16.5	25.4	28.7	28.5	26.6
2-Chlorophenol-D4	93951-73-6	0.1	%	52.4	52.1	68.2	64.8	63.1
2,4,6-Tribromophenol	118-79-6	0.1	%	71.1	70.9	75.5	67.3	59.4
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	65.1	61.3	63.8	66.7	61.2
Anthracene-d10	1719-06-8	0.1	%	74.5	70.6	75.9	72.4	64.0
4-Terphenyl-d14	1718-51-0	0.1	%	80.0	75.0	83.6	77.2	69.6
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	115	94.6	113	116	133
Toluene-D8	2037-26-5	0.1	%	105	127	132	131	128
4-Bromofluorobenzene	460-00-4	0.1	%	95.9	115	127	128	116



Analytical Results

Sub-Matrix: WATER

				Client sample ID				
				TTPB	QA1	TS	TB	----
				16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	----
				Client sampling date / time				
Compound	CAS Number	LOR	Unit	ES1224788-006	ES1224788-007	ES1224788-008	ES1224788-009	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	8.07	7.99	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	2170	2180	----	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	1110	1180	----	----	----
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	99	101	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	99	101	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	21	21	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	659	655	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	46	48	----	----	----
Magnesium	7439-95-4	1	mg/L	43	42	----	----	----
Sodium	7440-23-5	1	mg/L	331	324	----	----	----
Potassium	7440-09-7	1	mg/L	5	5	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	----	----	----
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	----
Barium	7440-39-3	0.001	mg/L	0.856	0.862	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	0.026	0.027	----	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Strontium	7440-24-6	0.001	mg/L	1.84	1.84	----	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	0.202	0.194	----	----	----



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	TTPB	QA1	TS	TB	----
				16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	----
				ES1224788-006	ES1224788-007	ES1224788-008	ES1224788-009	----
EP075(SIM)A: Phenolic Compounds - Continued								
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	----	----	----
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	----	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	<2.0	----	----	----
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	----	----	----
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	<1.0	----	----	----
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	----	----	----
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	----	----	----
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	<1.0	----	----	----
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	<1.0	----	----	----
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	<1.0	----	----	----
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	<2.0	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	----	----	----
Indeno(1,2,3-cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	----	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	----	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (WHO)	----	0.5	µg/L	<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	<20	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	----	----	----



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				TTPB	QA1	TS	TB	----
				16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	16-OCT-2012 16:00	----
Compound	CAS Number	LOR	Unit	ES1224788-006	ES1224788-007	ES1224788-008	ES1224788-009	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	20	µg/L	<20	<20	----	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	<20	----	<20	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	14	<1	----
Toluene	108-88-3	2	µg/L	<2	<2	14	<2	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	14	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	14	<2	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	14	<2	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	28	<2	----
^ Sum of BTEX	----	1	µg/L	<1	<1	70	<1	----
Naphthalene	91-20-3	5	µg/L	<5	<5	15	<5	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	29.6	27.9	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	64.2	64.2	----	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	70.9	62.5	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	67.6	70.4	----	----	----
Anthracene-d10	1719-06-8	0.1	%	76.3	70.8	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	84.1	78.6	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	73.7	125	124	124	----
Toluene-D8	2037-26-5	0.1	%	86.4	124	122	119	----
4-Bromofluorobenzene	460-00-4	0.1	%	83.8	120	120	120	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	64.1
2-Chlorophenol-D4	93951-73-6	11.3	122.9
2,4,6-Tribromophenol	118-79-6	11.7	144.0
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	19.9	122.8
Anthracene-d10	1719-06-8	23.3	125.8
4-Terphenyl-d14	1718-51-0	20.3	134.5
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: ES1224788	Page	: 1 of 14
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 17-OCT-2012
C-O-C number	: ----	Issue Date	: 24-OCT-2012
Sampler	: ----	No. of samples received	: 9
Order number	: ----	No. of samples analysed	: 9
Quote number	: SY/394/09		

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



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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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Phalak Inthaksone	Laboratory Manager - Organics	Sydney Organics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2553194)									
ES1224769-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	3.13	3.12	0.3	0% - 20%
ES1224769-010	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.71	7.69	0.2	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2553196)									
ES1224769-010	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	332	328	1.2	0% - 20%
ES1224794-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	23100	23000	0.4	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2560887)									
ES1224788-001	TCMB04	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	2100	2050	2.7	0% - 20%
ES1224806-006	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	638	654	2.5	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2553192)									
ES1224641-005	Anonymous	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	28	30	6.5	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	233	233	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	261	263	0.8	0% - 20%
ES1224769-001	Anonymous	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	<1	<1	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.0	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2553197)									
ES1224788-007	QA1	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	101	101	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	101	101	0.0	0% - 20%
ES1224806-007	Anonymous	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	<1	<1	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2552321)									
ES1224726-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	<10	0.0	No Limit
ES1224788-005	TTMB01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 2552320)									
ES1224726-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	223	221	0.7	0% - 20%
ES1224788-005	TTMB01	ED045G: Chloride	16887-00-6	1	mg/L	420	418	0.5	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2552318)									
ES1224726-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	13	12	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	22	22	0.0	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 (%)
ED093F: Dissolved Major Cations (QC Lot: 2552318) - continued									
ES1224726-001	Anonymous	ED093F: Sodium	7440-23-5	1	mg/L	96	95	1.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.0	No Limit
ES1224788-006	TTPB	ED093F: Calcium	7440-70-2	1	mg/L	46	47	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	43	42	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	331	309	7.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2554513)									
ES1224788-001	TCMB04	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.182	0.208	13.3	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.003	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.062	0.058	5.6	0% - 20%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.006	0.007	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.832	0.827	0.6	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	3.77	3.52	6.9	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.07	0.07	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020A-F: Bromine	7726-95-6	0.1	mg/L	1.5	1.4	7.3	0% - 50%		
ES1224797-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.095	0.099	3.9	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.008	0.008	0.0	No Limit
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.067	0.072	7.2	0% - 50%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.15	0.15	0.0	0% - 50%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.75	0.74	1.6	0% - 50%



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: 2554513) - continued									
ES1224797-004	Anonymous	EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2554514)									
ES1224788-001	TCMB04	EG020B-F: Strontium	7440-24-6	0.001	mg/L	0.605	0.649	7.0	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2559267)									
ES1225099-001	Anonymous	EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 2552322)									
ES1224788-001	TCMB04	EG052G: Reactive Silica	----	0.10	mg/L	17.5	17.8	1.8	0% - 20%
EK040P: Fluoride by PC Titrator (QC Lot: 2553195)									
ES1224769-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.9	0.9	0.0	No Limit
ES1224769-010	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.2	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2552905)									
ES1224699-014	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.04	0.0	No Limit
ES1224710-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.02	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2552319)									
ES1224726-001	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.10	<0.10	0.0	No Limit
ES1224788-006	TTPB	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2552903)									
ES1224699-014	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.08	0.08	0.0	No Limit
ES1224710-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2553710)									
ES1224678-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	4.20	4.09	2.5	0% - 20%
ES1224735-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.01	0.02	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2552315)									
ES1224648-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 2552628)									
ES1224679-002	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	6	6	0.0	No Limit
ES1224692-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	5	6	18.2	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 2552629)									
ES1224788-003	TCMB01	EP005: Total Organic Carbon	----	1	mg/L	4	4	0.0	No Limit
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2557789)									
EB1227011-001	Anonymous	EP033: Methane	74-82-8	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit



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 (%)	
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2557789) - continued										
ER1200284-001	Anonymous	EP033: Methane	74-82-8	10	µg/L	<10	<10	0.0	No Limit	
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit	
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit	
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit	
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit	
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit	
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2556678)										
ES1224770-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit	
ES1224807-010	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2556678)										
ES1224770-001	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit	
ES1224807-010	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit	
EP080: BTEXN (QC Lot: 2556678)										
ES1224770-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit	
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit	
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit	
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit	
			106-42-3							
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit	
ES1224807-010	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit	
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit	
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit	
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit	
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.0	No Limit	
			106-42-3							
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit	
EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	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 Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)
Method: Compound	CAS Number	LOR	Unit				LCS	Low	High
EA010P: Conductivity by PC Titrator (QCLot: 2553196)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	107	96	110
EA015: Total Dissolved Solids (QCLot: 2560887)								
EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	<10	293 mg/L	90.1	71	119
ED037P: Alkalinity by PC Titrator (QCLot: 2553192)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	92.2	74	110
ED037P: Alkalinity by PC Titrator (QCLot: 2553197)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	91.4	74	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2552321)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	84	124
ED045G: Chloride Discrete analyser (QCLot: 2552320)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	107	84	122
ED093F: Dissolved Major Cations (QCLot: 2552318)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	85	111
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	103	87	111
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.7	79	109
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	105	86	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2554513)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	95.2	79	119
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.8	80	118
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	101	76	120
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	98.2	81	113
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	91.5	82	114
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	90.2	78	116
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	86.1	79	115
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.5	81	113
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	93.7	80	114
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	98.3	77	119
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	86.6	80	116
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	85.4	74	126
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	88.9	70	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	80.7	75	121
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	98.6	71	127
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	85.7	78	116



Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
Method: Compound	CAS Number	LOR	Unit		Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2554513) - continued									
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2554514)									
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	90.8	78	116	
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2559267)									
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	75	121	
EG052G: Silica by Discrete Analyser (QCLot: 2552322)									
EG052G: Reactive Silica	----	0.1	mg/L	<0.10	5 mg/L	104	90	120	
EK040P: Fluoride by PC Titrator (QCLot: 2553195)									
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	90.8	79	117	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2552905)									
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1.00 mg/L	94.4	89	113	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2552319)									
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	92.9	87	119	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2552903)									
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	86	124	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2553710)									
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	86.3	70	130	
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2552315)									
EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.50 mg/L	103	86	124	
EP005: Total Organic Carbon (TOC) (QCLot: 2552628)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	102	81	119	
EP005: Total Organic Carbon (TOC) (QCLot: 2552629)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	101	81	119	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2557789)									
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	95.1	86	108	
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	102	87	111	
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	101	87	111	
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	101	86	112	
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	102	87	111	
EP033: Butene	25167-67-3	20	µg/L	<20	99.61 µg/L	101	87	113	
EP033: Butane	106-97-8	20	µg/L	<20	102.18 µg/L	102	87	113	
EP075(SIM)A: Phenolic Compounds (QCLot: 2552939)									
EP075(SIM): Phenol	108-95-2	0.2	µg/L	----	5 µg/L	41.4	24.5	61.9	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Chlorophenol	95-57-8	0.2	µg/L	----	5 µg/L	67.4	63.8	110	
		1	µg/L	<1.0	----	----	----	----	



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
EP075(SIM)A: Phenolic Compounds (QCLot: 2552939) - continued								
EP075(SIM): 2-Methylphenol	95-48-7	0.2	µg/L	----	5 µg/L	75.1	55.9	112
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	0.4	µg/L	----	10 µg/L	57.2	42.5	114
		2	µg/L	<2.0	----	----	----	----
EP075(SIM): 2-Nitrophenol	88-75-5	0.2	µg/L	----	5 µg/L	75.2	62.7	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.2	µg/L	----	5 µg/L	69.2	59.9	112
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.2	µg/L	----	5 µg/L	73.3	59.3	122
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.2	µg/L	----	5 µg/L	66.2	64.3	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	0.2	µg/L	----	5 µg/L	69.2	63	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.2	µg/L	----	5 µg/L	69.7	58.7	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.2	µg/L	----	5 µg/L	69.2	51.2	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pentachlorophenol	87-86-5	0.4	µg/L	----	10 µg/L	51.2	6.85	95.6
		2	µg/L	<2.0	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2552939)								
EP075(SIM): Naphthalene	91-20-3	0.2	µg/L	----	5 µg/L	73.8	58.6	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthylene	208-96-8	0.2	µg/L	----	5 µg/L	80.6	63.6	114
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthene	83-32-9	0.2	µg/L	----	5 µg/L	79.4	62.2	113
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluorene	86-73-7	0.2	µg/L	----	5 µg/L	80.4	63.9	115
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Phenanthrene	85-01-8	0.2	µg/L	----	5 µg/L	83.5	62.6	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Anthracene	120-12-7	0.2	µg/L	----	5 µg/L	76.1	64.3	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluoranthene	206-44-0	0.2	µg/L	----	5 µg/L	86.8	63.6	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pyrene	129-00-0	0.2	µg/L	----	5 µg/L	81.3	63.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benz(a)anthracene	56-55-3	0.2	µg/L	----	5 µg/L	86.9	64.1	117
		1	µg/L	<1.0	----	----	----	----



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2552939) - continued									
EP075(SIM): Chrysene	218-01-9	0.2	µg/L	----	5 µg/L	84.2	62.5	116	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.2	µg/L	----	5 µg/L	81.7	61.7	119	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.2	µg/L	----	5 µg/L	90.2	61.7	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.2	µg/L	----	5 µg/L	86.8	63.3	117	
		0.5	µg/L	<0.5	----	----	----	----	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.2	µg/L	----	5 µg/L	80.2	59.9	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.2	µg/L	----	5 µg/L	78.0	61.2	117	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.2	µg/L	----	5 µg/L	77.2	59.1	118	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	1	µg/L	<1.0	----	----	----	----	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2552938)									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	83.5	58.9	131	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	2500 µg/L	117	73.9	138	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	77.9	62.7	131	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2556678)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	94.1	75	127	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2552938)									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	76.1	58.9	131	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	81.5	73.9	138	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----	
		50	µg/L	----	1500 µg/L	101	62.7	131	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2556678)									
EP080: C6 - C10 Fraction	----	20	µg/L	<20	310 µg/L	92.1	75	127	
EP080: BTEXN (QCLot: 2556678)									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	# 70.0	70	124	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	79.9	66	132	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	74.7	70	120	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	81.0	69	121	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	78.6	72	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	83.3	70	124	



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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2552321)							
ES1224726-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	125	70	130
ED045G: Chloride Discrete analyser (QCLot: 2552320)							
ES1224726-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	95.7	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2554513)							
ES1224788-001	TCMB04	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	108	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	95.8	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	99.3	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	90.2	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	90.5	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	93.0	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	85.7	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	86.0	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	89.1	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	95.3	70	130
EG020A-F: Zinc	7440-66-6	0.2 mg/L	# Not Determined	70	130		
EG020F: Dissolved Metals by ICP-MS (QCLot: 2559267)							
ES1225099-001	Anonymous	EG020A-F: Zinc	7440-66-6	0.2 mg/L	101	70	130
EG052G: Silica by Discrete Analyser (QCLot: 2552322)							
ES1224788-001	TCMB04	EG052G: Reactive Silica	----	5.0 mg/L	93.4	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2553195)							
ES1224769-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	88.0	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2552905)							
ES1224699-014	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	84.8	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2552319)							
ES1224726-001	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	97.8	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2552903)							
ES1224699-014	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	90.2	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2553710)							
ES1224678-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	# Not Determined	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2552315)							
ES1224648-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	109	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 2552628)							
ES1224679-003	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	116	70	130



Sub-Matrix: WATER

Laboratory sample ID				Matrix Spike (MS) Report					
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		
					MS	Low	High		
EP005: Total Organic Carbon (TOC) (QCLot: 2552629)									
ES1224788-004	TTMB02	EP005: Total Organic Carbon	----	100 mg/L	107	70	130		
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2557789)									
ES1224788-001	TCMB04	EP033: Methane	74-82-8	28.48 µg/L	# Not Determined	70	130		
		EP033: Ethene	74-85-1	50.29 µg/L	106	70	130		
		EP033: Ethane	74-84-0	54.43 µg/L	105	70	130		
		EP033: Propene	115-07-1	73.97 µg/L	105	70	130		
		EP033: Propane	74-98-6	78.28 µg/L	105	70	130		
		EP033: Butene	25167-67-3	99.61 µg/L	103	70	130		
		EP033: Butane	106-97-8	102.18 µg/L	103	70	130		
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2556678)									
ES1224770-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	88.6	70	130		
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2556678)									
ES1224770-001	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	90.0	70	130		
EP080: BTEXN (QCLot: 2556678)									
ES1224770-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	106	70	130		
		EP080: Toluene	108-88-3	25 µg/L	81.9	70	130		
		EP080: Ethylbenzene	100-41-4	25 µg/L	76.1	70	130		
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	83.4	70	130		
			106-42-3						
		EP080: ortho-Xylene	95-47-6	25 µg/L	84.3	70	130		
		EP080: Naphthalene	91-20-3	25 µg/L	85.4	70	130		

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.

Sub-Matrix: WATER

Laboratory sample ID				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
					MS	MSD	Low	High	Value	Control Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2552315)										
ES1224648-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	109	----	70	130	----	----
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2552319)										
ES1224726-001	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	97.8	----	70	130	----	----
ED045G: Chloride Discrete analyser (QCLot: 2552320)										
ES1224726-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	95.7	----	70	130	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2552321)										
ES1224726-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	125	----	70	130	----	----



Sub-Matrix: WATER

					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)		
					MS	MSD	Low	High	Value	Control Limit	
EG052G: Silica by Discrete Analyser (QCLot: 2552322)											
ES1224788-001	TCMB04	EG052G: Reactive Silica	----	5.0 mg/L	93.4	----	70	130	----	----	
EP005: Total Organic Carbon (TOC) (QCLot: 2552628)											
ES1224679-003	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	116	----	70	130	----	----	
EP005: Total Organic Carbon (TOC) (QCLot: 2552629)											
ES1224788-004	TTMB02	EP005: Total Organic Carbon	----	100 mg/L	107	----	70	130	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2552903)											
ES1224699-014	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	90.2	----	70	130	----	----	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2552905)											
ES1224699-014	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	84.8	----	70	130	----	----	
EK040P: Fluoride by PC Titrator (QCLot: 2553195)											
ES1224769-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	88.0	----	70	130	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2553710)											
ES1224678-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	# Not Determined	----	70	130	----	----	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2554513)											
ES1224788-001	TCMB04	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	108	----	70	130	----	----	
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	95.8	----	70	130	----	----	
		EG020A-F: Barium	7440-39-3	0.2 mg/L	99.3	----	70	130	----	----	
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	90.2	----	70	130	----	----	
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	90.5	----	70	130	----	----	
		EG020A-F: Copper	7440-50-8	0.2 mg/L	93.0	----	70	130	----	----	
		EG020A-F: Lead	7439-92-1	0.2 mg/L	85.7	----	70	130	----	----	
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	86.0	----	70	130	----	----	
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	89.1	----	70	130	----	----	
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	95.3	----	70	130	----	----	
EG020A-F: Zinc	7440-66-6	0.2 mg/L	# Not Determined	----	70	130	----	----			
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2556678)											
ES1224770-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	88.6	----	70	130	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2556678)											
ES1224770-001	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	90.0	----	70	130	----	----	
EP080: BTEXN (QCLot: 2556678)											
ES1224770-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	106	----	70	130	----	----	
		EP080: Toluene	108-88-3	25 µg/L	81.9	----	70	130	----	----	
		EP080: Ethylbenzene	100-41-4	25 µg/L	76.1	----	70	130	----	----	
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	83.4	----	70	130	----	----	
			106-42-3								
		EP080: ortho-Xylene	95-47-6	25 µg/L	84.3	----	70	130	----	----	
EP080: Naphthalene	91-20-3	25 µg/L	85.4	----	70	130	----	----			



Sub-Matrix: WATER

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2557789)										
ES1224788-001	TCMB04	EP033: Methane	74-82-8	28.48 µg/L	# Not Determined	----	70	130	----	----
		EP033: Ethene	74-85-1	50.29 µg/L	106	----	70	130	----	----
		EP033: Ethane	74-84-0	54.43 µg/L	105	----	70	130	----	----
		EP033: Propene	115-07-1	73.97 µg/L	105	----	70	130	----	----
		EP033: Propane	74-98-6	78.28 µg/L	105	----	70	130	----	----
		EP033: Butene	25167-67-3	99.61 µg/L	103	----	70	130	----	----
		EP033: Butane	106-97-8	102.18 µg/L	103	----	70	130	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2559267)										
ES1225099-001	Anonymous	EG020A-F: Zinc	7440-66-6	0.2 mg/L	101	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1224788	Page	: 1 of 12
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 17-OCT-2012
C-O-C number	: ----	Issue Date	: 24-OCT-2012
Sampler	: ----	No. of samples received	: 9
Order number	: ----	No. of samples analysed	: 9
Quote number	: SY/394/09		

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	
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural (EA005-P) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	16-OCT-2012	----	18-OCT-2012	16-OCT-2012	*
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	13-NOV-2012	----	18-OCT-2012	13-NOV-2012	✓
EA015: Total Dissolved Solids								
Clear Plastic Bottle - Natural (EA015H) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	23-OCT-2012	----	23-OCT-2012	23-OCT-2012	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	30-OCT-2012	----	18-OCT-2012	30-OCT-2012	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	13-NOV-2012	----	18-OCT-2012	13-NOV-2012	✓
ED045G: Chloride Discrete analyser								
Clear Plastic Bottle - Natural (ED045G) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	13-NOV-2012	----	18-OCT-2012	13-NOV-2012	✓



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 (ED093F) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	23-OCT-2012	----	18-OCT-2012	23-OCT-2012	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	14-APR-2013	----	19-OCT-2012	14-APR-2013	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	14-APR-2013	----	19-OCT-2012	14-APR-2013	✓
EG052G: Silica by Discrete Analyser								
Clear Plastic Bottle - Natural (EG052G) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	13-NOV-2012	----	18-OCT-2012	13-NOV-2012	✓
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural (EK040P) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	13-NOV-2012	----	18-OCT-2012	13-NOV-2012	✓
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	13-NOV-2012	----	18-OCT-2012	13-NOV-2012	✓
EK057G: Nitrite as N by Discrete Analyser								
Clear Plastic Bottle - Natural (EK057G) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	18-OCT-2012	----	18-OCT-2012	18-OCT-2012	✓



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	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	13-NOV-2012	----	18-OCT-2012	13-NOV-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	19-OCT-2012	13-NOV-2012	✓	19-OCT-2012	13-NOV-2012	✓
EK071G: Reactive Phosphorus as P by discrete analyser								
Clear Plastic Bottle - Natural (EK071G) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	---	18-OCT-2012	----	18-OCT-2012	18-OCT-2012	✓
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005) TCMB04,	TCMB02	16-OCT-2012	----	----	----	18-OCT-2012	13-NOV-2012	✓
Amber VOC Vial - Sulfuric Acid (EP005) TCMB01, TTMB01, QA1	TTMB02, TTPB,	16-OCT-2012	----	----	----	18-OCT-2012	13-NOV-2012	✓
EP033: C1 - C4 Hydrocarbon Gases								
Amber VOC Vial - H2SO4 for C1 - C4 Gases (EP033) TCMB01, TTMB01, QA1	TTMB02, TTPB,	16-OCT-2012	----	----	----	22-OCT-2012	30-OCT-2012	✓
Amber VOC Vial - Sulfuric Acid (EP033) TCMB04,	TCMB02	16-OCT-2012	----	----	----	22-OCT-2012	30-OCT-2012	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
Amber Glass Bottle - Unpreserved (EP071) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	18-OCT-2012	23-OCT-2012	✓	20-OCT-2012	27-NOV-2012	✓
EP075(SIM)A: Phenolic Compounds								
Amber Glass Bottle - Unpreserved (EP075(SIM)) TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	18-OCT-2012	23-OCT-2012	✓	19-OCT-2012	27-NOV-2012	✓



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	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	16-OCT-2012	18-OCT-2012	23-OCT-2012	✓	19-OCT-2012	27-NOV-2012	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
TCMB04, TCMB01, TTMB01, QA1, TB	TCMB02, TTMB02, TTPB, TS,	16-OCT-2012	22-OCT-2012	30-OCT-2012	✓	22-OCT-2012	30-OCT-2012	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)								
TCMB04, TCMB01, TTMB01, QA1,	TCMB02, TTMB02, TTPB, TB	16-OCT-2012	22-OCT-2012	30-OCT-2012	✓	22-OCT-2012	30-OCT-2012	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	2	17	11.8	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	12	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	34	8.8	10.0	*	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	7	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	12	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	17	11.8	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	11	18.2	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	7	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	12	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	3	22	13.6	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	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	40	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	12	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	34	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	19	10.5	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	22	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	15.0	15.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	34	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	22	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	17	5.9	5.0	✓	ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	12	8.3	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	34	5.9	5.0	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	17	5.9	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	11	9.1	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	9	11.1	5.0	✓	ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	7	14.3	5.0	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	12	8.3	5.0	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	2	22	9.1	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	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
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids (High Level)	EA015H	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
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- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um 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) Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Hardness parameters are calculated based on APHA 21st ed., 2340 B. 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): Samples are 0.45 um filtered prior to analysis. 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.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. 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.
Silica (Reactive) by Discrete Analyser	EG052G	WATER	APHA 21st ed. 4500-SiO2 D: Under Acidic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Analytical Methods	Method	Matrix	Method Descriptions
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TPH - Semivolatle Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Page : 10 of 12
Work Order : ES1224788
Client : PARSONS BRINCKERHOFF AUST P/L
Project : 2162406B



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



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

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP080: BTEXN	3030897-002	----	Benzene	71-43-2	70.0 %	70-124%	Recovery less than lower control limit
Matrix Spike (MS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	ES1224788-001	TCMB04	Zinc	7440-66-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK067G: Total Phosphorus as P by Discrete Analyser	ES1224678-001	Anonymous	Total Phosphorus as P	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP033: C1 - C4 Hydrocarbon Gases	ES1224788-001	TCMB04	Methane	74-82-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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

Regular Sample Surrogates

Sub-Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP080S: TPH(V)/BTEX Surrogates	ES1224788-003	TCMB01	Toluene-D8	2037-26-5	132 %	79-131 %	Recovery greater than upper data quality objective
EP080S: TPH(V)/BTEX Surrogates	ES1224788-004	TTMB02	Toluene-D8	2037-26-5	131 %	79-131 %	Recovery greater than upper data quality objective

Outliers : Analysis Holding Time Compliance

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

Matrix: **WATER**

Method	Container / Client Sample ID(s)	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue	
EA005P: pH by PC Titrator								
Clear Plastic Bottle - Natural	TCMB04, TCMB01, TTMB01, QA1	TCMB02, TTMB02, TTPB,	----	----	----	18-OCT-2012	16-OCT-2012	2



Outliers : Frequency of Quality Control Samples

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

Matrix: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Dissolved Metals by ICP-MS - Suite A	3	34	8.8	10.0	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order : ES1223218 Client : PARSONS BRINCKERHOFF AUST P/L Contact : MR JAMES DUGGLEBY Address : GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001 E-mail : jduggleby@pb.com.au Telephone : +61 02 9272 5100 Facsimile : +61 02 9272 5101 Project : 2162406B Order number : ---- C-O-C number : ---- Sampler : N PH Site : ---- Quote number : SY/394/09	Page : 1 of 7 Laboratory : Environmental Division Sydney Contact : Loren Schiavon Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : loren.schiavon@alsglobal.com Telephone : +61 2 8784 8503 Facsimile : +61 2 8784 8500 QC Level : NEPM 1999 Schedule B(3) and ALS QCS3 requirement Date Samples Received : 27-SEP-2012 Issue Date : 05-OCT-2012 No. of samples received : 1 No. of samples analysed : 1	
---	---	--

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
- Surrogate Control Limits



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Edwandy Fadjar	Organic Coordinator	Sydney Organics
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 insufficient sample for analysis.

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

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

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

LOR = Limit of reporting

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

- **EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.**
- **EG020: Poor matrix spike recovery was obtained for Lead on sample ES1223190 #017 due to matrix interference. Confirmed by re-analysis.**
- **EK071G:LOR raised for Rp analysis on sample ID(S4) due to sample matrix.**



Analytical Results

Sub-Matrix: **WATER**

		Client sample ID		S4					
		Client sampling date / time		26-SEP-2012 14:00					
Compound	CAS Number	LOR	Unit	ES1223218-001					
EA005P: pH by PC Titrator									
pH Value		0.01	pH Unit	8.05					
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C		1	µS/cm	8990					
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	6280					
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	5240					
Total Alkalinity as CaCO3		1	mg/L	5240					
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1					
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L	565					
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	20					
Magnesium	7439-95-4	1	mg/L	3					
Sodium	7440-23-5	1	mg/L	2530					
Potassium	7440-09-7	1	mg/L	34					
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01					
Arsenic	7440-38-2	0.001	mg/L	0.001					
Beryllium	7440-41-7	0.001	mg/L	<0.001					
Barium	7440-39-3	0.001	mg/L	12.3					
Cadmium	7440-43-9	0.0001	mg/L	<0.0001					
Cobalt	7440-48-4	0.001	mg/L	0.001					
Copper	7440-50-8	0.001	mg/L	<0.001					
Lead	7439-92-1	0.001	mg/L	<0.001					
Manganese	7439-96-5	0.001	mg/L	0.113					
Molybdenum	7439-98-7	0.001	mg/L	0.009					
Nickel	7440-02-0	0.001	mg/L	0.002					
Selenium	7782-49-2	0.01	mg/L	<0.01					
Strontium	7440-24-6	0.001	mg/L	8.07					
Uranium	7440-61-1	0.001	mg/L	<0.001					
Vanadium	7440-62-2	0.01	mg/L	<0.01					
Zinc	7440-66-6	0.005	mg/L	0.056					



Analytical Results

Sub-Matrix: **WATER**

				Client sample ID				
				S4	----	----	----	----
				Client sampling date / time	26-SEP-2012 14:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1223218-001				
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	0.32	----	----	----	----
Iron	7439-89-6	0.05	mg/L	0.96	----	----	----	----
Bromine	7726-95-6	0.1	mg/L	1.5	----	----	----	----
EG052G: Silica by Discrete Analyser								
Reactive Silica	----	0.10	mg/L	17.8	----	----	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	1.1	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	3.03	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.33	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	----	0.01	mg/L	<0.10	----	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	121	----	----	----	----
Total Cations	----	0.01	meq/L	112	----	----	----	----
Ionic Balance	----	0.01	%	3.70	----	----	----	----
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon	----	1	mg/L	<1	----	----	----	----
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	12100	----	----	----	----
Ethene	74-85-1	10	µg/L	<10	----	----	----	----
Ethane	74-84-0	10	µg/L	<10	----	----	----	----
Propene	115-07-1	10	µg/L	<10	----	----	----	----
Propane	74-98-6	10	µg/L	<10	----	----	----	----
Butene	25167-67-3	10	µg/L	<10	----	----	----	----
Butane	106-97-8	10	µg/L	<10	----	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	<1.0	----	----	----	----



Analytical Results

Sub-Matrix: WATER

Client sample ID

S4

Client sampling date / time

26-SEP-2012 14:00

Compound	CAS Number	LOR	Unit	ES1223218-001				
EP075(SIM)A: Phenolic Compounds - Continued								
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	----	----	----	----
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	----	----	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	----	----	----	----
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	----	----	----	----
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	----	----	----	----
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	----	----	----	----
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	----	----	----	----
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	----	----	----	----
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	----	----	----	----
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	----	----	----	----
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (WHO)	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----



Analytical Results

Sub-Matrix: WATER

Client sample ID

S4

Client sampling date / time

26-SEP-2012 14:00

Compound	CAS Number	LOR	Unit	ES1223218-001				
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	20	µg/L	<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	29.8	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	79.8	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	76.4	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	81.6	----	----	----	----
Anthracene-d10	1719-06-8	0.1	%	79.7	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	85.2	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	106	----	----	----	----
Toluene-D8	2037-26-5	0.1	%	99.6	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	87.6	----	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	64.1
2-Chlorophenol-D4	93951-73-6	11.3	122.9
2,4,6-Tribromophenol	118-79-6	11.7	144.0
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	19.9	122.8
Anthracene-d10	1719-06-8	23.3	125.8
4-Terphenyl-d14	1718-51-0	20.3	134.5
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: ES1223218	Page	: 1 of 15
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 27-SEP-2012
C-O-C number	: ----	Issue Date	: 05-OCT-2012
Sampler	: N PH	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1
Quote number	: SY/394/09		

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Edwandy Fadjar	Organic Coordinator	Sydney Organics
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2521439)									
ES1223209-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.31	6.30	0.2	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2521437)									
ES1223174-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	?S/cm	1810	1820	0.5	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2527682)									
ES1223124-001	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	1660	1610	2.7	0% - 20%
ES1223223-001	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	256	282	9.7	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2521438)									
ES1223189-002	Anonymous	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	123	121	1.6	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	351	347	1.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	474	468	1.2	0% - 20%
ES1223291-004	Anonymous	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	38	40	3.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	38	40	3.6	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2521418)									
ES1223162-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3190	3240	1.4	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 2521419)									
ES1223162-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	61	62	2.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2521416)									
ES1223162-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	498	490	1.6	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	112	111	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	651	659	1.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	76	77	1.4	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2525536)									
ES1223190-017	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.441	0.485	9.4	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.005	0.004	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.180	0.185	2.7	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.023	0.023	0.0	0% - 20%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.227	0.245	7.5	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.008	0.008	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.016	0.014	13.4	0% - 50%



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: 2525536) - continued									
ES1223190-017	Anonymous	EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.080	0.086	6.7	0% - 50%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	1.24	1.21	2.2	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	3.1	3.3	5.0	0% - 20%
ES1223190-028	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 2521420)									
ES1223218-001	S4	EG052G: Reactive Silica	----	0.10	mg/L	17.8	17.9	0.4	0% - 20%
EK040P: Fluoride by PC Titrator (QC Lot: 2521436)									
ES1223174-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.5	0.4	24.7	No Limit
ES1223189-002	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.4	0.4	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2526340)									
ES1223218-001	S4	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	3.03	3.19	5.1	0% - 20%
EW1202607-006	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	55.2	56.0	1.3	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2521417)									
ES1223162-006	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1223256-005	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2526339)									
ES1223218-001	S4	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EW1202607-007	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.03	0.04	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2527100)									



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 (%)
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2527100) - continued									
ES1223044-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	5.18	5.44	4.9	0% - 20%
EW1202607-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.03	0.08	84.1	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2521409)									
ES1223031-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1223102-010	Anonymous	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 2522060)									
ES1223176-003	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.0	No Limit
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2527365)									
EM1211336-001	Anonymous	EP033: Methane	74-82-8	10	?g/L	725	744	2.6	0% - 20%
		EP033: Ethene	74-85-1	10	?g/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	?g/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	?g/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	?g/L	24	25	0.0	No Limit
		EP033: Butene	25167-67-3	10	?g/L	145	158	8.6	0% - 50%
		EP033: Butane	106-97-8	10	?g/L	1440	1370	4.6	0% - 20%
EM1211377-005	Anonymous	EP033: Methane	74-82-8	10	?g/L	<10	<10	0.0	No Limit
		EP033: Ethene	74-85-1	10	?g/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	?g/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	?g/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	?g/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	?g/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	?g/L	<10	<10	0.0	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 2522351)									
ES1222995-001	Anonymous	EP075(SIM): Phenol	108-95-2	1.0	?g/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	1.0	?g/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	1.0	?g/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	1.0	?g/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4-Dimethylphenol	105-67-9	1.0	?g/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4-Dichlorophenol	120-83-2	1.0	?g/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,6-Dichlorophenol	87-65-0	1.0	?g/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	1.0	?g/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	1.0	?g/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	1.0	?g/L	<1.0	<1.0	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2.0	?g/L	<2.0	<2.0	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2.0	?g/L	<2.0	<2.0	0.0	No Limit
		EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2522351)							
ES1222995-001	Anonymous	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	?g/L	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Naphthalene	91-20-3	1.0	?g/L	14.6	9.4	43.4	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1.0	?g/L	<1.0	<1.0	0.0	No Limit



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 (%)	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2522351) - continued										
ES1222995-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	1.0	?g/L	<1.0	<1.0	0.0	No Limit	
		EP075(SIM): Fluorene	86-73-7	1.0	?g/L	<1.0	<1.0	0.0	No Limit	
		EP075(SIM): Phenanthrene	85-01-8	1.0	?g/L	<1.0	<1.0	0.0	No Limit	
		EP075(SIM): Anthracene	120-12-7	1.0	?g/L	<1.0	<1.0	0.0	No Limit	
		EP075(SIM): Fluoranthene	206-44-0	1.0	?g/L	<1.0	<1.0	0.0	No Limit	
		EP075(SIM): Pyrene	129-00-0	1.0	?g/L	<1.0	<1.0	0.0	No Limit	
		EP075(SIM): Benz(a)anthracene	56-55-3	1.0	?g/L	<1.0	<1.0	0.0	No Limit	
		EP075(SIM): Chrysene	218-01-9	1.0	?g/L	<1.0	<1.0	0.0	No Limit	
		EP075(SIM): Benzo(b)fluoranthene	205-99-2	1.0	?g/L	<1.0	<1.0	0.0	No Limit	
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1.0	?g/L	<1.0	<1.0	0.0	No Limit	
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1.0	?g/L	<1.0	<1.0	0.0	No Limit	
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1.0	?g/L	<1.0	<1.0	0.0	No Limit	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1.0	?g/L	<1.0	<1.0	0.0	No Limit			
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2522350)										
ES1222995-001	Anonymous	EP071: C15 - C28 Fraction	----	100	?g/L	300	260	12.6	No Limit	
		EP071: C10 - C14 Fraction	----	50	?g/L	360	370	0.0	No Limit	
		EP071: C29 - C36 Fraction	----	50	?g/L	<50	<50	0.0	No Limit	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2527280)										
EP1208004-001	Anonymous	EP080: C6 - C9 Fraction	----	20	?g/L	<20	<20	0.0	No Limit	
ES1223133-001	Anonymous	EP080: C6 - C9 Fraction	----	20	?g/L	<20	<20	0.0	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2522350)										
ES1222995-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	?g/L	370	340	7.8	No Limit	
		EP071: >C16 - C34 Fraction	----	100	?g/L	240	240	0.0	No Limit	
		EP071: >C34 - C40 Fraction	----	100	?g/L	<100	<100	0.0	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2527280)										
EP1208004-001	Anonymous	EP080: C6 - C10 Fraction	----	20	?g/L	<20	<20	0.0	No Limit	
ES1223133-001	Anonymous	EP080: C6 - C10 Fraction	----	20	?g/L	<20	<20	0.0	No Limit	
EP080: BTEXN (QC Lot: 2527280)										
EP1208004-001	Anonymous	EP080: Benzene	71-43-2	1	?g/L	<1	<1	0.0	No Limit	
		EP080: Toluene	108-88-3	2	?g/L	<2	<2	0.0	No Limit	
		EP080: Ethylbenzene	100-41-4	2	?g/L	<2	<2	0.0	No Limit	
		EP080: meta- & para-Xylene	108-38-3	2	?g/L	<2	<2	0.0	No Limit	
			106-42-3							
		EP080: ortho-Xylene	95-47-6	2	?g/L	<2	<2	0.0	No Limit	
ES1223133-001	Anonymous	EP080: Naphthalene	91-20-3	5	?g/L	<5	<5	0.0	No Limit	
		EP080: Benzene	71-43-2	1	?g/L	<1	<1	0.0	No Limit	
		EP080: Toluene	108-88-3	2	?g/L	<2	<2	0.0	No Limit	
		EP080: Ethylbenzene	100-41-4	2	?g/L	<2	<2	0.0	No Limit	
		EP080: meta- & para-Xylene	108-38-3	2	?g/L	<2	<2	0.0	No Limit	
	106-42-3									

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 Work Order : ES1223218
 Client : PARSONS BRINCKERHOFF AUST P/L
 Project : 2162406B



Sub-Matrix: **WATER**

Laboratory Duplicate (DUP) Report

<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD (%)</i>	<i>Recovery Limits (%)</i>
EP080: BTEXN (QC Lot: 2527280) - continued									
ES1223133-001	Anonymous	EP080: ortho-Xylene	95-47-6	2	?g/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	?g/L	<5	<5	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 Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit			LCS	Low	High	
EA010P: Conductivity by PC Titrator (QCLot: 2521437)									
EA010-P: Electrical Conductivity @ 25°C	----	1	?S/cm	<1	2000 ?S/cm	105	96	110	
EA015: Total Dissolved Solids (QCLot: 2527682)									
EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	<10	293 mg/L	99.4	71	119	
ED037P: Alkalinity by PC Titrator (QCLot: 2521438)									
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	93.7	74	110	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2521418)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	95.3	84	124	
ED045G: Chloride Discrete analyser (QCLot: 2521419)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	104	84	122	
ED093F: Dissolved Major Cations (QCLot: 2521416)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.9	85	111	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.8	87	111	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	88.2	79	109	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.7	86	112	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2525536)									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	112	79	119	
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	110	80	118	
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	106	76	120	
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----	
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	114	82	114	
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	111	78	116	
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	107	79	115	
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	110	81	113	
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	105	80	114	
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	106	77	119	
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	106	80	116	
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	113	74	126	
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	108	70	120	
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	114	75	121	
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	117	71	127	
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	105	78	116	
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2525537)									



Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2525537) - continued								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	114	78	116
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG052G: Silica by Discrete Analyser (QCLot: 2521420)								
EG052G: Reactive Silica	----	0.1	mg/L	<0.10	5 mg/L	106	90	120
EK040P: Fluoride by PC Titrator (QCLot: 2521436)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	87.4	79	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2526340)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1.00 mg/L	94.3	89	113
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2521417)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.6	87	119
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2526339)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	105	86	124
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2527100)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	97.4	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2521409)								
EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.50 mg/L	89.6	86	124
EP005: Total Organic Carbon (TOC) (QCLot: 2522060)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	104	81	119
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2527365)								
EP033: Methane	74-82-8	10	?g/L	<10	28.48 ?g/L	102	86	108
EP033: Ethene	74-85-1	10	?g/L	<10	50.29 ?g/L	98.0	87	111
EP033: Ethane	74-84-0	10	?g/L	<10	54.43 ?g/L	98.1	87	111
EP033: Propene	115-07-1	10	?g/L	<10	73.97 ?g/L	99.0	86	112
EP033: Propane	74-98-6	10	?g/L	<10	78.28 ?g/L	99.7	87	111
EP033: Butene	25167-67-3	20	?g/L	<20	99.61 ?g/L	98.7	87	113
EP033: Butane	106-97-8	20	?g/L	<20	102.18 ?g/L	98.4	87	113
EP075(SIM)A: Phenolic Compounds (QCLot: 2522351)								
EP075(SIM): Phenol	108-95-2	0.2	?g/L	----	5 ?g/L	42.7	24.5	61.9
		1	?g/L	<1.0	----	----	----	----
EP075(SIM): 2-Chlorophenol	95-57-8	0.2	?g/L	----	5 ?g/L	77.6	63.8	110
		1	?g/L	<1.0	----	----	----	----
EP075(SIM): 2-Methylphenol	95-48-7	0.2	?g/L	----	5 ?g/L	59.8	55.9	112
		1	?g/L	<1.0	----	----	----	----
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	0.4	?g/L	----	10 ?g/L	58.3	42.5	114
		2	?g/L	<2.0	----	----	----	----
EP075(SIM): 2-Nitrophenol	88-75-5	0.2	?g/L	----	5 ?g/L	105	62.7	117
		1	?g/L	<1.0	----	----	----	----



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
EP075(SIM)A: Phenolic Compounds (QCLot: 2522351) - continued									
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.2	?g/L	----	5 ?g/L	72.7	59.9	112	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.2	?g/L	----	5 ?g/L	66.6	59.3	122	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.2	?g/L	----	5 ?g/L	76.2	64.3	118	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	0.2	?g/L	----	5 ?g/L	93.6	63	119	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.2	?g/L	----	5 ?g/L	74.8	58.7	118	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.2	?g/L	----	5 ?g/L	96.3	51.2	118	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Pentachlorophenol	87-86-5	0.4	?g/L	----	10 ?g/L	51.0	6.85	95.6	
		2	?g/L	<2.0	----	----	----	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2522351)									
EP075(SIM): Naphthalene	91-20-3	0.2	?g/L	----	5 ?g/L	83.3	58.6	119	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Acenaphthylene	208-96-8	0.2	?g/L	----	5 ?g/L	85.7	63.6	114	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Acenaphthene	83-32-9	0.2	?g/L	----	5 ?g/L	84.0	62.2	113	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Fluorene	86-73-7	0.2	?g/L	----	5 ?g/L	90.3	63.9	115	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Phenanthrene	85-01-8	0.2	?g/L	----	5 ?g/L	93.6	62.6	116	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Anthracene	120-12-7	0.2	?g/L	----	5 ?g/L	86.6	64.3	116	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Fluoranthene	206-44-0	0.2	?g/L	----	5 ?g/L	98.0	63.6	118	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Pyrene	129-00-0	0.2	?g/L	----	5 ?g/L	92.0	63.1	118	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Benz(a)anthracene	56-55-3	0.2	?g/L	----	5 ?g/L	93.6	64.1	117	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Chrysene	218-01-9	0.2	?g/L	----	5 ?g/L	103	62.5	116	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.2	?g/L	----	5 ?g/L	89.0	61.7	119	
		1	?g/L	<1.0	----	----	----	----	
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.2	?g/L	----	5 ?g/L	106	61.7	117	
		1	?g/L	<1.0	----	----	----	----	



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
EP075(SIM): Polynuclear Aromatic Hydrocarbons (QCLot: 2522351) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.2	?g/L	----	5 ?g/L	96.1	63.3	117
		0.5	?g/L	<0.5	----	----	----	----
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.2	?g/L	----	5 ?g/L	94.0	59.9	118
		1	?g/L	<1.0	----	----	----	----
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.2	?g/L	----	5 ?g/L	92.4	61.2	117
		1	?g/L	<1.0	----	----	----	----
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.2	?g/L	----	5 ?g/L	91.6	59.1	118
		1	?g/L	<1.0	----	----	----	----
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	1	?g/L	<1.0	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2522350)								
EP071: C10 - C14 Fraction	----	50	?g/L	<50	200 ?g/L	91.9	58.9	131
EP071: C15 - C28 Fraction	----	100	?g/L	<100	250 ?g/L	105	73.9	138
EP071: C29 - C36 Fraction	----	50	?g/L	<50	200 ?g/L	77.6	62.7	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2527280)								
EP080: C6 - C9 Fraction	----	20	?g/L	<20	260 ?g/L	94.2	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2522350)								
EP071: >C10 - C16 Fraction	----	100	?g/L	<100	250 ?g/L	68.6	58.9	131
EP071: >C16 - C34 Fraction	----	100	?g/L	<100	350 ?g/L	78.4	73.9	138
EP071: >C34 - C40 Fraction	----	100	?g/L	<100	----	----	----	----
		50	?g/L	----	150 ?g/L	98.0	62.7	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2527280)								
EP080: C6 - C10 Fraction	----	20	?g/L	<20	310 ?g/L	96.1	75	127
EP080: BTEXN (QCLot: 2527280)								
EP080: Benzene	71-43-2	1	?g/L	<1	10 ?g/L	97.4	70	124
EP080: Toluene	108-88-3	2	?g/L	<2	10 ?g/L	102	66	132
EP080: Ethylbenzene	100-41-4	2	?g/L	<2	10 ?g/L	94.2	70	120
EP080: meta- & para-Xylene	108-38-3	2	?g/L	<2	10 ?g/L	102	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	?g/L	<2	10 ?g/L	106	72	122
EP080: Naphthalene	91-20-3	5	?g/L	<5	10 ?g/L	103	70	124

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**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)
				MS	Low	High



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2521418)							
ES1223162-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride Discrete analyser (QCLot: 2521419)							
ES1223162-007	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	109	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2525536)							
ES1223190-017	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	120	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	81.6	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	120	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	75.8	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	128	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	89.1	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	# 52.8	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	104	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	116	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	118	70	130
EG020A-F: Zinc	7440-66-6	0.2 mg/L	88.6	70	130		
EG052G: Silica by Discrete Analyser (QCLot: 2521420)							
ES1223218-001	S4	EG052G: Reactive Silica	----	5.0 mg/L	96.6	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2521436)							
ES1223174-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	91.6	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2526340)							
ES1223218-001	S4	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	82.3	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2521417)							
ES1223162-006	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	98.0	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2526339)							
ES1223218-001	S4	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	86.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2527100)							
ES1223044-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	# Not Determined	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2521409)							
ES1223031-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	97.8	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 2522060)							
ES1223204-003	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	107	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2527365)							
EM1211377-001	Anonymous	EP033: Methane	74-82-8	28.48 ?g/L	84.6	70	130
		EP033: Ethene	74-85-1	50.29 ?g/L	82.2	70	130
		EP033: Ethane	74-84-0	54.43 ?g/L	84.7	70	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		
				Concentration	MS	Low	High		
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2527365) - continued									
EM1211377-001	Anonymous	EP033: Propene	115-07-1	73.97 ?g/L	89.5	70	130		
		EP033: Propane	74-98-6	78.28 ?g/L	92.6	70	130		
		EP033: Butene	25167-67-3	99.61 ?g/L	98.6	70	130		
		EP033: Butane	106-97-8	102.18 ?g/L	99.2	70	130		
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2527280)									
EP1208004-001	Anonymous	EP080: C6 - C9 Fraction	----	325 ?g/L	103	70	130		
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2527280)									
EP1208004-001	Anonymous	EP080: C6 - C10 Fraction	----	375 ?g/L	104	70	130		
EP080: BTEXN (QCLot: 2527280)									
EP1208004-001	Anonymous	EP080: Benzene	71-43-2	25 ?g/L	75.9	70	130		
		EP080: Toluene	108-88-3	25 ?g/L	94.2	70	130		
		EP080: Ethylbenzene	100-41-4	25 ?g/L	97.2	70	130		
		EP080: meta- & para-Xylene	108-38-3	25 ?g/L	105	70	130		
			106-42-3						
		EP080: ortho-Xylene	95-47-6	25 ?g/L	108	70	130		
	EP080: Naphthalene	91-20-3	25 ?g/L	97.8	70	130			

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.

Sub-Matrix: WATER

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2521409)										
ES1223031-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	97.8	----	70	130	----	----
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2521417)										
ES1223162-006	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	98.0	----	70	130	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2521418)										
ES1223162-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	----	70	130	----	----
ED045G: Chloride Discrete analyser (QCLot: 2521419)										
ES1223162-007	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	109	----	70	130	----	----
EG052G: Silica by Discrete Analyser (QCLot: 2521420)										
ES1223218-001	S4	EG052G: Reactive Silica	----	5.0 mg/L	96.6	----	70	130	----	----
EK040P: Fluoride by PC Titrator (QCLot: 2521436)										
ES1223174-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	91.6	----	70	130	----	----
EP005: Total Organic Carbon (TOC) (QCLot: 2522060)										



Sub-Matrix: WATER

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit
EP005: Total Organic Carbon (TOC) (QCLot: 2522060) - continued										
ES1223204-003	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	107	----	70	130	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2525536)										
ES1223190-017	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	120	----	70	130	----	----
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	81.6	----	70	130	----	----
		EG020A-F: Barium	7440-39-3	0.2 mg/L	120	----	70	130	----	----
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	75.8	----	70	130	----	----
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	128	----	70	130	----	----
		EG020A-F: Copper	7440-50-8	0.2 mg/L	89.1	----	70	130	----	----
		EG020A-F: Lead	7439-92-1	0.2 mg/L	# 52.8	----	70	130	----	----
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	104	----	70	130	----	----
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	116	----	70	130	----	----
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	118	----	70	130	----	----
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	88.6	----	70	130	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2526339)										
ES1223218-001	S4	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	86.0	----	70	130	----	----
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2526340)										
ES1223218-001	S4	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	82.3	----	70	130	----	----
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2527100)										
ES1223044-001	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	# Not Determined	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2527280)										
EP1208004-001	Anonymous	EP080: C6 - C9 Fraction	----	325 ?g/L	103	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2527280)										
EP1208004-001	Anonymous	EP080: C6 - C10 Fraction	----	375 ?g/L	104	----	70	130	----	----
EP080: BTEXN (QCLot: 2527280)										
EP1208004-001	Anonymous	EP080: Benzene	71-43-2	25 ?g/L	75.9	----	70	130	----	----
		EP080: Toluene	108-88-3	25 ?g/L	94.2	----	70	130	----	----
		EP080: Ethylbenzene	100-41-4	25 ?g/L	97.2	----	70	130	----	----
		EP080: meta- & para-Xylene	108-38-3	25 ?g/L	105	----	70	130	----	----
			106-42-3							
		EP080: ortho-Xylene	95-47-6	25 ?g/L	108	----	70	130	----	----
		EP080: Naphthalene	91-20-3	25 ?g/L	97.8	----	70	130	----	----
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2527365)										
EM1211377-001	Anonymous	EP033: Methane	74-82-8	28.48 ?g/L	84.6	----	70	130	----	----
		EP033: Ethene	74-85-1	50.29 ?g/L	82.2	----	70	130	----	----
		EP033: Ethane	74-84-0	54.43 ?g/L	84.7	----	70	130	----	----
		EP033: Propene	115-07-1	73.97 ?g/L	89.5	----	70	130	----	----
		EP033: Propane	74-98-6	78.28 ?g/L	92.6	----	70	130	----	----
		EP033: Butene	25167-67-3	99.61 ?g/L	98.6	----	70	130	----	----

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 Client : PARSONS BRINCKERHOFF AUST P/L
 Project : 2162406B



Sub-Matrix: **WATER**

					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2527365) - continued										
EM1211377-001	Anonymous	EP033: Butane	106-97-8	102.18 ?g/L	99.2	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1223218	Page	: 1 of 9
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Loren Schiavon
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Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 27-SEP-2012
Sampler	: N PH	Issue Date	: 05-OCT-2012
Order number	: ----		
Quote number	: SY/394/09	No. of samples received	: 1
		No. of samples analysed	: 1

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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) S4	26-SEP-2012	---	26-SEP-2012	----	27-SEP-2012	26-SEP-2012	*
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) S4	26-SEP-2012	---	24-OCT-2012	----	27-SEP-2012	24-OCT-2012	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural (EA015H) S4	26-SEP-2012	---	03-OCT-2012	----	03-OCT-2012	03-OCT-2012	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) S4	26-SEP-2012	---	10-OCT-2012	----	27-SEP-2012	10-OCT-2012	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) S4	26-SEP-2012	---	24-OCT-2012	----	27-SEP-2012	24-OCT-2012	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural (ED045G) S4	26-SEP-2012	---	24-OCT-2012	----	27-SEP-2012	24-OCT-2012	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) S4	26-SEP-2012	---	03-OCT-2012	----	27-SEP-2012	03-OCT-2012	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) S4	26-SEP-2012	---	25-MAR-2013	----	03-OCT-2012	25-MAR-2013	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) S4	26-SEP-2012	---	25-MAR-2013	----	03-OCT-2012	25-MAR-2013	✓
EG052G: Silica by Discrete Analyser							
Clear Plastic Bottle - Natural (EG052G) S4	26-SEP-2012	---	24-OCT-2012	----	27-SEP-2012	24-OCT-2012	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) S4	26-SEP-2012	---	24-OCT-2012	----	27-SEP-2012	24-OCT-2012	✓



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
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) S4	26-SEP-2012	---	24-OCT-2012	----	02-OCT-2012	24-OCT-2012	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) S4	26-SEP-2012	---	28-SEP-2012	----	27-SEP-2012	28-SEP-2012	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) S4	26-SEP-2012	---	24-OCT-2012	----	02-OCT-2012	24-OCT-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) S4	26-SEP-2012	03-OCT-2012	24-OCT-2012	✓	03-OCT-2012	24-OCT-2012	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) S4	26-SEP-2012	---	28-SEP-2012	----	27-SEP-2012	28-SEP-2012	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005) S4	26-SEP-2012	----	----	----	28-SEP-2012	24-OCT-2012	✓
EP033: C1 - C4 Hydrocarbon Gases							
Amber VOC Vial - Sulfuric Acid (EP033) S4	26-SEP-2012	----	----	----	03-OCT-2012	10-OCT-2012	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) S4	26-SEP-2012	28-SEP-2012	03-OCT-2012	✓	02-OCT-2012	07-NOV-2012	✓
EP075(SIM)A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075(SIM)) S4	26-SEP-2012	28-SEP-2012	03-OCT-2012	✓	02-OCT-2012	07-NOV-2012	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) S4	26-SEP-2012	28-SEP-2012	03-OCT-2012	✓	02-OCT-2012	07-NOV-2012	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) S4	26-SEP-2012	03-OCT-2012	10-OCT-2012	✓	03-OCT-2012	10-OCT-2012	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080) S4	26-SEP-2012	03-OCT-2012	10-OCT-2012	✓	03-OCT-2012	10-OCT-2012	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	11	18.2	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	2	15	13.3	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	2	20	10.0	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	2	50.0	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	8	12.5	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
Fluoride by PC Titrator	EK040P	2	12	16.7	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	4	25.0	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	13	15.4	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	10	20.0	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	11	9.1	10.0	✖	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	1	6	16.7	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	12	16.7	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	1	100.0	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	14.3	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	20	10.0	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	10	10.0	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.0	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	11	9.1	10.0	✖	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	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	1	11	9.1	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	15	6.7	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	2	100.0	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	8	12.5	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
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	100.0	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	12	8.3	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	4	25.0	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	13	7.7	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	10	10.0	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	11	9.1	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	8.3	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	1	100.0	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	14.3	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	20	10.0	10.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	10	10.0	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	15.0	15.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	11	9.1	5.0	✔	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Laboratory Control Samples (LCS) - Continued							
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	15	6.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	8	12.5	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
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	1	100.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	4	25.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	1	100.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	10	10.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	15	6.7	5.0	✓	ALS QCS3 requirement
C1 - C4 Gases	EP033	1	20	5.0	5.0	✓	ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	2	50.0	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	5.3	5.0	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	12	8.3	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	13	7.7	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	10	10.0	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	8.3	5.0	✓	ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	1	100.0	5.0	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	7	14.3	5.0	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	10	10.0	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	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
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids (High Level)	EA015H	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
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- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um 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) Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Hardness parameters are calculated based on APHA 21st ed., 2340 B. 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): Samples are 0.45 um filtered prior to analysis. 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.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. 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.
Silica (Reactive) by Discrete Analyser	EG052G	WATER	APHA 21st ed. 4500-SiO2 D: Under Acidic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Analytical Methods	Method	Matrix	Method Descriptions
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TPH - Semivolatle Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Page : 8 of 9
Work Order : ES1223218
Client : PARSONS BRINCKERHOFF AUST P/L
Project : 2162406B



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.



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

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1223162-007	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG020F: Dissolved Metals by ICP-MS	ES1223190-017	Anonymous	Lead	7439-92-1	52.8 %	70-130%	Recovery less than lower data quality objective
EK067G: Total Phosphorus as P by Discrete Analyser	ES1223044-001	Anonymous	Total Phosphorus as P	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural S4	----	----	----	27-SEP-2012	26-SEP-2012	1

Outliers : Frequency of Quality Control Samples

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

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	1	11	9.1	10.0	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	1	11	9.1	10.0	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

CHAIN-OF-CUSTODY

Laboratory Name: A.L.S. Environmental
Address: 277-289 Woodpark Road
 SMITHFIELD NSW 2164
Phone Number: 02 8784 8500
Fax Number: 02 8784 8500
Contact Name:

PB Job No.
 2162406B

Results Expected By/On: 7 days
Fax Results To: James Dugleby
Fax Number: 02 9272 5101
Phone Number: 9272 5248
Email Results to: james.dugleby@als.com.au
Quotation Number: SY/394/09
Invoice To: James Dugleby
 Head Office Sydney

Sample ID	Date sampled	Time	Medium *	Preservative Type	Filtered (x)	Containers	Analysis Required													Sampled By	Company	Signature	Remarks					
							Cations (Na, K, Ca, Mg)	Anions (Alkalinity, SO4, Cl, reactive silica)	Dissolved Metals (Al, As, Ba, B, Be, Br, Cd, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, Sr, U, V, Zn)	Ammonia as N	Nitrate, nitrite	Flouride	Reactive Phosphorus as P	Total phosphorous as P	TOC	Gases C1-C4 + methane	BTEX/ TPH C6-C9	TPH C10-C36	PAH					Phenols	pH	EC	Total dissolved solids	
S4	26-Sep-12	2:00 PM					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	N/PH	PB		

Environmental Division
 Work Order
 Sydney
ES1223218

 Telephone : + 61-2-8784 8555

HT

Relinquished By: A. McFarlane
Date: 27/9/12
Company: PB
Time: 12:00
Signature: [Signature]

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

Parsons Brinckerhoff
 & Young Co
 1 George St
 SYDNEY NSW 2000
Environmental and Geotechnical Services

Comments:

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

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: ES1224045	Page	: 1 of 7
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 09-OCT-2012
Sampler	: NPH	Issue Date	: 16-OCT-2012
Site	: ----		
Quote number	: SY/394/09	No. of samples received	: 1
		No. of samples analysed	: 1

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
- Surrogate Control Limits



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Raymond Commodor	Instrument Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney 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 insufficient sample for analysis.

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

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

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

LOR = Limit of reporting

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

- **ED041G: LOR raised for SO4 analysis on sample ID: S4 due to sample matrix.due to sample matrix.**
- **EG020: Bromine quantification may be unreliable due to its low solubility in acid, leading to variable volatility during measurement by ICPMS.**
- **EG020: Samples were diluted and rerun due to matrix interference and LOR's have been raised accordingly. (Internal Standard Suppression)**
- **EK057G/EK059G: LOR raised for NO2/NOx analysis on sample ID: S4 due to sample matrix.due to sample matrix.**



Analytical Results

Sub-Matrix: WATER

			Client sample ID	S4				
			Client sampling date / time	08-OCT-2012 11:00				
Compound	CAS Number	LOR	Unit	ES1224045-001				
EA005P: pH by PC Titrator								
pH Value		0.01	pH Unit	8.20				
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C		1	µS/cm	9470				
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	5460				
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	5120				
Total Alkalinity as CaCO3		1	mg/L	5120				
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10				
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	577				
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	24				
Magnesium	7439-95-4	1	mg/L	4				
Sodium	7440-23-5	1	mg/L	2470				
Potassium	7440-09-7	1	mg/L	29				
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.10				
Arsenic	7440-38-2	0.001	mg/L	<0.010				
Beryllium	7440-41-7	0.001	mg/L	<0.010				
Barium	7440-39-3	0.001	mg/L	6.62				
Cadmium	7440-43-9	0.0001	mg/L	<0.0010				
Cobalt	7440-48-4	0.001	mg/L	<0.010				
Copper	7440-50-8	0.001	mg/L	<0.010				
Lead	7439-92-1	0.001	mg/L	<0.010				
Manganese	7439-96-5	0.001	mg/L	0.071				
Molybdenum	7439-98-7	0.001	mg/L	<0.010				
Nickel	7440-02-0	0.001	mg/L	<0.010				
Selenium	7782-49-2	0.01	mg/L	<0.10				
Strontium	7440-24-6	0.001	mg/L	4.30				
Uranium	7440-61-1	0.001	mg/L	<0.010				
Vanadium	7440-62-2	0.01	mg/L	<0.10				
Zinc	7440-66-6	0.005	mg/L	<0.050				



Analytical Results

Sub-Matrix: **WATER**

			Client sample ID	S4				
			Client sampling date / time	08-OCT-2012 11:00				
Compound	CAS Number	LOR	Unit	ES1224045-001				
EG020F: Dissolved Metals by ICP-MS - Continued								
Boron	7440-42-8	0.05	mg/L	<0.50				
Iron	7439-89-6	0.05	mg/L	0.51				
Bromine	7726-95-6	0.1	mg/L	<1.0				
EG052G: Silica by Discrete Analyser								
Reactive Silica		0.10	mg/L	17.5				
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	1.2				
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	3.00				
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N		0.01	mg/L	<0.10				
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	<0.10				
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N		0.01	mg/L	<0.10				
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P		0.01	mg/L	0.02				
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P		0.01	mg/L	0.02				
EN055: Ionic Balance								
Total Anions		0.01	meq/L	118				
Total Cations		0.01	meq/L	110				
Ionic Balance		0.01	%	3.95				
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon		1	mg/L	5				
EP033: C1 - C4 Hydrocarbon Gases								
Methane	74-82-8	10	µg/L	90				
Ethene	74-85-1	10	µg/L	<10				
Ethane	74-84-0	10	µg/L	<10				
Propene	115-07-1	10	µg/L	<10				
Propane	74-98-6	10	µg/L	<10				
Butene	25167-67-3	10	µg/L	<10				
Butane	106-97-8	10	µg/L	<10				
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	<1.0				



Analytical Results

Sub-Matrix: WATER

Client sample ID

S4

Client sampling date / time

08-OCT-2012 11:00

Compound	CAS Number	LOR	Unit	ES1224045-001				
EP075(SIM)A: Phenolic Compounds - Continued								
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	----	----	----	----
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	----	----	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	----	----	----	----
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	----	----	----	----
2,4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	----	----	----	----
2,4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	----	----	----	----
2,6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	----	----	----	----
4-Chloro-3-Methylphenol	59-50-7	1.0	µg/L	<1.0	----	----	----	----
2,4,6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	----	----	----	----
2,4,5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0	----	----	----	----
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1,2,3-cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (WHO)	----	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	500	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	220	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	720	----	----	----	----



Analytical Results

Sub-Matrix: WATER

Client sample ID

S4

Client sampling date / time

08-OCT-2012 11:00

Compound	CAS Number	LOR	Unit	ES1224045-001				
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	20	µg/L	<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	640	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	110	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	750	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	22.8	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	46.4	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	65.4	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	41.9	----	----	----	----
Anthracene-d10	1719-06-8	0.1	%	95.9	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	92.6	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	108	----	----	----	----
Toluene-D8	2037-26-5	0.1	%	112	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	107	----	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	64.1
2-Chlorophenol-D4	93951-73-6	11.3	122.9
2,4,6-Tribromophenol	118-79-6	11.7	144.0
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	19.9	122.8
Anthracene-d10	1719-06-8	23.3	125.8
4-Terphenyl-d14	1718-51-0	20.3	134.5
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

<p>Work Order : ES1224045</p> <p>Client : PARSONS BRINCKERHOFF AUST P/L</p> <p>Contact : MR JAMES DUGGLEBY</p> <p>Address : GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001</p> <p>E-mail : jduggleby@pb.com.au</p> <p>Telephone : +61 02 9272 5100</p> <p>Facsimile : +61 02 9272 5101</p> <p>Project : 2162406B</p> <p>Site : ----</p> <p>C-O-C number : ----</p> <p>Sampler : NPH</p> <p>Order number : ----</p> <p>Quote number : SY/394/09</p>	<p>Page : 1 of 14</p> <p>Laboratory : Environmental Division Sydney</p> <p>Contact : Loren Schiavon</p> <p>Address : 277-289 Woodpark Road Smithfield NSW Australia 2164</p> <p>E-mail : loren.schiavon@alsglobal.com</p> <p>Telephone : +61 2 8784 8503</p> <p>Facsimile : +61 2 8784 8500</p> <p>QC Level : NEPM 1999 Schedule B(3) and ALS QCS3 requirement</p> <p>Date Samples Received : 09-OCT-2012</p> <p>Issue Date : 16-OCT-2012</p> <p>No. of samples received : 1</p> <p>No. of samples analysed : 1</p>
--	---

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Raymond Commodor	Instrument Chemist	Sydney Inorganics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics



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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 (%)
EA005P: pH by PC Titrator (QC Lot: 2538454)									
ES1224042-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.55	7.55	0.0	0% - 20%
ES1224042-008	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.91	6.05	13.3	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2538453)									
EN1203851-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	21000	21200	0.5	0% - 20%
ES1224049-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	104	102	1.8	0% - 20%
EA015: Total Dissolved Solids (QC Lot: 2544021)									
ES1223924-001	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	11	<10	9.5	No Limit
ES1224042-007	Anonymous	EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	1870	1900	1.4	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2538455)									
ES1224042-001	Anonymous	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	362	360	0.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	362	360	0.3	0% - 20%
ES1224042-008	Anonymous	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	4	<1	119	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	4	<1	119	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2537968)									
ES1223819-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	<10	0.0	No Limit
ES1224045-001	S4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<10	<10	0.0	No Limit
ED045G: Chloride Discrete analyser (QC Lot: 2537967)									
ES1223819-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	32	33	0.0	0% - 20%
ES1224045-001	S4	ED045G: Chloride	16887-00-6	1	mg/L	577	578	0.2	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2537966)									
ES1223819-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	3	2	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	16	16	0.0	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
ES1224030-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	116	112	3.4	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	62	60	3.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	13	13	0.0	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2538785)									
ES1223973-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit



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: 2538785) - continued									
ES1223973-001	Anonymous	EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.041	0.042	2.9	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.032	0.028	12.9	0% - 20%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.239	0.235	1.8	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.083	0.073	12.5	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.141	0.138	2.0	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	<0.1	0.0	No Limit		
ES1224045-001	S4	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	6.62	6.84	3.3	0% - 20%
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.071	0.069	3.0	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.0	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.10	0.18	57.3	0% - 50%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.10	<0.10	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.10	<0.10	0.0	No Limit
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.50	<0.50	0.0	No Limit		
EG020A-F: Iron	7439-89-6	0.05	mg/L	0.51	0.54	5.0	0% - 50%		
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<1.0	<1.0	0.0	No Limit		
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2538786)									
ES1224045-001	S4	EG020B-F: Strontium	7440-24-6	0.001	mg/L	4.30	4.44	3.2	0% - 20%
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.010	<0.010	0.0	No Limit
EG052G: Silica by Discrete Analyser (QC Lot: 2537971)									
ES1224045-001	S4	EG052G: Reactive Silica	----	0.10	mg/L	17.5	17.9	2.0	0% - 20%
EK040P: Fluoride by PC Titrator (QC Lot: 2538456)									
ES1224042-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	2.0	2.0	0.0	0% - 20%
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2538677)									



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 (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2538677) - continued									
ES1224042-004	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	75.9	72.4	4.7	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2537969)									
ES1224027-001	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
ES1224045-001	S4	EK057G: Nitrite as N	----	0.01	mg/L	<0.10	<0.10	0.0	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2538676)									
ES1224042-004	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.01	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2541006)									
ES1224091-002	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.0	No Limit
ES1224045-001	S4	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.02	0.0	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2537970)									
ES1224027-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.0	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 2541655)									
ES1223968-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.0	No Limit
ES1224042-006	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	89	86	3.4	0% - 20%
EP033: C1 - C4 Hydrocarbon Gases (QC Lot: 2544230)									
EB1226262-001	Anonymous	EP033: Methane	74-82-8	10	µg/L	16	16	0.0	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit
EB1226262-013	Anonymous	EP033: Methane	74-82-8	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethene	74-85-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Ethane	74-84-0	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propene	115-07-1	10	µg/L	<10	<10	0.0	No Limit
		EP033: Propane	74-98-6	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butene	25167-67-3	10	µg/L	<10	<10	0.0	No Limit
		EP033: Butane	106-97-8	10	µg/L	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2541395)									
EB1225949-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES1224045-001	S4	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2541395)									
EB1225949-001	Anonymous	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES1224045-001	S4	EP080: C6 - C10 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 2541395)									
EB1225949-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit

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 Work Order : ES1224045
 Client : PARSONS BRINCKERHOFF AUST P/L
 Project : 2162406B



Sub-Matrix: **WATER**

Laboratory Duplicate (DUP) Report

<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD (%)</i>	<i>Recovery Limits (%)</i>
EP080: BTEXN (QC Lot: 2541395) - continued									
EB1225949-001	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES1224045-001	S4	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	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			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EA010P: Conductivity by PC Titrator (QCLot: 2538453)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	108	96	110
EA015: Total Dissolved Solids (QCLot: 2544021)								
EA015H: Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	<10	293 mg/L	99.6	71	119
ED037P: Alkalinity by PC Titrator (QCLot: 2538455)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	93.8	74	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2537968)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	84	124
ED045G: Chloride Discrete analyser (QCLot: 2537967)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	90.5	84	122
ED093F: Dissolved Major Cations (QCLot: 2537966)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.2	85	111
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	87	111
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.9	79	109
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	86	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2538785)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	87.2	79	119
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	80	118
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	98.3	76	120
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	95.8	81	113
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.9	82	114
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.2	78	116
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	105	79	115
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.4	81	113
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	96.6	80	114
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	98.5	77	119
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.7	80	116
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	104	74	126
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	92.1	70	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	75	121
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.1 mg/L	96.3	71	127
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.4	78	116
EG020A-F: Bromine	7726-95-6	0.1	mg/L	<0.1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 2538786)								



Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
Method: Compound	CAS Number	LOR	Unit		Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2538786) - continued									
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	102	78	116	
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----	
EG052G: Silica by Discrete Analyser (QCLot: 2537971)									
EG052G: Reactive Silica	----	0.1	mg/L	<0.10	5 mg/L	102	90	120	
EK040P: Fluoride by PC Titrator (QCLot: 2538456)									
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5.0 mg/L	99.4	79	117	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2538677)									
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1.00 mg/L	92.2	89	113	
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2537969)									
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	112	87	119	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2538676)									
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	109	86	124	
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2541006)									
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	99.1	70	130	
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2537970)									
EK071G: Reactive Phosphorus as P	----	0.01	mg/L	<0.01	0.50 mg/L	103	86	124	
EP005: Total Organic Carbon (TOC) (QCLot: 2541655)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	95.5	81	119	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2544230)									
EP033: Methane	74-82-8	10	µg/L	<10	28.48 µg/L	89.5	86	108	
EP033: Ethene	74-85-1	10	µg/L	<10	50.29 µg/L	97.2	87	111	
EP033: Ethane	74-84-0	10	µg/L	<10	54.43 µg/L	97.3	87	111	
EP033: Propene	115-07-1	10	µg/L	<10	73.97 µg/L	88.4	86	112	
EP033: Propane	74-98-6	10	µg/L	<10	78.28 µg/L	92.0	87	111	
EP033: Butene	25167-67-3	20	µg/L	<20	99.61 µg/L	90.0	87	113	
EP033: Butane	106-97-8	20	µg/L	<20	102.18 µg/L	89.2	87	113	
EP075(SIM)A: Phenolic Compounds (QCLot: 2539469)									
EP075(SIM): Phenol	108-95-2	0.2	µg/L	----	5 µg/L	30.0	24.5	61.9	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Chlorophenol	95-57-8	0.2	µg/L	----	5 µg/L	67.7	63.8	110	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 2-Methylphenol	95-48-7	0.2	µg/L	----	5 µg/L	81.8	55.9	112	
		1	µg/L	<1.0	----	----	----	----	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	0.4	µg/L	----	10 µg/L	62.4	42.5	114	
		2	µg/L	<2.0	----	----	----	----	
EP075(SIM): 2-Nitrophenol	88-75-5	0.2	µg/L	----	5 µg/L	68.4	62.7	117	
		1	µg/L	<1.0	----	----	----	----	



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
EP075(SIM)A: Phenolic Compounds (QCLot: 2539469) - continued								
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.2	µg/L	----	5 µg/L	66.8	59.9	112
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.2	µg/L	----	5 µg/L	90.2	59.3	122
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.2	µg/L	----	5 µg/L	69.1	64.3	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 4-Chloro-3-Methylphenol	59-50-7	0.2	µg/L	----	5 µg/L	81.5	63	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.2	µg/L	----	5 µg/L	83.2	58.7	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.2	µg/L	----	5 µg/L	81.2	51.2	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pentachlorophenol	87-86-5	0.4	µg/L	----	10 µg/L	55.9	6.85	95.6
		2	µg/L	<2.0	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2539469)								
EP075(SIM): Naphthalene	91-20-3	0.2	µg/L	----	5 µg/L	68.9	58.6	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthylene	208-96-8	0.2	µg/L	----	5 µg/L	74.9	63.6	114
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthene	83-32-9	0.2	µg/L	----	5 µg/L	93.2	62.2	113
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluorene	86-73-7	0.2	µg/L	----	5 µg/L	83.7	63.9	115
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Phenanthrene	85-01-8	0.2	µg/L	----	5 µg/L	80.3	62.6	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Anthracene	120-12-7	0.2	µg/L	----	5 µg/L	96.4	64.3	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluoranthene	206-44-0	0.2	µg/L	----	5 µg/L	94.4	63.6	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pyrene	129-00-0	0.2	µg/L	----	5 µg/L	94.2	63.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benz(a)anthracene	56-55-3	0.2	µg/L	----	5 µg/L	68.9	64.1	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Chrysene	218-01-9	0.2	µg/L	----	5 µg/L	81.6	62.5	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.2	µg/L	----	5 µg/L	73.6	61.7	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.2	µg/L	----	5 µg/L	71.4	61.7	117
		1	µg/L	<1.0	----	----	----	----



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2537968)							
ES1223819-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	119	70	130
ED045G: Chloride Discrete analyser (QCLot: 2537967)							
ES1223819-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	103	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2538785)							
ES1224021-004	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	111	70	130
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	108	70	130
		EG020A-F: Barium	7440-39-3	0.2 mg/L	97.4	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	101	70	130
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	93.7	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	108	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	95.5	70	130
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	97.5	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	91.5	70	130
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	94.9	70	130
EG020A-F: Zinc	7440-66-6	0.2 mg/L	112	70	130		
EG052G: Silica by Discrete Analyser (QCLot: 2537971)							
ES1224045-001	S4	EG052G: Reactive Silica	----	5.0 mg/L	99.3	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2538456)							
ES1224042-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	102	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2538677)							
ES1224042-004	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	# Not Determined	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2537969)							
ES1224027-001	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	110	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2538676)							
ES1224042-004	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	94.6	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2541006)							
ES1224091-002	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	87.0	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2537970)							
ES1224027-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	111	70	130
EP005: Total Organic Carbon (TOC) (QCLot: 2541655)							
ES1223972-006	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	93.4	70	130
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2544230)							
EB1226262-009	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	114	70	130
		EP033: Ethene	74-85-1	50.29 µg/L	103	70	130
		EP033: Ethane	74-84-0	54.43 µg/L	105	70	130



Sub-Matrix: **WATER**

				Matrix Spike (MS) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		
				Concentration	MS	Low	High		
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2544230) - continued									
EB1226262-009	Anonymous	EP033: Propene	115-07-1	73.97 µg/L	109	70	130		
		EP033: Propane	74-98-6	78.28 µg/L	112	70	130		
		EP033: Butene	25167-67-3	99.61 µg/L	124	70	130		
		EP033: Butane	106-97-8	102.18 µg/L	118	70	130		
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2541395)									
EB1225949-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	125	70	130		
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2541395)									
EB1225949-001	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	127	70	130		
EP080: BTEXN (QCLot: 2541395)									
EB1225949-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	116	70	130		
		EP080: Toluene	108-88-3	25 µg/L	109	70	130		
		EP080: Ethylbenzene	100-41-4	25 µg/L	112	70	130		
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	105	70	130		
			106-42-3						
		EP080: ortho-Xylene	95-47-6	25 µg/L	103	70	130		
	EP080: Naphthalene	91-20-3	25 µg/L	105	70	130			

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.

Sub-Matrix: **WATER**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
				Concentration	MS	MSD	Low	High	Value	Control Limit
ED045G: Chloride Discrete analyser (QCLot: 2537967)										
ES1223819-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	103	----	70	130	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2537968)										
ES1223819-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	119	----	70	130	----	----
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2537969)										
ES1224027-001	Anonymous	EK057G: Nitrite as N	----	0.5 mg/L	110	----	70	130	----	----
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2537970)										
ES1224027-001	Anonymous	EK071G: Reactive Phosphorus as P	----	0.50 mg/L	111	----	70	130	----	----
EG052G: Silica by Discrete Analyser (QCLot: 2537971)										
ES1224045-001	S4	EG052G: Reactive Silica	----	5.0 mg/L	99.3	----	70	130	----	----
EK040P: Fluoride by PC Titrator (QCLot: 2538456)										
ES1224042-001	Anonymous	EK040P: Fluoride	16984-48-8	5.0 mg/L	102	----	70	130	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2538676)										



Sub-Matrix: WATER

					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)		
					MS	MSD	Low	High	Value	Control Limit	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2538676) - continued											
ES1224042-004	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	94.6	----	70	130	----	----	
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2538677)											
ES1224042-004	Anonymous	EK055G: Ammonia as N	7664-41-7	1.00 mg/L	# Not Determined	----	70	130	----	----	
EG020F: Dissolved Metals by ICP-MS (QCLot: 2538785)											
ES1224021-004	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	111	----	70	130	----	----	
		EG020A-F: Beryllium	7440-41-7	0.2 mg/L	108	----	70	130	----	----	
		EG020A-F: Barium	7440-39-3	0.2 mg/L	97.4	----	70	130	----	----	
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	101	----	70	130	----	----	
		EG020A-F: Cobalt	7440-48-4	0.2 mg/L	93.7	----	70	130	----	----	
		EG020A-F: Copper	7440-50-8	0.2 mg/L	108	----	70	130	----	----	
		EG020A-F: Lead	7439-92-1	0.2 mg/L	95.5	----	70	130	----	----	
		EG020A-F: Manganese	7439-96-5	0.2 mg/L	97.5	----	70	130	----	----	
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	91.5	----	70	130	----	----	
		EG020A-F: Vanadium	7440-62-2	0.2 mg/L	94.9	----	70	130	----	----	
EG020A-F: Zinc	7440-66-6	0.2 mg/L	112	----	70	130	----	----			
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2541006)											
ES1224091-002	Anonymous	EK067G: Total Phosphorus as P	----	1.00 mg/L	87.0	----	70	130	----	----	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2541395)											
EB1225949-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	125	----	70	130	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2541395)											
EB1225949-001	Anonymous	EP080: C6 - C10 Fraction	----	375 µg/L	127	----	70	130	----	----	
EP080: BTEXN (QCLot: 2541395)											
EB1225949-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	116	----	70	130	----	----	
		EP080: Toluene	108-88-3	25 µg/L	109	----	70	130	----	----	
		EP080: Ethylbenzene	100-41-4	25 µg/L	112	----	70	130	----	----	
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	105	----	70	130	----	----	
			106-42-3								
		EP080: ortho-Xylene	95-47-6	25 µg/L	103	----	70	130	----	----	
EP080: Naphthalene	91-20-3	25 µg/L	105	----	70	130	----	----			
EP005: Total Organic Carbon (TOC) (QCLot: 2541655)											
ES1223972-006	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	93.4	----	70	130	----	----	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2544230)											
EB1226262-009	Anonymous	EP033: Methane	74-82-8	28.48 µg/L	114	----	70	130	----	----	
		EP033: Ethene	74-85-1	50.29 µg/L	103	----	70	130	----	----	
		EP033: Ethane	74-84-0	54.43 µg/L	105	----	70	130	----	----	
		EP033: Propene	115-07-1	73.97 µg/L	109	----	70	130	----	----	
		EP033: Propane	74-98-6	78.28 µg/L	112	----	70	130	----	----	
		EP033: Butene	25167-67-3	99.61 µg/L	124	----	70	130	----	----	

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 Work Order : ES1224045
 Client : PARSONS BRINCKERHOFF AUST P/L
 Project : 2162406B



Sub-Matrix: **WATER**

					<i>Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report</i>						
					<i>Spike</i>	<i>Spike Recovery (%)</i>		<i>Recovery Limits (%)</i>		<i>RPDs (%)</i>	
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>Concentration</i>	<i>MS</i>	<i>MSD</i>	<i>Low</i>	<i>High</i>	<i>Value</i>	<i>Control Limit</i>	
EP033: C1 - C4 Hydrocarbon Gases (QCLot: 2544230) - continued											
EB1226262-009	Anonymous	EP033: Butane	106-97-8	102.18 µg/L	118	----	70	130	----	----	

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: ES1224045	Page	: 1 of 9
Client	: PARSONS BRINCKERHOFF AUST P/L	Laboratory	: Environmental Division Sydney
Contact	: MR JAMES DUGGLEBY	Contact	: Loren Schiavon
Address	: GPO BOX 5394 SYDNEY NSW, AUSTRALIA 2001	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: jduggleby@pb.com.au	E-mail	: loren.schiavon@alsglobal.com
Telephone	: +61 02 9272 5100	Telephone	: +61 2 8784 8503
Facsimile	: +61 02 9272 5101	Facsimile	: +61 2 8784 8500
Project	: 2162406B	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 09-OCT-2012
Sampler	: NPH	Issue Date	: 16-OCT-2012
Order number	: ----		
Quote number	: SY/394/09	No. of samples received	: 1
		No. of samples analysed	: 1

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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) S4	08-OCT-2012	---	08-OCT-2012	----	09-OCT-2012	08-OCT-2012	*
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) S4	08-OCT-2012	---	05-NOV-2012	----	09-OCT-2012	05-NOV-2012	✓
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural (EA015H) S4	08-OCT-2012	---	15-OCT-2012	----	12-OCT-2012	15-OCT-2012	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) S4	08-OCT-2012	---	22-OCT-2012	----	09-OCT-2012	22-OCT-2012	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) S4	08-OCT-2012	---	05-NOV-2012	----	09-OCT-2012	05-NOV-2012	✓
ED045G: Chloride Discrete analyser							
Clear Plastic Bottle - Natural (ED045G) S4	08-OCT-2012	---	05-NOV-2012	----	09-OCT-2012	05-NOV-2012	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) S4	08-OCT-2012	---	15-OCT-2012	----	09-OCT-2012	15-OCT-2012	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) S4	08-OCT-2012	---	06-APR-2013	----	10-OCT-2012	06-APR-2013	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F) S4	08-OCT-2012	---	06-APR-2013	----	10-OCT-2012	06-APR-2013	✓
EG052G: Silica by Discrete Analyser							
Clear Plastic Bottle - Natural (EG052G) S4	08-OCT-2012	---	05-NOV-2012	----	09-OCT-2012	05-NOV-2012	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P) S4	08-OCT-2012	---	05-NOV-2012	----	09-OCT-2012	05-NOV-2012	✓



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
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G) S4	08-OCT-2012	---	05-NOV-2012	----	10-OCT-2012	05-NOV-2012	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G) S4	08-OCT-2012	---	10-OCT-2012	----	09-OCT-2012	10-OCT-2012	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G) S4	08-OCT-2012	---	05-NOV-2012	----	10-OCT-2012	05-NOV-2012	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G) S4	08-OCT-2012	11-OCT-2012	05-NOV-2012	✓	11-OCT-2012	05-NOV-2012	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G) S4	08-OCT-2012	---	10-OCT-2012	----	09-OCT-2012	10-OCT-2012	✓
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005) S4	08-OCT-2012	----	----	----	11-OCT-2012	05-NOV-2012	✓
EP033: C1 - C4 Hydrocarbon Gases							
Amber VOC Vial - Sulfuric Acid (EP033) S4	08-OCT-2012	---	----	----	12-OCT-2012	22-OCT-2012	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) S4	08-OCT-2012	11-OCT-2012	15-OCT-2012	✓	11-OCT-2012	20-NOV-2012	✓
EP075(SIM)A: Phenolic Compounds							
Amber Glass Bottle - Unpreserved (EP075(SIM)) S4	08-OCT-2012	11-OCT-2012	15-OCT-2012	✓	12-OCT-2012	20-NOV-2012	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) S4	08-OCT-2012	11-OCT-2012	15-OCT-2012	✓	12-OCT-2012	20-NOV-2012	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) S4	08-OCT-2012	12-OCT-2012	22-OCT-2012	✓	12-OCT-2012	22-OCT-2012	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft							
Amber VOC Vial - Sulfuric Acid (EP080) S4	08-OCT-2012	12-OCT-2012	22-OCT-2012	✓	12-OCT-2012	22-OCT-2012	✓



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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	12	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	9	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	2	19	10.5	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
Conductivity by PC Titrator	EA010-P	2	11	18.2	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	2	50.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	9	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	9	22.2	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH by PC Titrator	EA005-P	2	14	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	14.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	1	100.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	12	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	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	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	19	5.3	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
Conductivity by PC Titrator	EA010-P	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	1	100.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	12	16.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	15.0	15.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement



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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C1 - C4 Gases	EP033	1	19	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	2	50.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	9	11.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	11	9.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	14.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	1	100.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	16	6.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	9	11.1	5.0	✓	ALS QCS3 requirement
C1 - C4 Gases	EP033	1	19	5.3	5.0	✓	ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.0	5.0	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	9	11.1	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	9	11.1	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	9	11.1	5.0	✓	ALS QCS3 requirement
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	7	14.3	5.0	✓	ALS QCS3 requirement
Silica (Reactive) by Discrete Analyser	EG052G	1	1	100.0	5.0	✓	ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Total Organic Carbon	EP005	1	20	5.0	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.0	5.0	✓	ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	5.0	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
pH by PC Titrator	EA005-P	WATER	APHA 21st ed. 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Dissolved Solids (High Level)	EA015H	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
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- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. 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 liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um 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) Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) Hardness parameters are calculated based on APHA 21st ed., 2340 B. 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): Samples are 0.45 um filtered prior to analysis. 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.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um filtered prior to analysis. 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.
Silica (Reactive) by Discrete Analyser	EG052G	WATER	APHA 21st ed. 4500-SiO2 D: Under Acidic conditions reactive silicon combines with ammonium molybdate to form a yellow molybdosilicic acid complex. This is reduced by 1-amino-2-naphthol-4-sulfonic acid to a silicomolybdenum blue complex which is measured by discrete analyser at 670 nm. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Analytical Methods	Method	Matrix	Method Descriptions
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500-P B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	APHA 21st ed., 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with orthophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Organic Carbon	EP005	WATER	APHA 21st ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
C1 - C4 Gases	EP033	WATER	Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene, US EPA - Region 1, EPA New England, July 2001. Automated static headspace, dual column GC/FID. A 12 mL sample is pipetted into a 20 mL headspace vial containing 3g of sodium chloride and sealed. Each sample is equilibrated with shaking at 40 degrees C for 10 minutes prior to analysis by GC/FID using a pair of PLOT columns of different polarity.
TPH - Semivolatle Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

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Client : PARSONS BRINCKERHOFF AUST P/L
Project : 2162406B



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.



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

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK055G: Ammonia as N by Discrete Analyser	ES1224042-004	Anonymous	Ammonia as N	7664-41-7	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural S4	----	----	----	09-OCT-2012	08-OCT-2012	1

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.

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. _____
 2162406B

Results Expected By/On: 7 days
 Fax Results To: James Duggley
 Fax Number: 02 9272 5101
 Phone Number: 9272 5248
 Email Results to: jduggley@als.com.au
 Quotation Number: SY1394/09
 Invoice To: James Duggley Head Office, Sydney

Sample ID	Date sampled	Time	Medium *	Preservative Type	Filtered (x)	Containers	Analysis Required									
S4	2/10/12	11					<input checked="" type="checkbox"/> Cations (Na, K, Ca, Mg) <input checked="" type="checkbox"/> Anions (Alkalinity, SO4, Cl, reactive silica) <input checked="" type="checkbox"/> Dissolved Metals (Al, As, Ba, B, Be, Br, Cd, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, Sr, U, V, Zn) <input checked="" type="checkbox"/> Ammonia as N <input checked="" type="checkbox"/> Nitrate, nitrite <input checked="" type="checkbox"/> Flouride <input checked="" type="checkbox"/> Reactive Phosphorus as P <input checked="" type="checkbox"/> Total phosphorous as P <input checked="" type="checkbox"/> TOC <input checked="" type="checkbox"/> Gases C1-C4 + methane <input checked="" type="checkbox"/> BTEX/ TPH C6-C9 <input checked="" type="checkbox"/> TPH C10-C36 <input checked="" type="checkbox"/> PAH <input checked="" type="checkbox"/> Phenols <input checked="" type="checkbox"/> pH <input checked="" type="checkbox"/> EC <input checked="" type="checkbox"/> Total dissolved solids									

Sampled By	Company	Signature	Remarks
N/PH	PB		

Relinquished By: *Adm Searns* *N. Pearce*
 Date: 2/10/12
 Company: PB
 Time: _____
 Signature:

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

Received By (Name): *Searns*
 Date: 2/10/12
 Company: *ALS*
 Time: 14:30
 Signature: *Searns*

Environmental Division
 Sydney
 Work Order
ES1224045
 Telephone : + 61-2-8784 8555

PARSONS BRINCKERHOFF
 Parsons Brinckerhoff
 & Young Co
 241 George St
 SYDNEY NSW 2000
 Environmental and Geotechnical Services

Comments: _____

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

Appendix G

GNS stable isotope laboratory results



STABLE ISOTOPE RESULTS

Wendy McLean
Level 27, 680 George St

Sydney 2001
Australia



National Isotope Centre
30 Gracefield Road
Lower Hutt 5010
PO Box 31 312
Lower Hutt 5040
New Zealand
T +64-4-570 1444
F +64-4-570 4657
www.gns.cri.nz

Project Title		Invoice	Parsons Brinckerhoff
SIL Order No.:	W-1204085	Attn:	Wendy McLean
Client Ref.:			Level 27, 680 George St
Date Received:	9/07/2012		World Square, Sydney
Date Measured:			NSW 2001
Approved By:			Australia
Date Reported:	26/07/2012		

Sample Type: water (H & O)

SIL ID	External ID	δD Value	$\delta 18O$ Value	Analysis Type	Overseas or NZ	Country Code	Collection Date/Time (Start)	Other Info
W-1204085	TTMB03	-29.8	-4.91	D, O18	OS	AS	27/06/2012	Groundwater
W-1204086	TPPB	-26.3	-4.68	D, O18	OS	AS	16/06/2012	Groundwater
W-1204087	TTMB02	-26.1	-4.78	D, O18	OS	AS	18/06/2012	Groundwater
W-1204088	WKMB01	-22.5	-4.13	D, O18	OS	AS	17/06/2012	Groundwater
W-1204089	S4MB03	-29.0	-5.32	D, O18	OS	AS	13/06/2012	Groundwater
W-1204090	S4MB01	-28.2	-5.18	D, O18	OS	AS	19/06/2012	Groundwater
W-1204091	S5MB01	-25.0	-4.42	D, O18	OS	AS	14/06/2012	Groundwater
W-1204092	TTMB01	-27.9	-5.02	D, O18	OS	AS	19/06/2012	Groundwater
W-1204093	S4MB02	-30.6	-5.37	D, O18	OS	AS	13/06/2012	Groundwater
W-1204094	TCMB01	-29.8	-5.36	D, O18	OS	AS	14/06/2012	Groundwater

STABLE ISOTOPE RESULTS

Parsons Brinckerhoff
 Level 27, 680 George St
 World Square, Sydney
 NSW 2001
 Australia



National Isotope Centre
 30 Gracefield Road
 Lower Hutt 5010
 PO Box 31 312
 Lower Hutt 5040
 New Zealand
 T +64-4-570 1444
 F +64-4-570 4657
 www.gns.cri.nz

Project Title	2162406B	Invoice	Parsons Brinckerhoff
SIL Order No.:	W-1204557	Attn:	Nina Pearse-Hawkins
Client Ref.:			Level 27, 680 George St
Date Received:	25/10/2012		World Square, Sydney
Date Measured:			NSW 2001
Approved By:			Australia
Date Reported:	19/11/2012		
Sample Type:	water (H & O)		

SIL ID	External ID	δD Value	$\delta 18O$ Value	Analysis Type	Overseas or NZ	Country Code	Collection Date/Time (Start)	Other Info
W-1204557	S4MB03	-28.8	-5.39	D, O18	OS	AS	11/10/2012	groundwater
W-1204558	S5MB03	-23.1	-4.46	D, O18	OS	AS	11/10/2012	groundwater
W-1204559	S4MB02	-29.6	-5.31	D, O18	OS	AS	11/10/2012	groundwater
W-1204560	S4MB01	-29.5	-5.14	D, O18	OS	AS	11/10/2012	groundwater
W-1204561	S5MB01	-24.4	-4.47	D, O18	OS	AS	11/10/2012	groundwater
W-1204562	S5MB02	-24.5	-4.51	D, O18	OS	AS	11/10/2012	groundwater
W-1204563	TTMB03	-29.1	-4.96	D, O18	OS	AS	11/10/2012	groundwater
W-1204564	TTPB	-26.1	-4.80	D, O18	OS	AS	11/10/2012	groundwater
W-1204565	TCMB02	-27.2	-4.95	D, O18	OS	AS	11/10/2012	groundwater
W-1204566	TTMB01	-27.5	-5.06	D, O18	OS	AS	11/10/2012	groundwater
W-1204567	TTMB02	-25.3	-4.78	D, O18	OS	AS	11/10/2012	groundwater
W-1204568	TCMB04	-24.9	-4.71	D, O18	OS	AS	11/10/2012	groundwater
W-1204569	TCMB01	-28.3	-5.16	D, O18	OS	AS	11/10/2012	groundwater

STABLE ISOTOPE RESULTS

Parsons Brinckerhoff
Level 27, 680 George St
World Square, Sydney
NSW 2001
Australia



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Project Title
SIL Order No.: W-1204582
Client Ref.:
Date Received: 30/10/2012
Date Measured:
Approved By:
Date Reported: 19/11/2012
Sample Type: water (H & O)

Invoice
Attn: Parsons Brinckerhoff
Nina Pearse-Hawkins
Level 27, 680 George St
World Square, Sydney
NSW 2001
Australia

SIL ID	External ID	δD Value	$\delta 18O$ Value	Analysis Type	Overseas or NZ	Country Code	Collection Date/Time (Start)	Other Info
W-1204582	S4 8/10	-50.1	-7.64	D, O18	OS	AS	8/10/2012	groundwater
W-1204583	S4 26/9	-46.6	-6.92	D, O18	OS	AS	26/09/2012	groundwater

STABLE ISOTOPE RESULTS

Wendy McLean
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Project Title
SIL Order No.: W-1204150
Client Ref.:
Date Received: 24/07/2012
Date Measured:
Approved By:
Date Reported: 15/08/2012
Sample Type: water (H & O)

Invoice
Attn: Parsons Brinckerhoff
Wendy McLean
Level 27, 680 George St
World Square, Sydney
NSW 2001
Australia

SIL ID	External ID	δD Value	$\delta^{18}O$ Value	Analysis Type	Overseas or NZ	Country Code	Collection Date/Time (Start)	Other Info
W-1204150	TCMB02	-27.8	-5.09	D, O18	OS	AS	12/07/2012	groundwater
W-1204151	S5MB02	-25.3	-4.62	D, O18	OS	AS	11/07/2012	groundwater

STABLE ISOTOPE RESULTS

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Project Title
SIL Order No.: W-1204501
Client Ref.:
Date Received: 27/09/2012
Date Measured:
Approved By:
Date Reported: 24/10/2012
Sample Type: water (H & O)

Invoice
Attn: Parsons Brinckerhoff
Wendy McLean
Level 27, 680 George St
World Square, Sydney
NSW 2001
Australia

SIL ID	External ID	δD Value	$\delta 18O$ Value	Analysis Type	Overseas or NZ	Country Code	Collection Date/Time (Start)	Other Info
W-1204501	TCMB04	-27.7	-4.84	D, O18	OS	AS	21/08/2012	groundwater
W-1204502	WKMB02	-22.9	-4.27	D, O18	OS	AS	21/08/2012	groundwater
W-1204503	WKMB03	-30.2	-5.53	D, O18	OS	AS	21/08/2012	groundwater
W-1204504	S4	-42.4	-6.59	D, O18	OS	AS	17/09/2012	groundwater

Appendix H

Rafter radiocarbon laboratory results





Rafter Radiocarbon

NZA 50654

R 40031/1

Job No: 190802

Measured: 31/07/2012

TW No: 2776

Date issued: 24 Aug 2012

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

Sample ID S4MB01
Description Groundwater
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	8803	±	26	
$\delta^{13}\text{C}$ and Source of measurement	-19.8	±	0.1	C13
Fraction modern	0.3343	±	0.0011	
$\Delta^{14}\text{C}$ (‰) and collection date	-668.3	±	1.1	19 Jun 2012
Measurement Comment:				

Sample Treatment Details

Sample submitted fully capped in a plastic nalgene bottle and was colourless with sediment at the bottom. Sample loaded with 4 ml phosphoric acid for CO₂ evolution, carbonate content 75.8mg/kg C TDIC=6.31mmol/kgCO₂. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

NZA 50655

R 40031/2

Job No: 190803

Measured: 31/07/2012

TW No: 2776

Date issued: 24 Aug 2012

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

Sample ID	TTPB
Description	Groundwater
Fraction dated	Groundwater
Submitter	Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	38523	±	341	
$\delta^{13}\text{C}$ and Source of measurement	-18.9	±	0.1	C13
Fraction modern	0.0083	±	0.0004	
$\Delta^{14}\text{C}$ (‰) and collection date	-991.8	±	0.3	14 Jun 2012
Measurement Comment:				

Sample Treatment Details

Sample submitted fully capped in a plastic nalgene bottle consisting of colourless water with reddish brown sediment at the bottom. Sample was loaded with 4 ml phosphoric acid for water CO₂ evolution, carbonate content 110.0 mg/kg C TDIC=9.17mmol/kg. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

NZA 50656

R 40031/3

Job No: 190804

Measured: 31/07/2012

TW No: 2776

Date issued: 24 Aug 2012

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

Sample ID S4MB03
Description Groundwater
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	5399	±	21	
$\delta^{13}\text{C}$ and Source of measurement	-13.8	±	0.1	C13
Fraction modern	0.5106	±	0.0013	
$\Delta^{14}\text{C}$ (‰) and collection date	-493.2	±	1.3	21 Jun 2012
Measurement Comment:				

Sample Treatment Details

Sample submitted fully capped in a plastic nalgene bottle consisting of colourless water with some floating particulate matter. Sample was loaded with 4 ml phosphoric acid for water CO₂ evolution carbonate content 295.2mg/kg C TDIC= 24.6mmol/kg CO₂. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

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NZA 50657

R 40031/4

Job No: 190805

Measured: 31/07/2012

TW No: 2776

Date issued: 24 Aug 2012

Sample ID S5MB01
Description Groundwater
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	4461	±	19	
$\delta^{13}\text{C}$ and Source of measurement	-19.9	±	0.1	C13
Fraction modern	0.5739	±	0.0014	
$\Delta^{14}\text{C}$ (‰) and collection date	-430.4	±	1.4	14 Jun 2012
Measurement Comment:				

Sample Treatment Details

Sample submitted fully capped in a plastic nalgene bottle consisting of colourless water and only a little particulate matter. Sample loaded with 4 ml phosphoric acid for CO₂ evolution carbonate content 246.9mg/kg C TDIC= 20.58mmol/kgCO₂. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

NZA 50658

R 40031/5

Job No: 190806

Measured: 31/07/2012

TW No: 2776

Date issued: 24 Aug 2012

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

Sample ID S4MB02
Description Groundwater
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	16466	±	43	
$\delta^{13}\text{C}$ and Source of measurement	-19.2	±	0.1	C13
Fraction modern	0.1288	±	0.0007	
$\Delta^{14}\text{C}$ (‰) and collection date	-872.2	±	0.7	13 Jun 2012
Measurement Comment:				

Sample Treatment Details

Sample submitted fully capped in a plastic nalgene bottle, water clear with minimal particulate. Sample loaded with 4 ml phosphoric acid. CO₂ was generated by water CO₂ evolution carbonate content 40.53mg/kg C TDIC=3.38mmol/kg. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 50832

R 40031/6

Job No: 190807

Measured: 16/08/2012

TW No: 2781

Date issued: 24 Aug 2012

Sample ID WKMB01
Description Groundwater
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	3148	±	24	
$\delta^{13}\text{C}$ and Source of measurement	-15.6	±	0.1	C13
Fraction modern	0.6758	±	0.0020	
$\Delta^{14}\text{C}$ (‰) and collection date	-329.3	±	2.0	19 Jun 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in a nalgene bottle, was colourless with minimal brown particulate matter. Sample loaded with 4 ml phosphoric acid. CO₂ was generated by water CO₂ evolution 4.5 mg C was obtained. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 50833

R 40031/7

Job No: 190808

Measured: 16/08/2012

TW No: 2781

Date issued: 24 Aug 2012

Sample ID TCMB01
Description Groundwater
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	24113	±	53	
$\delta^{13}\text{C}$ and Source of measurement	-19.1	±	0.1	C13
Fraction modern	0.0497	±	0.0003	
$\Delta^{14}\text{C}$ (‰) and collection date	-950.7	±	0.3	14 Jun 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in a nalgene bottle, was colourless with some tan particulates. Sample was loaded with 4 ml of phosphoric acid. CO₂ was generated by water CO₂ evolution 1.5 mg C was obtained. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

NZA 50834

R 40031/8

Job No: 190809

Measured: 16/08/2012

TW No: 2781

Date issued: 24 Aug 2012

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

Sample ID TTMB03
Description Groundwater
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	24531	±	54	
$\delta^{13}\text{C}$ and Source of measurement	-11.9	±	0.1	C13
Fraction modern	0.0472	±	0.0003	
$\Delta^{14}\text{C}$ (‰) and collection date	-953.2	±	0.3	27 Jun 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in a nalgene bottle, was colourless with some sediment particles. Sample was loaded with 4 ml phosphoric acid. CO₂ was generated by water CO₂ evolution 1.8 mg C was obtained. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.

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Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 50835

R 40031/9

Job No: 190810

Measured: 16/08/2012

TW No: 2781

Date issued: 24 Aug 2012

Sample ID TTMB02
Description Groundwater
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	30354	±	78	
$\delta^{13}\text{C}$ and Source of measurement	-18.2	±	0.1	C13
Fraction modern	0.0229	±	0.0002	
$\Delta^{14}\text{C}$ (‰) and collection date	-977.3	±	0.2	18 Jun 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in a nalgene bottle and was colourless with some sediment particulates. Sample loaded with 4 ml phosphoric acid. CO₂ was generated by water CO₂ evolution 2.5 mg C was obtained. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

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NZA 50836

R 40031/10

Job No: 190811

Measured: 16/08/2012

TW No: 2781

Date issued: 24 Aug 2012

Sample ID TTMB01
Description Groundwater
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	37157	±	138	
$\delta^{13}\text{C}$ and Source of measurement	-22.7	±	0.1	C13
Fraction modern	0.0098	±	0.0002	
$\Delta^{14}\text{C}$ (‰) and collection date	-990.3	±	0.2	19 Jun 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in a nalgene bottle and was colourless with sediment at the bottom. Sample was loaded with 4 ml of phosphoric acid. CO₂ was generated by water CO₂ evolution 3.3 mg C was obtained. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

NZA 50996

R 40052/1

Job No: 191096

Measured: 7/09/2012

TW No: 2787

Date issued: 17 Sep 2012

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

Sample ID S5MB02
Description Groundwater
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	9295	±	27	
$\delta^{13}\text{C}$ and Source of measurement	-14.8	±	0.1	C13
Fraction modern	0.3144	±	0.0010	
$\Delta^{14}\text{C}$ (‰) and collection date	-688.0	±	1.0	11 Jul 2012
Measurement Comment:				

Sample Treatment Details

Sample submitted in a white plastic bottle with a small amount of grey ppt at the bottom. Loaded sample with 4 ml phosphoric acid. CO₂ was generated by water CO₂ evolution 9.1656 mg C was obtained. Carbonate content was 213.65 mgC per kgH₂O, and total dissolved inorganic carbon (TDIC) 1780 mmol/KgCO₂. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

NZA 50997

R 40052/2

Job No: 191097

Measured: 7/09/2012

TW No: 2787

Date issued: 17 Sep 2012

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

Sample ID TCMB02
Description Groundwater
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	19166	±	49	
$\delta^{13}\text{C}$ and Source of measurement	-12.9	±	0.1	C13
Fraction modern	0.0920	±	0.0006	
$\Delta^{14}\text{C}$ (‰) and collection date	-908.7	±	0.6	12 Jul 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in a white plastic bottle fully capped. Sample was clear was sediment at the bottom. Sample was loaded with 4 ml phosphoric acid. CO₂ was generated by water CO₂ evolution 0.9 mg C was obtained. Carbonate content was 54.64 mgC per kgH₂O, and total dissolved inorganic carbon (TDIC) 4.55 mmol/KgCO₂. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

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NZA 51702

R 40114/1

Job No: 192257

Measured: 12/11/2012

TW No: 2813

Date issued: 14 Nov 2012

Sample ID WKMB02
Description
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	8126	±	24	
$\delta^{13}\text{C}$ and Source of measurement	-16.0	±	0.2	C13
Fraction modern	0.3636	±	0.0011	
$\Delta^{14}\text{C}$ (‰) and collection date	-639.1	±	1.1	21 Aug 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: Semi-transparent plastic square bottle and some whitish precipitate with head space. Head space comment: big. Sample colour: colourless. Odour Description: no smell. CO₂ was generated by phosphoric acid evolution, and carbonate content was 64.3mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 5.4mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 51703

R 40114/3

Job No: 192259

Measured: 12/11/2012

TW No: 2813

Date issued: 14 Nov 2012

Sample ID TCMB04
Description
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	17041	±	48	
$\delta^{13}\text{C}$ and Source of measurement	-1.8	±	0.2	C13
Fraction modern	0.1199	±	0.0007	
$\Delta^{14}\text{C}$ (‰) and collection date	-881.0	±	0.7	21 Aug 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: Semi-transparent plastic square bottle and some whitish pale brownish precipitate with head space. Head space comment: big. Sample colour: colourless. Odour Description: no smell. CO₂ was generated by phosphoric acid evolution, and carbonate content was 40.3mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 3.4mmol/kgH₂O. Sample carbon dioxide was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 51704

R 40114/4

Job No: 192260

Measured: 12/11/2012

TW No: 2813

Date issued: 14 Nov 2012

Sample ID S4
Description
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	35287	±	304	
δ ¹³ C and Source of measurement	29.1	±	0.2	C13
Fraction modern	0.0124	±	0.0005	
Δ ¹⁴ C (‰) and collection date	-987.7	±	0.5	17 Sep 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: Semi-transparent plastic square bottle and abundant whitish brownish precipitate with head space. Head space comment: big. Sample colour: colourless. Odour Description: no smell. CO₂ was generated by phosphoric acid evolution, and carbonate content was 1054.9mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 87.9mmol/kgH₂O. Sample carbon dioxide was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and Δ¹⁴C are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and Δ¹⁴C is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to δ¹³C of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). δ¹³C was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 52010

R 40114/2

Job No: 192258

Measured: 5/12/2012

TW No: 2821

Date issued: 17 Dec 2012

Sample ID WKMB03
Description
Fraction dated Groundwater
Submitter Wendy McLean Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	19528	±	63	
$\delta^{13}\text{C}$ and Source of measurement	13.4	±	0.2	C13
Fraction modern	0.0880	±	0.0007	
$\Delta^{14}\text{C}$ (‰) and collection date	-912.7	±	0.7	21 Aug 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: Semi-transparent plastic square bottle and some pale dark brownish precipitate and with head space. Head space comment: large head space. Sample colour: slightly dirty looking. Odour Description: no smell. CO₂ was generated by phosphoric acid evolution, and carbonate content was 124mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 10.3mmol/kgH₂O. The low yield meant that insufficient CO₂ was obtained for further processing, and therefore the process was repeated and CO₂ from both was combined. Gas was recombusted with silver wire to remove possible sulphur contamination. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 52284

R 40133/11

Job No: 192895

Measured: 17/12/2012

TW No: 2828

Date issued: 21 Dec 2012

Sample ID TTMB02
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	26219	±	172	
$\delta^{13}\text{C}$ and Source of measurement	-17.2	±	0.2	C13
Fraction modern	0.0382	±	0.0008	
$\Delta^{14}\text{C}$ (‰) and collection date	-962.0	±	0.8	16 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: Water sample was submitted in a semi-transparent plastic bottle, a layer of brown precipitate at bottom and no head space. Sample colour: colourless. CO₂ was generated by phosphoric acid evolution, and carbonate content was 106.4mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 8.9mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 52264

R 40133/12

Job No: 192896

Measured: 17/12/2012

TW No: 2828

Date issued: 21 Dec 2012

Sample ID TCMB04
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	13722	±	43	
$\delta^{13}\text{C}$ and Source of measurement	-16.4	±	0.2	C13
Fraction modern	0.1812	±	0.0010	
$\Delta^{14}\text{C}$ (‰) and collection date	-820.2	±	1.0	16 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: Water sample was submitted in a semi-transparent plastic bottle with head space. Head space comment: empty head space. Sample colour: colourless. CO₂ was generated by phosphoric acid evolution, and carbonate content was 57.7mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 4.8mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 52280

R 40133/13

Job No: 192897

Measured: 17/12/2012

TW No: 2828

Date issued: 21 Dec 2012

Sample ID TCMB01
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	18145	±	67	
$\delta^{13}\text{C}$ and Source of measurement	-17.9	±	0.2	C13
Fraction modern	0.1045	±	0.0009	
$\Delta^{14}\text{C}$ (‰) and collection date	-896.3	±	0.9	16 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: Water sample was submitted in a semi-transparent plastic bottle, a layer of brown precipitate at bottom with no head space. Sample colour: colourless. CO₂ was generated by phosphoric acid evolution, and carbonate content was 79.7mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 6.6mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 52282

R 40133/15

Job No: 192899

Measured: 17/12/2012

TW No: 2828

Date issued: 21 Dec 2012

Sample ID S4 8/10
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	42622	±	1283	
$\delta^{13}\text{C}$ and Source of measurement	28.7	±	0.2	C13
Fraction modern	0.0050	±	0.0008	
$\Delta^{14}\text{C}$ (‰) and collection date	-995.1	±	0.8	8 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: Water sample was submitted in a semi-transparent plastic bottle, a layer of orange precipitate at bottom with head space. Head space comment: empty head space. Sample colour: colourless. CO₂ was generated by phosphoric acid evolution, and carbonate content was 77.5mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 6.5mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

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NZA 52269

R 40133/16

Job No: 192900

Measured: 17/12/2012

TW No: 2828

Date issued: 21 Dec 2012

Sample ID S4 26/9
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	37805	±	707	
$\delta^{13}\text{C}$ and Source of measurement	29.3	±	0.2	C13
Fraction modern	0.0090	±	0.0008	
$\Delta^{14}\text{C}$ (‰) and collection date	-991.0	±	0.8	26 Sep 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: Water sample was submitted in a semi-transparent plastic bottle, a layer of orange precipitate at bottom with head space. Head space comment: empty head space. Sample colour: colourless. CO₂ was generated by phosphoric acid evolution, and carbonate content was 1070mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 89.2mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

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NZA 52017

R 40133/1

Job No: 192885

Measured: 5/12/2012

TW No: 2821

Date issued: 18 Dec 2012

Sample ID S4MB03
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	27178	±	140	
$\delta^{13}\text{C}$ and Source of measurement	-15.0	±	0.2	C13
Fraction modern	0.0339	±	0.0006	
$\Delta^{14}\text{C}$ (‰) and collection date	-966.3	±	0.6	15 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: Water sample was submitted in a semi-transparent plastic bottle, with some black precipitate at bottom and no head space. Sample colour: colourless. CO₂ was generated by phosphoric acid evolution, and carbonate content was 72.8mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 6.1mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

NZA 52008

R 40133/2

Job No: 192886

Measured: 5/12/2012

TW No: 2821

Date issued: 18 Dec 2012

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

Sample ID S5MB03
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	5030	±	21	
$\delta^{13}\text{C}$ and Source of measurement	-12.7	±	0.2	C13
Fraction modern	0.5347	±	0.0014	
$\Delta^{14}\text{C}$ (‰) and collection date	-469.4	±	1.4	15 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: Water sample was submitted in a semi-transparent plastic bottle, with some black precipitate at bottom and with no head space. Sample colour: colourless. CO₂ was generated by phosphoric acid evolution, and carbonate content was 291.9mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 24.3mmol/kgH₂O. 1.0mgC was sent on for further processing. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.

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Rafter Radiocarbon

Accelerator Mass Spectrometry Result

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NZA 52155

R 40133/3

Job No: 192887

Measured: 12/12/2012

TW No: 2825

Date issued: 18 Dec 2012

Sample ID S4MB02
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	15834	±	46	
$\delta^{13}\text{C}$ and Source of measurement	-18.1	±	0.2	C13
Fraction modern	0.1393	±	0.0008	
$\Delta^{14}\text{C}$ (‰) and collection date	-861.7	±	0.8	15 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: a semi-transparent plastic bottle, with a lay of brown precipitate at bottom and no head space. Sample colour: colourless. CO₂ was generated by phosphoric acid evolution, and carbonate content was 43.2mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 3.6mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 52162

R 40133/4

Job No: 192888

Measured: 12/12/2012

TW No: 2825

Date issued: 18 Dec 2012

Sample ID S4MB01
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	6456	±	21	
$\delta^{13}\text{C}$ and Source of measurement	-18.7	±	0.2	C13
Fraction modern	0.4476	±	0.0012	
$\Delta^{14}\text{C}$ (‰) and collection date	-555.7	±	1.2	15 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: a semi-transparent plastic bottle, with a layer of brown precipitate at bottom and some head space. Head space comment: bottle neck is empty. Sample colour: colourless. CO₂ was generated by phosphoric acid evolution, and carbonate content was 86.5mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 7.2mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 52163

R 40133/5

Job No: 192889

Measured: 12/12/2012

TW No: 2825

Date issued: 18 Dec 2012

Sample ID S5MB01
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	2929	±	17	
$\delta^{13}\text{C}$ and Source of measurement	-18.2	±	0.2	C13
Fraction modern	0.6944	±	0.0015	
$\Delta^{14}\text{C}$ (‰) and collection date	-310.8	±	1.5	15 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: a semi-transparent plastic bottle, with a layer of brown precipitate at bottom. It has an old mud smell. No head space. Sample colour: colourless. CO₂ was generated by phosphoric acid evolution, and carbonate content was 378.5mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 31.5mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 52156

R 40133/6

Job No: 192890

Measured: 12/12/2012

TW No: 2825

Date issued: 18 Dec 2012

Sample ID S5MB02
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	9136	±	29	
$\delta^{13}\text{C}$ and Source of measurement	-15.3	±	0.2	C13
Fraction modern	0.3207	±	0.0012	
$\Delta^{14}\text{C}$ (‰) and collection date	-681.8	±	1.2	15 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: a semi-transparent plastic bottle, with a layer of black precipitate at bottom. No head space. Sample colour: colourless. CO₂ was generated by phosphoric acid evolution, and carbonate content was 215.9mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 18mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 52158

R 40133/7

Job No: 192891

Measured: 12/12/2012

TW No: 2825

Date issued: 18 Dec 2012

Sample ID TTMB03
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	21240	±	68	
$\delta^{13}\text{C}$ and Source of measurement	-14.6	±	0.2	C13
Fraction modern	0.0711	±	0.0006	
$\Delta^{14}\text{C}$ (‰) and collection date	-929.5	±	0.6	15 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: a semi-transparent plastic bottle, no precipitate; with head space. Head space comment: bottle neck is empty. Sample colour: colourless. CO₂ was generated by phosphoric acid evolution, and carbonate content was 76mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 6.3mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 52154

R 40133/8

Job No: 192892

Measured: 12/12/2012

TW No: 2825

Date issued: 18 Dec 2012

Sample ID TTPB
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	15971	±	47	
$\delta^{13}\text{C}$ and Source of measurement	-19.2	±	0.2	C13
Fraction modern	0.1369	±	0.0008	
$\Delta^{14}\text{C}$ (‰) and collection date	-864.1	±	0.8	16 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: a semi-transparent plastic bottle, a layer of brown precipitate at bottom with no head space. CO₂ was generated by phosphoric acid evolution, and carbonate content was 31.1mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 2.6mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 52160

R 40133/9

Job No: 192893

Measured: 12/12/2012

TW No: 2825

Date issued: 18 Dec 2012

Sample ID TCMB02
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	16357	±	46	
$\delta^{13}\text{C}$ and Source of measurement	-19.4	±	0.2	C13
Fraction modern	0.1305	±	0.0007	
$\Delta^{14}\text{C}$ (‰) and collection date	-870.5	±	0.7	16 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: a semi-transparent plastic bottle with head space. Head space comment: empty bottle neck. CO₂ was generated by phosphoric acid evolution, and carbonate content was 63.1mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 5.3mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.



Rafter Radiocarbon

Accelerator Mass Spectrometry Result

This result for the sample submitted is for the exclusive use of the submitter. All liability whatsoever to any third party is excluded.

NZA 52161

R 40133/10

Job No: 192894

Measured: 12/12/2012

TW No: 2825

Date issued: 18 Dec 2012

Sample ID TTMB01
Description
Fraction dated Water
Submitter Nina Pearse-Hawkins Parsons Brinckerhoff

Conventional Radiocarbon Age (years BP)	31933	±	212	
$\delta^{13}\text{C}$ and Source of measurement	-20.0	±	0.2	C13
Fraction modern	0.0188	±	0.0005	
$\Delta^{14}\text{C}$ (‰) and collection date	-981.4	±	0.5	16 Oct 2012
Measurement Comment:				

Sample Treatment Details

Sample was submitted in: a semi-transparent plastic bottle, a layer of brown precipitate at bottom with head space. Head space comment: empty bottle neck. CO₂ was generated by phosphoric acid evolution, and carbonate content was 113.7mgC/kgH₂O, total dissolved inorganic carbon (TDIC) 9.5mmol/kgH₂O. Sample was converted to graphite by reduction with hydrogen over iron catalyst.

Conventional Radiocarbon Age and $\Delta^{14}\text{C}$ are reported as defined by Stuiver and Polach, Radiocarbon 19:355-363 (1977) and $\Delta^{14}\text{C}$ is decay corrected to the collection date given, and not reported if no collection date was supplied. Fraction modern (F) is the blank corrected fraction modern normalized to $\delta^{13}\text{C}$ of -25 permil, defined by Donahue, D. J., T. Linick, and A. T. Jull, Radiocarbon, 32 (2):135-142 (1990). $\delta^{13}\text{C}$ was obtained from the source indicated. The reported errors comprise statistical errors in sample and standard determinations, combined in quadrature with a system error component based on the analysis of an ongoing series of measurements on an oxalic acid standard. Further details of pretreatment and analysis are available on request.

Appendix I

University of California, Davis: Isotopes of ^{13}C and ^2H in dissolved methane in groundwater - results



Isotopic analysis of $\delta^2\text{H}$ and $\delta^{13}\text{C}$ in dissolved methane in groundwater - University of California Davis

Client: AGL Upstream Investments Ltd

Project: Hydrogeological investigation of a strike slip fault, Northern Gloucester Basin

Location: Gloucester Basin, NSW



Laboratory:

Stable Isotope Facility
 Department of Plant Sciences
 Univ. of California-Davis
 One Shields Ave., MS 1
 3112 PES Bldg.
 Davis, CA 95616
 Tel: 530-754-7517
stableisotopefacility.ucdavis.edu

Sample	$\delta^2\text{H}_{\text{VSMOW}}$	Comments	Standards			Sample	$\delta^{13}\text{C}_{\text{VPDB}}$	Comments	Standards		
Received 7/9/12					Received 7/9/12						
S4MB03	-141.3	Below LOQ	CHECK STD	MEASURED	KNOWN	S4MB03	-44.5		CHECK STD	MEASURED	KNOWN
S4MB01	-139.8	Below LOQ	UCDM2	-146.9	-149.0	S4MB01	-48.4		12.38 ppm tan	-36.6	-36.8
TTMB03	389.9		UCDM2	-149.8	-149.0	TTMB03	-41.3		12.38 ppm tan	-37.2	-36.8
S4MB02	-133.7	Below LOQ	UCDM2	-148.7	-149.0	S4MB02	-46.8		12.38 ppm tan	-36.7	-36.8
TTMB01	-153.5	Below LOQ	UCDM2	-149.2	-149.0	TTMB01	-45.2		12.38 ppm tan	-37.2	-36.8
TTPB	-140.6	Below LOQ	UCDM2	-145.4	-149.0	TTPB	-49.0		12.38 ppm tan	-36.9	-36.8
S5MB01	-184.9		UCDM2	-148.2	-149.0	S5MB01	-39.6		12.38 ppm tan	-36.9	-36.8
TTMB02	-129.4	Below LOQ	UCDM2	-151.7	-149.0	TTMB02	-38.6	Below LOQ			
TCMB01	-121.9	Below LOQ	UCDM2	-148.3	-149.0	TCMB01	-46.0	Below LOQ			
Received 7/26/12					Received 7/26/12						
S5MB02	-55.0					S5MB02	-36.0				
TCMB02	-272.8					TCMB02	-50.3				

Sample	$\delta^2\text{H}_{\text{VSMOW}}$	Comments	Standards			Sample	$\delta^{13}\text{C}_{\text{VPDB}}$	Comments	Standards		
October Results											
S4MB03	-126.7	Below LOQ	CHECK STD	MEASURED	KNOWN	S4MB03	-14.05	1.09023	CHECK STD	MEASURED	KNOWN
S5MB03	-147.5	Below LOQ	UCDM2	-152.5	-149.0	S5MB03	-36.60	1.06556	CHECK STD	MEASURED	KNOWN
S4MB02	-172.9	Below LOQ	UCDM2	-150.1	-149.0	S4MB02	-36.81	1.06533			
S4MB01	-160.6	Below LOQ	UCDM2	-147.7	-149.0	S4MB01	-43.11	1.05844	L iso	-66.44	-66.5
S5MB01	-218.1		UCDM2	-149.3	-149.0	S5MB01	59.32	1.17042	H iso	-23.74	-23.9
S5MB02	-69.0	Below LOQ	UCDM2	-149.9	-149.0	S5MB02	-39.48	1.06241	B iso	-54.46	-54.5
TTMB03	-245.3		UCDM2	-150.8	-149.0	TTMB03	-33.55	1.06891	T iso	-38.56	-38.3
TTPB	-118.3	Below LOQ	UCDM2	-150.5	-149.0	TTPB	-38.81	1.06315			
TCMB02	-278.9		UCDM2	-149.7	-149.0	TCMB02	-47.10	1.05407			
TTMB01	-100.3	Below LOQ	UCDM2	-151.0	-149.0	TTMB01	-39.39	1.06252	CHECK STDS	MEASURED	KNOWN
TTMB02	-71.5	Below LOQ	UCDM2	-151.9	-149.0	TTMB02	-40.78	1.06100			
TCMB04	-223.7		UCDM2	-151.9	-149.0	TCMB04	-50.07	1.05083	UCDM1	-35.31	-35.7
TCMB01	-74.2	Below LOQ				TCMB01	-36.09	1.06613			
QA1	-138.4	Below LOQ				QA1	-47.08	1.05410			
S4 8_10	844.5	Below LOQ				S4 8/10	109.57	1.22526			
S4 26_9	1590.3	Below LOQ				S4 26/9	147.78	1.26692			

Client: AGL Upstream Investments Ltd
 Project: Gloucester Gas Project - fault investigation
 Location: Gloucester, NSW

Appendix J

ANSTO – Groundwater tritium laboratory results





Australian Government



Nuclear-based science benefiting all Australians

Institute for Environmental Research Analytical Report

Client: **Parsons Brinckerhoff**
GPO Box 5394
Sydney
NSW 2001

Contact: **Wendy McLean**
Tel: **(02) 9272-5234**

Report Number: **2012/0188**
Batch Description: **tritium in water**
Samples Received: **8**
Registration Date: **5-Jul-2012**
Report Date: **27-Aug-2012**
Logged By: **Kellie-Anne Farrawell**
ANSTO Cost Code: **0205V-1**
Funds Type: **Project - Commercial**
Supervising Analyst: **Robert Chisari**

Signature: _____

Robert Chisari

Date: 27/08/2012



Australian Government



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LIMS ID#	Client Identification	Sample Description
2012/0188-1	TTMB02	Groundwater
2012/0188-2	S5MB01	Groundwater
2012/0188-3	S4MB03	Groundwater
2012/0188-4	TTMB01	Groundwater
2012/0188-5	WKMB01	Groundwater
2012/0188-6	TCMB01	Groundwater
2012/0188-7	TTPB	Groundwater
2012/0188-8	S4MB02	Groundwater

Institute for Environmental Research
Analytical Report

Report Number: 2012/0188

Tritium Concentration at Sampling Date

Client Identification	Sample No.	Date Sample Collected	Tritium Ratio		Tritium Uncertainty ¹		Quant Limit ²		Tritium Activity		Uncertainty ¹		MDA ²	
			TU	TU	TU	TU	TU	TU	Bq/kg	Bq/kg	Bq/kg	Bq/kg		
TTMB02	1	18/06/2012	0.08 [^]	0.03	0.14	0.009 [^]	0.003	0.017	0.017					
S5MB01	2	14/06/2012	0.29	0.03	0.14	0.035	0.004	0.017	0.017					
S4MB03	3	13/06/2012	0.12 [^]	0.03	0.13	0.014 [^]	0.003	0.016	0.016					
TTMB01	4	19/06/2012	0.03 [^]	0.02	0.14	0.004 [^]	0.003	0.017	0.017					
WKMB01	5	14/06/2012	0.12 [^]	0.03	0.14	0.014 [^]	0.003	0.017	0.017					
TCMB01	6	14/06/2012	0.14	0.03	0.13	0.017	0.003	0.016	0.016					
TTPB	7	14/06/2012	0.25	0.03	0.17	0.030	0.004	0.020	0.020					
S4MB02	8	13/06/2012	0.05 [^]	0.03	0.14	0.006 [^]	0.003	0.017	0.017					

Notes:

1. Values reported are combined standard uncertainty, calculated to 1 sigma. A Coverage factor, k , of 2 may be used to calculate Expanded Uncertainty to 95% confidence.
 2. The MDA (Minimum Detectable Activity) and Quant Limit (Limit of Quantification) are calculated to 95% confidence.
- [^] This result is below the MDA/Quant Limit and therefore has an unacceptable level of uncertainty. Hence, the data should only be used as an indicator of the true concentration

Signature: _____ Date: 27/08/2012

Robert Chisari





Australian Government



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Institute for Environmental Research Analytical Report

Client: **Parsons Brinckerhoff
GPO Box 5394
Sydney
NSW 2001**

Contact: **Wendy McLean**
Tel: **(02) 9272-5234**

Report Number: **2012/0209**
Batch Description: **Tritium in groundwater**
Samples Received: **2**
Registration Date: **23-Jul-2012**
Report Date: **6-Sep-2012**
Logged By: **Kellie-Anne Farrawell**
ANSTO Cost Code: **0205V-33-2**
Funds Type: **Project - Commercial**
Supervising Analyst: **Robert Chisari**

Signature:  Date: 6/09/2012
Robert Chisari

Institute for Environmental Research
Analytical Report

Report Number: 2012/0188

LIMS ID#	Client Identification	Sample Description
2012/0209-1	TTMB02	Groundwater
2012/0209-2	S5MB02	Groundwater

Tritium Concentration at Sampling Date

Client Identification	Sample No.	Date Sample Collected	Tritium Ratio		Quant Limit ²		Tritium Activity		MDA ²
			TU	TU	TU	TU	Bq/kg	Bq/kg	
TTMB02	1	12/07/2012	0.06 [^]	0.02	0.13	0.007 [^]	0.003	0.016	
S5MB02	2	11/07/2012	0.09 [^]	0.02	0.13	0.011 [^]	0.003	0.016	

Notes:

1. Values reported are combined standard uncertainty, calculated to 1 sigma. A Coverage factor, k , of 2 may be used to calculate Expanded Uncertainty to 95% confidence.
 2. The MDA (Minimum Detectable Activity) and Quant Limit (Limit of Quantification) are calculated to 95% confidence.
- [^] This result is below the MDA/Quant Limit and therefore has an unacceptable level of uncertainty. Hence, the data should only be used as an indicator of the true concentration

Signature: 
Robert Chisari

Date: 6/09/2012



Australian Government



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Institute for Environmental Research Analytical Report

Client: **Parsons Brinckerhoff
GPO Box 5394
Sydney
NSW 2001**

Contact: **Wendy McLean/ Nina Pearse-Hawkins**
Tel: **(02) 9272-5234**

Report Number: **2012/0283a**
Batch Description: **Tritium activity in ground water**
Samples Received: **19**
Registration Date: **24-Sep-2012**
Report Date: **8-Jan-2013**
Logged By: **Robert Chisari**
ANSTO Cost Code: **0205v-1**
Funds Type: **Project - Commercial**
Supervising Analyst: **Robert Chisari**

Signature:  Date: 8/01/2013
Robert Chisari



Australian Government



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LIMS ID#	Client Identification	Sample Description
2012/0283-1	WKMB02	Groundwater
2012/0283-2	WKMB03	Groundwater
2012/0283-3	TCMB04	Groundwater
2012/0283-4	Strat4	Groundwater
2012/0283-5	S4	Groundwater
2012/0283-20	S4MB03	Groundwater
2012/0283-21	S5MB03	Groundwater
2012/0283-22	S4MB02	Groundwater
2012/0283-23	S4MB01	Groundwater
2012/0283-24	S5MB01	Groundwater
2012/0283-25	S5MB02	Groundwater
2012/0283-26	TTMB03	Groundwater
2012/0283-27	TTPB	Groundwater
2012/0283-28	TCMB02	Groundwater
2012/0283-29	TTMB01	Groundwater
2012/0283-30	TCMB04	Groundwater
2012/0283-31	S4	Groundwater
2012/0283-32	TTMB02	Groundwater
2012/0283-33	TCMB01	Groundwater

Institute for Environmental Research
Analytical Report

Report Number: 2012/0283a

Tritium Concentration at Sampling Date

Client Identification	Sample No.	Date Sample Collected	Tritium Ratio		Uncertainty ¹		Quant Limit ²		Tritium Activity		Uncertainty ¹		MDA ²	
			TU		TU		TU		Bq/kg		Bq/kg		Bq/kg	
WKMB02	1	21/08/2012	0.23		0.03		0.14		0.028		0.003		0.017	
WKMB03	2	21/08/2012	0.34		0.03		0.14		0.040		0.004		0.016	
TCMB04	3	21/08/2012	0.53		0.04		0.14		0.063		0.004		0.017	
Strat4	4	17/09/2012	0.37		0.03		0.14		0.044		0.004		0.016	
S4	5	26/09/2012	0.30		0.03		0.15		0.036		0.004		0.017	
S4MB03	20	15/10/2012	0.09 ^		0.03		0.14		0.010 ^		0.003		0.017	
S5MB03	21	15/10/2012	0.08 ^		0.03		0.15		0.009 ^		0.003		0.018	
S4MB02	22	15/10/2012	0.10 ^		0.03		0.16		0.012 ^		0.003		0.019	
S4MB01	23	15/10/2012	0.08 ^		0.03		0.15		0.010 ^		0.003		0.018	
S5MB01	24	15/10/2012	0.48		0.04		0.15		0.057		0.005		0.018	
S5MB02	25	15/10/2012	0.22		0.03		0.15		0.026		0.004		0.018	
TTMB03	26	15/10/2012	0.13 ^		0.03		0.16		0.016 ^		0.003		0.018	
TTPB	27	16/10/2012	0.03 ^		0.03		0.15		0.004 ^		0.003		0.018	
TCMB02	28	16/10/2012	0.08 ^		0.03		0.16		0.009 ^		0.003		0.019	
TTMB01	29	16/10/2012	0.06 ^		0.03		0.15		0.007 ^		0.003		0.018	
TCMB04	30	16/10/2012	0.14 ^		0.03		0.15		0.017 ^		0.003		0.018	
S4	31	16/10/2012	0.24		0.03		0.16		0.029		0.004		0.019	
TTMB02	32	16/10/2012	0.07 ^		0.03		0.16		0.008 ^		0.003		0.019	
TCMB01	33	8/10/2012	0.09 ^		0.03		0.16		0.011 ^		0.003		0.019	

Continued...