

APPENDIX C

Groundwater Quality

C1	Groundwater Quality Table
C2	Laboratory Results



CERTIFICATE OF ANALYSIS

Work Order : EP1403083
Client : NORTHERN MINERALS
Contact : ROBIN JONES
Address : Level 1, 675 Murray Street West Perth 6005
E-mail : rjones@northernminerals.com.au
Telephone : 08 9481 2344
Facsimile : ----
Project : BROWNS RANGE
Order number : NML00787
C-O-C number : ----
Sampler : J.F.
Site : ----
Quote number : EP/440/14
Page : 1 of 6
Laboratory : Environmental Division Perth
Contact : Scott James
Address : 10 Hod Way Malaga WA Australia 6090
E-mail : perth.enviro.services@alsglobal.com
Telephone : +61-8-9209 7655
Facsimile : +61-8-9209 7600
QC Level : NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Date Samples Received : 29-APR-2014
Issue Date : 06-MAY-2014
No. of samples received : 7
No. of samples analysed : 6

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

This Certificate of Analysis contains the following information:

- General Comments
Analytical Results



NATA Accredited Laboratory 825

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.

Table with 3 columns: Signatories, Position, Accreditation Category. Rows include Canhuang Ke (Metals Instrument Chemist, Perth Inorganics), Chas Tucker (Senior Inorganic Chemist, Perth Inorganics), Efua Wilson (Metals Chemist, Perth Inorganics), and Shobhna Chandra (Metals 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.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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: Metals LOR for particular sample(s) raised due to high TDS content.**
- **EK071G (Reactive Phosphorus): LOR raised due to possible sample matrix interference.**



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRWWD002	BRGWD003	BRAWD008	BRRWS007M	BRRWS002M
				17-APR-2014 12:55	20-APR-2014 12:50	19-APR-2014 14:30	18-APR-2014 14:10	18-APR-2014 11:30
Compound	CAS Number	LOR	Unit	EP1403083-001	EP1403083-002	EP1403083-003	EP1403083-004	EP1403083-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.59	6.84	7.29	6.63	7.82
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	220	208	1930	99	2030
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	141	125	1110	60	1210
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	42	40	462	34	280
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	45	44	316	40	590
Total Alkalinity as CaCO3	----	1	mg/L	45	44	316	40	590
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	14	18	142	2	123
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	29	25	388	8	272
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	7	8	53	7	23
Magnesium	7439-95-4	1	mg/L	6	5	80	4	54
Sodium	7440-23-5	1	mg/L	27	25	251	6	377
Potassium	7440-09-7	1	mg/L	8	7	36	4	41
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.01	<0.01	<0.01	0.04
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<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	0.074	0.042	0.075	0.107	0.070
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.004	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.001	<0.001	0.003	<0.001
Copper	7440-50-8	0.001	mg/L	0.004	0.002	0.002	0.003	<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	0.142	0.248	0.108	0.590	0.277
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.003



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRWWD002	BRGWD003	BRAWD008	BRRWS007M	BRRWS002M
				17-APR-2014 12:55	20-APR-2014 12:50	19-APR-2014 14:30	18-APR-2014 14:10	18-APR-2014 11:30
Compound	CAS Number	LOR	Unit	EP1403083-001	EP1403083-002	EP1403083-003	EP1403083-004	EP1403083-005
EG020F: Dissolved Metals by ICP-MS - Continued								
Nickel	7440-02-0	0.001	mg/L	0.002	0.003	<0.001	0.011	<0.001
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.057	<0.001	0.008
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	4.38	6.21	0.010	2.65	<0.005
Boron	7440-42-8	0.05	mg/L	0.11	0.08	0.50	0.06	1.01
Iron	7439-89-6	0.05	mg/L	0.55	1.30	<0.05	<0.05	0.11
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00004	<0.00004	<0.00004	<0.00004	<0.00004
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS								
Selenium	7782-49-2	0.2	µg/L	0.4	<0.2	2.6	<0.2	<0.2
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.3	0.2	0.8	<0.1	1.1
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.42	0.01	2.69	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.1	0.2	0.4	0.2	<0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
Total Nitrogen as N	----	0.1	mg/L	0.5	0.2	3.1	0.2	<0.1
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.02	<0.01	0.02
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	2.01	1.96	20.2	1.07	22.0
Total Cations	----	0.01	meq/L	2.22	2.08	21.1	1.04	23.0
Ionic Balance	----	0.01	%	----	----	2.05	----	2.22



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

				BRR0036M	---	---	---	---
				19-APR-2014 10:20	---	---	---	---
Compound	CAS Number	LOR	Unit	EP1403083-006	---	---	---	---
EA005P: pH by PC Titrator								
pH Value	---	0.01	pH Unit	7.12	---	---	---	---
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	---	1	µS/cm	30700	---	---	---	---
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	---	10	mg/L	21900	---	---	---	---
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	---	1	mg/L	8520	---	---	---	---
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	258	---	---	---	---
Total Alkalinity as CaCO3	---	1	mg/L	258	---	---	---	---
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2820	---	---	---	---
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	11200	---	---	---	---
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	676	---	---	---	---
Magnesium	7439-95-4	1	mg/L	1660	---	---	---	---
Sodium	7440-23-5	1	mg/L	3820	---	---	---	---
Potassium	7440-09-7	1	mg/L	330	---	---	---	---
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.17	---	---	---	---
Arsenic	7440-38-2	0.001	mg/L	<0.005	---	---	---	---
Beryllium	7440-41-7	0.001	mg/L	<0.005	---	---	---	---
Barium	7440-39-3	0.001	mg/L	0.039	---	---	---	---
Cadmium	7440-43-9	0.0001	mg/L	<0.0005	---	---	---	---
Chromium	7440-47-3	0.001	mg/L	<0.005	---	---	---	---
Cobalt	7440-48-4	0.001	mg/L	<0.005	---	---	---	---
Copper	7440-50-8	0.001	mg/L	0.011	---	---	---	---
Lead	7439-92-1	0.001	mg/L	<0.005	---	---	---	---
Manganese	7439-96-5	0.001	mg/L	0.486	---	---	---	---
Molybdenum	7439-98-7	0.001	mg/L	<0.005	---	---	---	---



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

BRR0036M

Client sampling date / time

19-APR-2014 10:20

Compound	CAS Number	LOR	Unit	EP1403083-006	---	---	---	---
EG020F: Dissolved Metals by ICP-MS - Continued								
Nickel	7440-02-0	0.001	mg/L	<0.005	---	---	---	---
Thorium	7440-29-1	0.001	mg/L	<0.005	---	---	---	---
Tin	7440-31-5	0.001	mg/L	<0.005	---	---	---	---
Uranium	7440-61-1	0.001	mg/L	0.033	---	---	---	---
Vanadium	7440-62-2	0.01	mg/L	<0.05	---	---	---	---
Zinc	7440-66-6	0.005	mg/L	0.032	---	---	---	---
Boron	7440-42-8	0.05	mg/L	1.51	---	---	---	---
Iron	7439-89-6	0.05	mg/L	<0.25	---	---	---	---
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.00004	mg/L	<0.00004	---	---	---	---
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS								
Selenium	7782-49-2	2	µg/L	11	---	---	---	---
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.6	---	---	---	---
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.84	---	---	---	---
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	---	---	---	---
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
Total Nitrogen as N	----	0.1	mg/L	1.1	---	---	---	---
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.06	---	---	---	---
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.05	---	---	---	---
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	380	---	---	---	---
Total Cations	----	0.01	meq/L	345	---	---	---	---
Ionic Balance	----	0.01	%	4.81	---	---	---	---

CERTIFICATE OF ANALYSIS

Work Order	: EP1308322	Page	: 1 of 18
Client	: KLOHN CRIPPEN CONSULTANTS LTD	Laboratory	: Environmental Division Perth
Contact	: MR PIETER BOSHOFF	Contact	: Scott James
Address	: 506 HAY STREET SUBIACO WESTERN AUSTRALIA, AUSTRALIA 6904	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: pboshoff@klohn.com	E-mail	: perth.enviro.services@alsglobal.com
Telephone	: +61 08 9285 3200	Telephone	: +61-8-9209 7655
Facsimile	: +61 08 9285 3299	Facsimile	: +61-8-9209 7600
Project	: M09812A03 NTU Brown Range Stg 2	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: M2013PO-241	Date Samples Received	: 01-NOV-2013
C-O-C number	: ----	Issue Date	: 11-NOV-2013
Sampler	: K.V.	No. of samples received	: 15
Site	: ----	No. of samples analysed	: 15
Quote number	: EP/916/13 V2		

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



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: It is recognised that total concentration is less than dissolved for some metal analytes. However, the difference is within experimental variation of the methods**
- **EG020: Metals LOR for particular sample(s) raised due to high TDS content**
- **EP071(TRH): Samples "EP1308322-006, 010 & 012" detected positive. GC-MS confirmed "benzenedicarboxylic acid" with 91% library match.**
- **EP075(SIM): Poor surrogate recovery on sample "BRR010" is due to matrix effects. Confirmed by re-analysis.**



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>
Agnes Szilagyi	Senior Organic Chemist	Perth Organics
Benjamin Nicholson	Metals Chemist	Perth Inorganics
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics
Chas Tucker	Senior Inorganic Chemist	Perth Inorganics
Efua Wilson	Metals Chemist	Perth Inorganics



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

				BRRWS001	BRGWD007	BRAR0030	BRR130	BRR0036M
				24-OCT-2013 15:00	24-OCT-2013 15:00	27-OCT-2013 15:00	23-OCT-2013 15:00	24-OCT-2013 15:00
				EP1308322-001	EP1308322-002	EP1308322-003	EP1308322-004	EP1308322-005
Compound	CAS Number	LOR	Unit					
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.93	7.66	7.35	7.10	7.14
EA006: Sodium Adsorption Ratio (SAR)								
Sodium Adsorption Ratio	----	0.01	-	2.20	6.08	4.12	5.53	20.3
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	508	2030	1480	1140	32800
EA016: Non Marine - Estimated TDS Salinity								
Total Dissolved Solids (Calc.)	----	1	mg/L	330	1320	962	741	21300
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	98	364	334	164	9560
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	21	340	332	173	264
Total Alkalinity as CaCO3	----	1	mg/L	21	340	332	173	264
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	29	142	110	89	3180
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	130	409	237	220	12300
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	8	42	38	23	712
Magnesium	7439-95-4	1	mg/L	19	63	58	26	1890
Sodium	7440-23-5	1	mg/L	50	267	173	163	4560
Potassium	7440-09-7	1	mg/L	8	50	27	20	366
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.05
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.005
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.005
Boron	7440-42-8	0.05	mg/L	0.08	0.53	0.51	0.34	1.49
Barium	7440-39-3	0.001	mg/L	0.077	0.050	0.053	0.084	0.040
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.005
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005
Cobalt	7440-48-4	0.001	mg/L	0.001	<0.001	<0.001	<0.001	<0.005
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.005	<0.001	<0.005



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRRWS001	BRGWD007	BRAR0030	BRR130	BRR0036M
				24-OCT-2013 15:00	24-OCT-2013 15:00	27-OCT-2013 15:00	23-OCT-2013 15:00	24-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EP1308322-001	EP1308322-002	EP1308322-003	EP1308322-004	EP1308322-005
EG020F: Dissolved Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.003	<0.001	0.009
Manganese	7439-96-5	0.001	mg/L	0.043	0.082	0.008	0.001	0.140
Nickel	7440-02-0	0.001	mg/L	0.002	0.003	0.001	0.002	<0.005
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.005
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.05
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.05
Zinc	7440-66-6	0.005	mg/L	0.018	0.045	0.010	0.010	0.028
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.010	<0.001	<0.001	<0.005
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.005
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.005
Uranium	7440-61-1	0.001	mg/L	<0.001	0.017	0.044	<0.001	0.032
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.25
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.18	1.03	0.72	<0.01	<0.05
Antimony	7440-36-0	0.001	mg/L	<0.001	0.001	<0.001	<0.001	<0.005
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.001	<0.001	<0.005
Boron	7440-42-8	0.05	mg/L	0.08	0.52	0.48	0.33	1.46
Barium	7440-39-3	0.001	mg/L	0.079	0.070	0.056	0.084	0.038
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.005
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005
Cobalt	7440-48-4	0.001	mg/L	0.001	0.001	0.002	<0.001	<0.005
Chromium	7440-47-3	0.001	mg/L	<0.001	0.005	0.006	<0.001	<0.005
Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.013	0.002	0.009
Manganese	7439-96-5	0.001	mg/L	0.043	0.084	0.015	0.001	0.140
Nickel	7440-02-0	0.001	mg/L	0.002	0.004	0.002	0.002	<0.005
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.005
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.05
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.05
Zinc	7440-66-6	0.005	mg/L	0.011	0.084	0.009	<0.005	<0.025
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.013	<0.001	<0.001	<0.005
Thorium	7440-29-1	0.001	mg/L	<0.001	0.002	0.002	0.007	<0.005
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.005
Uranium	7440-61-1	0.001	mg/L	<0.001	0.026	0.064	0.002	0.050
Iron	7439-89-6	0.05	mg/L	0.31	0.74	0.30	<0.05	<0.25



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRRWS001	BRGWD007	BRAR0030	BRR130	BRR0036M
				24-OCT-2013 15:00	24-OCT-2013 15:00	27-OCT-2013 15:00	23-OCT-2013 15:00	24-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EP1308322-001	EP1308322-002	EP1308322-003	EP1308322-004	EP1308322-005
EG020T: Total Metals by ICP-MS - Continued								
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.1	1.2	0.7	0.6	0.5
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.01	0.01	0.02	0.10
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	1.47	1.18	2.23	1.62	0.76
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	1.47	1.19	2.23	1.62	0.76
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.4	0.2	<0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
Total Nitrogen as N	----	0.1	mg/L	1.7	1.4	2.6	1.8	0.8
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	0.03	0.07	0.05	0.02
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.04	0.04	<0.02
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	4.69	21.3	15.6	11.5	418
Total Cations	----	0.01	meq/L	4.34	20.2	14.9	10.9	399
Ionic Balance	----	0.01	%	3.86	2.70	2.39	2.81	2.41
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	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

				BRRWS001	BRGWD007	BRAR0030	BRR130	BRR0036M
				24-OCT-2013 15:00	24-OCT-2013 15:00	27-OCT-2013 15:00	23-OCT-2013 15:00	24-OCT-2013 15:00
				EP1308322-001	EP1308322-002	EP1308322-003	EP1308322-004	EP1308322-005
Compound	CAS Number	LOR	Unit					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
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 (zero)	----	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 2013								
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	----	<20	----	----
>C10 - C16 Fraction	>C10_C16	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	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	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	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRRWS001	BRGWD007	BRAR0030	BRR130	BRR0036M
				24-OCT-2013 15:00	24-OCT-2013 15:00	27-OCT-2013 15:00	23-OCT-2013 15:00	24-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EP1308322-001	EP1308322-002	EP1308322-003	EP1308322-004	EP1308322-005
EP080: BTEXN - Continued								
^ 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	%	----	----	24.7	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	----	----	57.0	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	----	----	54.5	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	----	----	52.8	----	----
Anthracene-d10	1719-06-8	0.1	%	----	----	64.0	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	----	----	61.3	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	----	----	88.1	----	----
Toluene-D8	2037-26-5	0.1	%	----	----	102	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	----	----	89.8	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRGR0016	BRGGWD003	BRR0030	Old Camp Bore	BRR004
				28-OCT-2013 15:00	25-OCT-2013 15:00	23-OCT-2013 15:00	23-OCT-2013 15:00	27-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EP1308322-006	EP1308322-007	EP1308322-008	EP1308322-009	EP1308322-010
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.49	6.57	7.21	7.66	8.17
EA006: Sodium Adsorption Ratio (SAR)								
Sodium Adsorption Ratio	----	0.01	-	2.83	2.23	5.56	3.63	7.97
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	274	271	1140	1410	4970
EA016: Non Marine - Estimated TDS Salinity								
Total Dissolved Solids (Calc.)	----	1	mg/L	178	176	741	916	3230
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	30	39	164	354	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	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	45	38	173	378	492
Total Alkalinity as CaCO3	----	1	mg/L	45	38	173	378	492
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	18	21	89	79	362
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	48	51	221	203	1240
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	4	4	23	43	143
Magnesium	7439-95-4	1	mg/L	5	7	26	60	209
Sodium	7440-23-5	1	mg/L	36	32	164	157	639
Potassium	7440-09-7	1	mg/L	15	13	20	35	114
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.01	<0.01	<0.01	<0.01	<0.01
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L	0.001	0.006	<0.001	<0.001	0.002
Boron	7440-42-8	0.05	mg/L	0.14	0.12	0.35	0.54	1.18
Barium	7440-39-3	0.001	mg/L	0.114	0.132	0.083	0.031	0.084
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
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	0.002
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	0.002	<0.001



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRGR0016	BRGGWD003	BRR0030	Old Camp Bore	BRR004
				28-OCT-2013 15:00	25-OCT-2013 15:00	23-OCT-2013 15:00	23-OCT-2013 15:00	27-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EP1308322-006	EP1308322-007	EP1308322-008	EP1308322-009	EP1308322-010
EG020F: Dissolved Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	0.002	<0.001	<0.001	0.002	0.001
Manganese	7439-96-5	0.001	mg/L	0.003	0.029	<0.001	0.023	0.068
Nickel	7440-02-0	0.001	mg/L	<0.001	0.002	0.002	<0.001	0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
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	0.014	0.015	0.006	0.012	0.009
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.001
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	0.003	0.034
Iron	7439-89-6	0.05	mg/L	<0.05	0.20	<0.05	<0.05	0.12
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	0.87	1.36	<0.01	<0.01	1.88
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.001
Arsenic	7440-38-2	0.001	mg/L	0.001	0.007	<0.001	<0.001	0.003
Boron	7440-42-8	0.05	mg/L	0.15	0.11	0.32	0.51	1.17
Barium	7440-39-3	0.001	mg/L	0.144	0.157	0.084	0.032	0.118
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
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	0.003
Chromium	7440-47-3	0.001	mg/L	<0.001	0.003	<0.001	0.003	0.006
Copper	7440-50-8	0.001	mg/L	0.004	0.002	<0.001	0.002	0.012
Manganese	7439-96-5	0.001	mg/L	0.004	0.031	0.001	0.022	0.079
Nickel	7440-02-0	0.001	mg/L	0.001	0.003	0.002	<0.001	0.003
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.002
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
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	0.008	0.015	<0.005	0.005	0.018
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.001	<0.001	<0.001	0.002
Thorium	7440-29-1	0.001	mg/L	0.002	0.004	0.001	<0.001	0.009
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.001	0.005	0.047
Iron	7439-89-6	0.05	mg/L	0.36	0.86	<0.05	<0.05	4.53



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRGR0016	BRGGWD003	BRR0030	Old Camp Bore	BRR004
				28-OCT-2013 15:00	25-OCT-2013 15:00	23-OCT-2013 15:00	23-OCT-2013 15:00	27-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EP1308322-006	EP1308322-007	EP1308322-008	EP1308322-009	EP1308322-010
EG020T: Total Metals by ICP-MS - Continued								
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.4	0.3	0.6	0.9	1.2
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.06	<0.01	0.07	0.16
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	0.97	0.26	1.62	0.92	2.41
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.97	0.26	1.62	0.92	2.41
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	0.2	0.3	0.2	0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
Total Nitrogen as N	----	0.1	mg/L	1.0	0.5	1.9	1.1	2.9
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.01	0.06	0.05	0.02	0.08
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.04	0.01	0.03
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	2.63	2.64	11.5	14.9	52.4
Total Cations	----	0.01	meq/L	2.56	2.50	10.9	14.8	55.0
Ionic Balance	----	0.01	%	----	----	2.74	0.40	2.51
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



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRGR0016	BRGGWD003	BRR0030	Old Camp Bore	BRR004
				28-OCT-2013 15:00	25-OCT-2013 15:00	23-OCT-2013 15:00	23-OCT-2013 15:00	27-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EP1308322-006	EP1308322-007	EP1308322-008	EP1308322-009	EP1308322-010
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
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 (zero)	----	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	70	----	----	----	<50
C15 - C28 Fraction	----	100	µg/L	620	----	----	----	600
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	490
^ C10 - C36 Fraction (sum)	----	50	µg/L	690	----	----	----	1090
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	<20
>C10 - C16 Fraction	>C10_C16	100	µg/L	<100	----	----	----	<100
>C16 - C34 Fraction	----	100	µg/L	600	----	----	----	1020
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	150
^ >C10 - C40 Fraction (sum)	----	100	µg/L	600	----	----	----	1170
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	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



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRGR0016	BRGGWD003	BRR0030	Old Camp Bore	BRR004
				28-OCT-2013 15:00	25-OCT-2013 15:00	23-OCT-2013 15:00	23-OCT-2013 15:00	27-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EP1308322-006	EP1308322-007	EP1308322-008	EP1308322-009	EP1308322-010
EP080: BTEXN - Continued								
^ 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	%	32.9	----	----	----	27.1
2-Chlorophenol-D4	93951-73-6	0.1	%	62.8	----	----	----	55.6
2,4,6-Tribromophenol	118-79-6	0.1	%	76.8	----	----	----	78.8
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	72.3	----	----	----	79.2
Anthracene-d10	1719-06-8	0.1	%	74.3	----	----	----	75.2
4-Terphenyl-d14	1718-51-0	0.1	%	72.3	----	----	----	77.2
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	93.0	----	----	----	94.5
Toluene-D8	2037-26-5	0.1	%	106	----	----	----	99.1
4-Bromofluorobenzene	460-00-4	0.1	%	91.4	----	----	----	94.9



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRWWD002	BRR010	BRRWS0037	BRRWS007M	BRRWS008
				26-OCT-2013 15:00	28-OCT-2013 15:00	24-OCT-2013 15:00	29-OCT-2013 15:00	27-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EP1308322-011	EP1308322-012	EP1308322-013	EP1308322-014	EP1308322-015
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.44	7.22	7.25	6.19	7.33
EA006: Sodium Adsorption Ratio (SAR)								
Sodium Adsorption Ratio	----	0.01	-	2.19	3.83	20.5	1.32	5.02
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	280	1270	33200	161	2970
EA016: Non Marine - Estimated TDS Salinity								
Total Dissolved Solids (Calc.)	----	1	mg/L	182	826	21600	105	1930
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	45	260	9720	31	811
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	46	333	264	24	488
Total Alkalinity as CaCO3	----	1	mg/L	46	333	264	24	488
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	15	23	3050	14	180
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	54	194	11800	29	614
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	5	38	725	6	99
Magnesium	7439-95-4	1	mg/L	8	40	1920	4	137
Sodium	7440-23-5	1	mg/L	34	142	4640	17	329
Potassium	7440-09-7	1	mg/L	12	54	374	5	49
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	0.01	<0.05	<0.01	<0.01
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.005	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.005	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	0.17	0.59	1.50	0.08	0.62
Barium	7440-39-3	0.001	mg/L	0.172	0.536	0.044	0.008	0.085
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.005	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.002	<0.005	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.005	<0.001	<0.001



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRWWD002	BRR010	BRRWS0037	BRRWS007M	BRRWS008
				26-OCT-2013 15:00	28-OCT-2013 15:00	24-OCT-2013 15:00	29-OCT-2013 15:00	27-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EP1308322-011	EP1308322-012	EP1308322-013	EP1308322-014	EP1308322-015
EG020F: Dissolved Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	0.001	0.006	0.010	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L	0.003	0.027	0.141	0.017	0.442
Nickel	7440-02-0	0.001	mg/L	<0.001	0.002	<0.005	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.005	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.05	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L	<0.01	0.01	<0.05	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	0.006	0.015	0.027	0.005	<0.005
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.002	<0.005	<0.001	<0.001
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.005	<0.001	<0.001
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.005	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	0.001	0.002	0.032	<0.001	0.016
Iron	7439-89-6	0.05	mg/L	<0.05	0.06	<0.25	1.83	1.40
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	1.14	3.97	<0.05	<0.01	0.51
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.005	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.005	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	0.17	0.53	1.48	0.08	0.58
Barium	7440-39-3	0.001	mg/L	0.184	0.581	0.042	0.008	0.091
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.005	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.003	<0.005	<0.001	0.003
Chromium	7440-47-3	0.001	mg/L	<0.001	0.012	<0.005	<0.001	0.005
Copper	7440-50-8	0.001	mg/L	0.002	0.016	0.009	<0.001	0.003
Manganese	7439-96-5	0.001	mg/L	0.003	0.038	0.141	0.017	0.436
Nickel	7440-02-0	0.001	mg/L	<0.001	0.006	<0.005	<0.001	0.005
Lead	7439-92-1	0.001	mg/L	<0.001	0.004	<0.005	<0.001	0.002
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.05	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L	<0.01	0.02	<0.05	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	<0.005	0.021	<0.025	<0.005	0.049
Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.002	<0.005	<0.001	0.003
Thorium	7440-29-1	0.001	mg/L	0.002	0.018	<0.005	<0.001	0.001
Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	<0.005	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	0.001	0.004	0.052	<0.001	0.034
Iron	7439-89-6	0.05	mg/L	0.14	2.52	<0.25	1.90	3.71



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRWWD002	BRR010	BRRWS0037	BRRWS007M	BRRWS008
				26-OCT-2013 15:00	28-OCT-2013 15:00	24-OCT-2013 15:00	29-OCT-2013 15:00	27-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EP1308322-011	EP1308322-012	EP1308322-013	EP1308322-014	EP1308322-015
EG020T: Total Metals by ICP-MS - Continued								
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	0.4	1.0	0.5	0.1	1.0
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.07	0.11	0.01	0.01
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	0.70	4.80	0.78	<0.01	0.22
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.70	4.80	0.78	<0.01	0.22
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	1.1	0.2	<0.1	<0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
Total Nitrogen as N	----	0.1	mg/L	0.7	5.9	1.0	<0.1	<0.5
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	0.03	0.02	<0.01	<0.05
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.01	<0.02	<0.01	<0.01
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	2.75	12.6	402	1.59	30.8
Total Cations	----	0.01	meq/L	2.69	12.8	406	1.50	31.8
Ionic Balance	----	0.01	%	----	0.55	0.48	----	1.53
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	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRWWD002	BRR010	BRRWS0037	BRRWS007M	BRRWS008
				26-OCT-2013 15:00	28-OCT-2013 15:00	24-OCT-2013 15:00	29-OCT-2013 15:00	27-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EP1308322-011	EP1308322-012	EP1308322-013	EP1308322-014	EP1308322-015
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
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 (zero)	----	0.5	µg/L	----	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	----	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	----	60	----	----	----
C15 - C28 Fraction	----	100	µg/L	----	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	----	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	----	60	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013								
C6 - C10 Fraction	C6_C10	20	µg/L	----	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	<20	----	----	----
>C10 - C16 Fraction	>C10_C16	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	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	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	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

Client sample ID

Client sampling date / time

				BRWWD002	BRR010	BRRWS0037	BRRWS007M	BRRWS008
				26-OCT-2013 15:00	28-OCT-2013 15:00	24-OCT-2013 15:00	29-OCT-2013 15:00	27-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EP1308322-011	EP1308322-012	EP1308322-013	EP1308322-014	EP1308322-015
EP080: BTEXN - Continued								
^ 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	%	----	13.1	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	----	45.6	----	----	----
2,4,6-Tribromophenol	118-79-6	0.1	%	----	51.2	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	----	59.0	----	----	----
Anthracene-d10	1719-06-8	0.1	%	----	29.3	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	----	54.8	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	----	121	----	----	----
Toluene-D8	2037-26-5	0.1	%	----	125	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	----	77.2	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM): Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	67.2
2-Chlorophenol-D4	93951-73-6	29.4	119.5
2.4.6-Tribromophenol	118-79-6	10.0	130.8
EP075(SIM): PAH Surrogates			
2-Fluorobiphenyl	321-60-8	33.8	130.7
Anthracene-d10	1719-06-8	42.7	126.5
4-Terphenyl-d14	1718-51-0	40.5	142.4
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	60.5	141.2
Toluene-D8	2037-26-5	73.4	126
4-Bromofluorobenzene	460-00-4	59.6	125.3



LABORATORY REPORT

Report Number:	J277-2013-2
Report Date:	20 January 2014

A. CLIENT

Company Name: Klohn Crippen Berger
Address: Level 4, 673 Murray Street
West Perth
WA 6005

B. SAMPLE DESCRIPTION


Matrix: Liquid
Quantity: 8 samples as received
Analysis Required: Radionuclide – Ra²²⁶, Ra²²⁸, Th²²⁷, Th²²⁸, Th²³⁰, Pb²¹⁰, Po²¹⁰
Elemental – Uranium and Thorium

C. RECEIVAL


Date: 6th November 2013
Packaging: 1L Plastic Sample Bottles
Preservation: None Required

C. METHOD REFERENCES

Radionuclide – *Liquid Scintillation, Gamma Spectrometry & Alpha Spectrometry after radiochemical separation*
Elemental – *Method 4AB/MS Multi Acid Digest + ICPMS*

Analysed by: Ms Danielle Stephen
Position: Laboratory Manager
Signature: 

Date: 20 January 2014

Review by: Mr Rex Breheny
Position: Senior Radiation Technician
Signature: 

Date: 20 January 2014



E. RESULTS

Elemental Analysis				
Sample ID	U (µg/l)	Th (µg/l)	²³⁸ U (Bq/g)	²³² Th (Bq/g)
BRRWS002M	10.44	<MDL #	0.13	<MDL #
BRRWS010M	0.06	<MDL #	<MDL #	<MDL #
BRRWS008	26.83	<MDL #	0.33	<MDL #
BRAWD008M	105.54	<MDL #	1.31	<MDL #
BRGWD003	0.67	2.02	0.01	0.01
BRWWD002	0.79	0.32	0.01	<MDL #
BRRWS0016	<MDL #	<MDL #	<MDL #	<MDL #
BRRWS007M	<MDL #	<MDL #	<MDL #	<MDL #
Radionuclide Analysis				
Sample ID	Ra ²²⁶ (Bq/L)	Ra ²²⁸ (Bq/L)	Counting Date for Po ²¹⁰	Po ²¹⁰ (Bq/L)
BRRWS002M	0.031 ± 0.012	0.055 ± 0.022	23/11/2013	0.0038 ± 0.0023
BRRWS010M	0.0114 ± 0.0075	< 0.006 *	19/11/2013	0.0008 ± 0.0009
BRRWS008	0.351 ± 0.033	0.144 ± 0.031	25/11/2013	0.0281 ± 0.0057
BRAWD008M	0.367 ± 0.031	0.804 ± 0.068	25/11/2013	0.0043 ± 0.0021
BRGWD003	0.096 ± 0.034	0.516 ± 0.076	24/11/2013	0.046 ± 0.010
BRWWD002	0.087 ± 0.012	0.493 ± 0.047	24/11/2013	0.0132 ± 0.0048
BRRWS0016	0.052 ± 0.017	0.058 ± 0.020	19/11/2013	<0.0016 *
BRRWS007M	0.0404 ± 0.0085	0.069 ± 0.023	23/11/2013	<0.0017 *
Sample ID	Pb ²¹⁰ (Bq/L)	Th ²²⁷ (Bq/L)	Th ²²⁸ (Bq/L)	Th ²³⁰ (Bq/L)
BRRWS002M	0.0155 ± 0.0065	0.0061 ± 0.041	0.0016 ± 0.0012	0.0026 ± 0.0017
BRRWS010M	< 0.022 *	< 0.0066 *	0.0015 ± 0.0023	0.0045 ± 0.0035
BRRWS008	0.0377 ± 0.0089	0.0085 ± 0.0045	0.0152 ± 0.0040	0.0132 ± 0.0037
BRAWD008M	0.0413 ± 0.0083	0.0058 ± 0.0052	0.0160 ± 0.0058	0.0027 ± 0.0025
BRGWD003	0.0438 ± 0.0076	< 0.0047 *	0.099 ± 0.013	0.0159 ± 0.0046
BRWWD002	0.0174 ± 0.0061	0.0040 ± 0.0049	0.0289 ± 0.0084	0.0046 ± 0.0035
BRRWS0016	< 0.018 *	< 0.0044 *	0.0027 ± 0.0018	0.0107 ± 0.0036
BRRWS007M	< 0.018 *	0.0052 ± 0.0060	0.0077 ± 0.0049	0.0113 ± 0.0056

¹ Derived activity based on assumptions: Isotopic ratios of 99.28% ²³⁸U in elemental Uranium, 99.9% ²³²Th in elemental Thorium Specific activities of 12,445 Bq/g ²³⁸U and 4,090 Bq/g ²³²Th.

MDL is 0.05 µg/l for Uranium and Thorium, 0.01 Bq/g for ²³⁸U and ²³²Th

* Reporting of a 'less than' result means that the measured value was consistent with a background measurement minimum detectable concentration with a level of 95% for errors



F. SAMPLE STORAGE

Radiation Professionals reserves the right to return any Radioactive Samples to the client at the clients cost.

All Samples will be stored for a period of 30 days from reporting date free of charge. After this time Samples will be stored at a rate of 20c per sample per day until written advice regarding collection is received. Expenses related to the return of Samples will be charged to you at cost price.