Appendix J
Groundwater Impact Assessment

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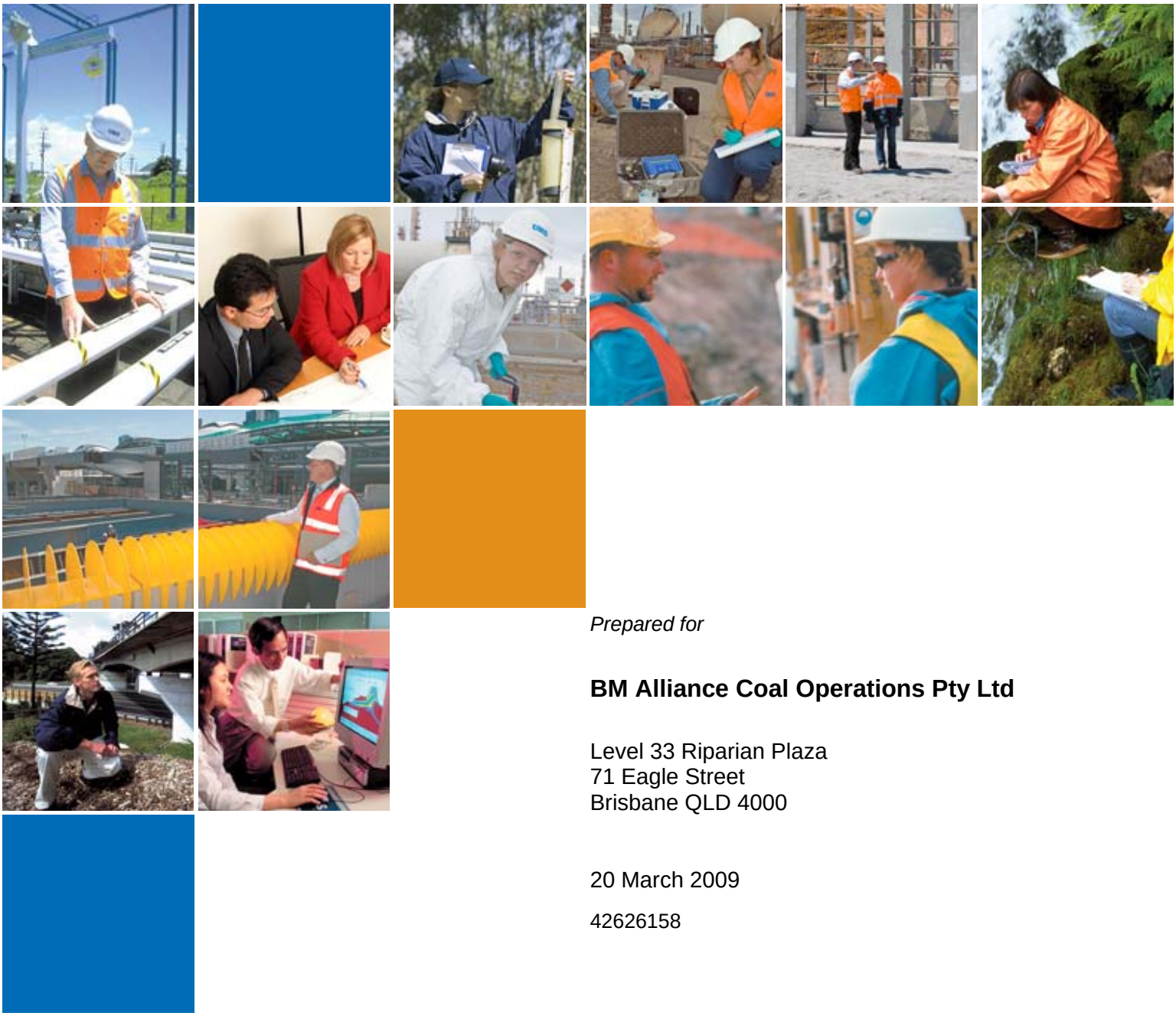
REPORT

Caval Ridge Groundwater Impact Assessment



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Introduction Section 1

URS Australia Pty Ltd (URS) was commissioned by BHP Billiton Mitsubishi Alliance Coal Operations Pty Ltd (BMA) to conduct a baseline groundwater investigation and impact assessment, as part of the Environmental Impact Statement (EIS) for the proposed Caval Ridge Mine.

The Caval Ridge Mine is a proposed open-cut coal mine located in Central Queensland. It will be located north of the existing Peak Downs Mine, 30km south of Moranbah (**Figure 1**).

This report provides an assessment of groundwater impacts associated with the proposed development of the mine and includes recommended mitigation measures and monitoring protocols.

1.1 Scope of Work

The scope of work for the groundwater investigation was based on the Terms of Reference (TOR) for the Bowen Basin Coal Growth Project released by the Queensland Department of Infrastructure and Planning (DIP 2008).

The sections of the TOR relevant to groundwater are reproduced below.

The EIS should review the quality, quantity and significance of groundwater in the Project area, together with groundwater use in neighbouring areas.

The review should include a survey of existing groundwater supply facilities (bores, wells, or excavations) within the area of any potential environmental harm. The information to be gathered for analysis is to include:

- *location;*
- *pumping parameters and yield at nearby bores;*
- *draw down and recharge at normal pumping rates; and*
- *seasonal variations (if records exist) of groundwater levels.*

A network of observation points which would satisfactorily monitor groundwater resources both before and after commencement of operations should be developed.

This section should include reference to:

- *nature of the aquifer/s:*
  - *geology/stratigraphy - such as alluvium, volcanic, metamorphic;*
  - *aquifer type - such as confined, unconfined; and*
  - *depth to and thickness of the aquifers.*
- *hydrology of the aquifer/s:*
  - *depth to water level and seasonal changes in levels;*
  - *groundwater flow directions (defined from water level contours);*
  - *interaction with surface water;*
  - *interaction with sea/salt water;*

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- *possible sources of recharge; and*
- *vulnerability to pollution.*

The data obtained from the groundwater survey should be sufficient to enable specification of the major ionic species present in the groundwater, pH, electrical conductivity and total dissolved solids.

Describe the environmental values of the underground waters of the affected area in terms of:

- *values identified in the EPP (Water)* [Environmental Protection {Water} Policy 1997]*;*
- *sustainability, including both quality and quantity; and*
- *physical integrity, fluvial processes and morphology of groundwater resources.*

The EIS should include an assessment of the potential environmental harm caused by the proposal to local groundwater resources as expressed in the EPP (Water) 1997.

The impact assessment should define the extent of the area within which groundwater resources are likely to be affected by the proposed operations and any final void(s) left after mining ceases, and the significance of the project to groundwater depletion or recharge, and propose management options available to monitor and mitigate these effects. The response of the groundwater resource to the progression and finally cessation of the proposal should be described.

An assessment should be undertaken of the impact of the project on the local ground water regime caused by the altered porosity and permeability of any land disturbance and any final void(s) left after mining ceases.

An assessment of the potential to contaminate groundwater resources and measures to prevent, mitigate and remediate such contamination should be discussed.

Water management controls should be described, addressing groundwater quality and quantity. The beneficial (environmental, production and recreational) use of nearby groundwater should be discussed. Monitoring programs should be described which will assess the effectiveness of management strategies for protecting water quality during the construction, operation and decommissioning of the proposal.

The objective of this study was to assess the potential impacts of the coal mining activities on the hydrogeological regime and, if necessary, identify measures for monitoring and/or mitigation of impacts as specified in the TOR. To achieve this objective, the scope of work included:

- a review of hydrogeological and geological data existing in the public domain, including reports and records held in the Department of Mine and Energy (DME) and Department of Natural Resources and Water (DNRW) libraries and maps published by the Geological Survey of Queensland;
- a review of exploration bore data provided by BMA;
- a review of hydrogeological data held on the DNRW Groundwater Database for existing water bores in the area;
- field investigations comprised of drilling and monitoring bore installation, groundwater sampling and falling/rising head tests;

- an assessment and analysis of all available hydrogeological data though the development of a conceptual hydrogeological model and empirical calculations; and
- preparation of a report detailing the potential impacts of the proposed development on the groundwater regime.

1.2 Description of Environmental Values

The Environmental Protection (Water) Policy 1997 and the Environmental Protection (Water) Amendment Policy (No. 1) 2007 [herein collectively referred to as the EPP (Water)] serves to protect Queensland's waters while allowing for ecologically sustainable development. The purpose of this policy is achieved by providing a framework for:

- Identifying environmental values for Queensland waters;
- Deciding and stating water quality guidelines and objectives to enhance or protect the environmental values;
- Making consistent and equitable decisions about Queensland waters that promote efficient use of resources and best practice environmental management; and
- Involving the community through consultation and education, and promoting community responsibility.

The location of the proposed Caval Ridge Mine is outside those areas described in Schedule 1 of the EPP (Water). The EPP (Water) states that for waters not listed in Schedule 1 the environmental values to be enhanced or protected are the following qualities:

- Biological integrity of a pristine or modified aquatic ecosystem;
- Suitability for recreational use (primary recreation, secondary recreation, visual appreciation);
- Suitability for minimal treatment before supply as drinking water;
- Suitability for use in primary industries (irrigating crops, farm use, stock water, aquaculture, aquatic food for human consumption);
- Suitability for industrial use; and
- Cultural and spiritual values.

Section 2 Review of Information

This groundwater assessment is based on a review of available information and additional data collected on-site between May 2008 and March 2009. The previous studies undertaken within the study area and the additional data collected have been used to describe the baseline groundwater resources.

The description of existing hydrogeological conditions at the site is based on the following available data sources:

- Historical reports and data collected by BMA from the exploration drilling conducted on-site;
- Environmental impact studies conducted for other coal mines in the area including
  - Daunia Coal Mine Project (Daunia) EIS (SKM, 2008);
  - Poitrel Coal Mine Project (Poitrel) EIS (SKM, 2005);
  - Integrated Issac Plains Project (IIPP) Supplementary EIS (Matrix+ Consulting Pty Ltd, 2008);
  - Carborough Downs Mine Expansion Draft EIS (Matrix+ Consulting Pty Ltd, 2007);
- Mount Coolon 1:250,000 Geological Map (Sheet SF55-7);
- Clermont 1:250,000 Geological Map (Sheet SF55-11);
- A search of the DNRW groundwater and licensing database for registered bores located within a 10 km radius of the site;
- Historical groundwater monitoring data for the period 2005 to 2007, recorded by BMA for the Peak Downs Mine; and
- Additional groundwater and lithological data collected on-site by URS between May 2008 and March 2009.

A search of the DNRW registered bore database on 8 November 2007 revealed that 13 groundwater bores have been installed and registered within a 10 km radius of the proposed project site. Of these 13 bores, 3 have been destroyed, 9 have been installed for private use, and 4 have been installed by DNRW for groundwater monitoring and assessment. The locations of these registered groundwater bores are shown on **Figure 2**. Extracts of the bore records from the DNRW groundwater database are provided in **Appendix A**.

A number of previous studies have assessed groundwater conditions in the vicinity of the project area. An EIS was prepared for the IIPP proposed coal mine by Matrix+ Consulting Pty Ltd (2008). The IIPP site is located approximately 9 km east of the proposed Caval Ridge Mine. An EIS was prepared for the Carborough Downs mine expansion by Matrix+ Consulting Pty Ltd (2007). The Carborough Downs mine site is located approximately 16 km northeast of the proposed Caval Ridge Mine. An EIS was prepared for the Poitrel coal mine by SKM (2005). The Poitrel coal mine site is located approximately 14 km east of the proposed Caval Ridge Mine. An EIS was prepared for the proposed Daunia coal mine by SKM (2008). The Daunia site is located approximately 21 km east of the proposed Caval Ridge Mine.

The BMA operated Peak Downs coal mine undertakes monitoring of a network of groundwater monitoring wells as part of the environmental monitoring of its operations. The locations of these monitoring wells are displayed on **Figure 3**. The full set of data supplied by BMA are provided in **Appendix B**.

Following the review of available information, a gap analysis determined that field investigations were required to provide additional information in order to describe the groundwater environment of the study area.

Field investigations undertaken to obtain site specific data for the proposed Caval Ridge Mine comprised drilling and monitoring well installation, groundwater sampling, and variable head tests.

A total of 16 bores were drilled and monitoring wells installed between 12 and 23 May 2008. After development, falling or rising head tests were conducted within the monitoring wells. Groundwater samples were collected from these monitoring wells during three sampling rounds from 5 to 8 June 2008, from 8 to 11 September 2008, and from 27 February to 3 March 2009.

3.1 Drilling and Installation of Groundwater Monitoring Wells

Sixteen bores were drilled and monitoring wells installed at eleven sites. At some sites a nest of monitoring wells were installed targeting separate geological formations. The locations of the monitoring wells are shown on **Figure 3**. A construction summary of each monitoring well is presented in **Table 3-1** and the detailed lithology and construction logs are presented in **Appendix C**. All monitoring wells were constructed in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (LWBC, 2003)

Table 3-1 Summary of Monitoring Well Construction Details

Monitoring Well	Easting (m)[a]	Northing (m)[a]	Top of Casing Elevation (mAHD)[a]	Ground Level Elevation (mAHD)[a]	Bore Depth (mbgl)	Well Screen Interval (mbgl)	Formation Screened
Pz01	609752	7560149	TBD	218	85.5	82.5-85.5	Coal Seam D04
Pz02	608384	7558233	TBD	240	35	24-35	Basalt
Pz03-S	608920	7556710	TBD	246	26.5	17.5-26.5	Basalt
Pz03-D	608920	7556710	TBD	246	42.8	39.8-42.8	Coal Seam D04
Pz04	610730	7555327	TBD	279	93.1	87.1-93.1	Coal Seam Q
Pz05	608929	7554114	TBD	255	118	115-118	Coal Seam D04
Pz06-S	611129	7551675	TBD	242	31	22-31	Basalt
Pz06-D	611129	7551675	TBD	242	84	81-84	Coal Seam P02
Pz07-S	612441	7550671	TBD	226	16	9-15	Alluvium
Pz07-D	612441	7550671	TBD	226	44	41-44	Coal Seam Q01
Pz08-S	611249	7549500	TBD	231	16	9-15	Alluvium
Pz08-D	611249	7549500	TBD	231	63	60-63	Sandstone Interburden
Pz09	614317	7548834	TBD	224	77	71-77	Coal Seam P08
Pz10	613679	7548084	TBD	234	83	77-83	Coal Seam H08
Pz11-S	616863	7547756	TBD	219	58	6-9	Alluvium
Pz11-D	616863	7547756	TBD	219	58	55-58	Coal Seam P08

a) The bores had not been surveyed at the time of report preparation; hence the location and elevation to AHD cannot be accurately determined. The values in this table were developed based on GPS readings and the 1m topographical contours for the site. Easting, Northing and Elevation values are approximate only, exact details will be provided when bores are surveyed.
TBD – To be determined after the bores have been surveyed.

Section 3 Extent of Field Investigations

All bores were drilled using a top head drive UDR 650 rig and the monitoring wells installed by Capricorn Weston Drilling Group, under direction from a Class 2 licensed water driller from Wizard Drilling. The drilling and installation sequence undertaken for the monitoring bores was as follows:

1) A 165 mm diameter hole was drilled to the desired depth using the rotary air method.

2) Class 9 or class 12 uPVC slotted screen and class 9 or class 12 uPVC casing (class dependent on depth of installation) was installed to the desired depth in the hole.

3) The annulus between the bore and the casing/screen was gravel packed from the base to the desired height above the screen. A 1 m bentonite seal was installed above the gravel pack and then the bore was backfill to approximately 6 m below surface elevation. The bore was then grouted above the backfill to surface.

4) A lockable steel standpipe was cemented in place over the top of the bore.

5) Each newly constructed monitoring well was developed at the time of installation by jetting water to the bottom of the bore and air lifting. Development was not possible on Pz02, Pz03-S, Pz06-S, Pz07-S, Pz08-S and Pz11-S as these bores were dry when installed.

3.2 Falling/Rising Head Tests

Variable head tests were conducted to determine estimates of the aquifer hydraulic conductivity (K) as outlined below:

1) An electronic data logging pressure transducer was set to take water level measurements at 1 second intervals;

2) The transducer was installed inside the monitoring well below the water level;

3) The standing water level was measured using the electronic water level tape;

4) A slug of water was inserted (falling) or removed (rising) from the monitoring well to produce an instantaneous change in head;

5) The bore was allowed to recover to at least 80% of the initial standing water level;

6) The transducer was retrieved and the data was downloaded; and

7) The data was analysed graphically using the methods of Hvorslev (1951) and Bouwer and Rice (1989) to determine estimates of the aquifer hydraulic conductivity.

A summary of the results is presented in **Table 3-2** with the analysis graphs for the falling/rising head tests provided in **Appendix D**. No falling/rising head test was conducted on monitoring well Pz11-S as it was dry.

Table 3-2 Summary of Falling Head Tests

Monitoring Well	Formation Screened	Hydraulic Conductivity [K] (m/day)	
		Bouwer & Rice Method	Hvorslev Method
Pz01	Coal Seam D04	1.00×10^{-1}	1.30×10^{-1}
Pz02	Basalt	5.18×10^{-3}	6.49×10^{-3}
Pz03-S	Basalt	8.25×10^{-2}	1.11×10^{-1}
Pz03-D	Coal Seam D04	4.60×10^{-1}	5.90×10^{-1}
Pz04	Coal Seam Q	2.60×10^{-1}	3.25×10^{-1}
Pz05	Coal Seam D04	2.49×10^{-2}	3.36×10^{-2}
Pz06-S	Basalt	1.38×10^{-1}	1.91×10^{-1}
Pz06-D	Coal Seam P02	6.12×10^{-2}	7.92×10^{-2}
Pz07-S	Alluvium	2.69×10^{-1}	3.79×10^{-1}
Pz07-D	Coal Seam Q01	2.60×10^{-1}	3.30×10^{-1}
Pz08-S	Alluvium	8.78×10^{-2}	1.22×10^{-1}
Pz08-D	Sandstone Interburden	2.60×10^{-2}	3.40×10^{-2}
Pz09	Coal Seam P08	1.25×10^{-1}	1.60×10^{-1}
Pz10	Coal Seam H08	2.82×10^{-2}	3.60×10^{-2}
Pz11-S	Alluvium	Dry	Dry
Pz11-D	Coal Seam P08	2.90×10^{-2}	3.70×10^{-2}

3.3 Groundwater Sampling

Groundwater level monitoring and sampling was conducted using standard industry procedures. These procedures are summarised in **Table 3-3**.

Section 3 Extent of Field Investigations

Table 3-3 Groundwater Level Monitoring and Sampling Procedure Summary

Activity/Item	Details
Groundwater Level Monitoring	The groundwater levels in all monitoring wells were measured using a depth to water interface probe. The total depth of the bore was also checked using this probe, with the exception of Pz05 which was 118 m deep and beyond the limit of the tape.
Monitoring Bore Purging and Sampling	A low flow air operated purging/sampling pump was used to purge monitoring wells with air supplied from a compressor. Groundwater physico-chemical parameters including Electrical Conductivity (EC), pH, Temperature, Redox (Eh), and Dissolved Oxygen (DO) were measured and recorded at regular intervals during purging. The monitoring wells were considered purged when the groundwater physico-chemical parameters had stabilised. The following monitoring wells were purged using the pump: Pz01, Pz02, Pz03-D, Pz05, Pz06-D, Pz07-D, Pz08-D, Pz09, Pz10 and Pz11-D. Dedicated disposable plastic bailers were used to purge shallow monitoring wells with low water levels, where the pump was not suitable. A minimum of three bore volumes were removed and the groundwater physico-chemical parameters were measured after each bore volume to check for stabilisation. The monitoring wells were considered purged when the groundwater physico-chemical parameters had stabilised. The following monitoring wells were purged using bailers: Pz03-S, Pz06-S, Pz07-S and Pz08-S. One monitoring well, Pz04, was not purged as the static water level was at the limit of the pump and the large bore volume (approximately 52 L) would make purging three bore volumes with a bailer an unacceptable manual handling risk. A grab sample was collected from the unpurged bore. Immediately following purging, a groundwater sample was collected from each monitoring well using the same method as used to purge the bore. It is considered that monitoring wells PZ01, Pz05, Pz09, Pz10 and Pz11-D may not have been adequately purged prior to sampling during the June 2008 monitoring event and monitoring wells Pz01 and Pz05 during the September 2008 monitoring event as the water quality from these wells was considerably poorer from the February-March 2009 monitoring event.
Sample Preservation	Samples were placed in laboratory-supplied bottles containing appropriate preservatives. Samples were stored at ± 4ºC and in the dark while on-site and in transit to the laboratory. Samples collected for dissolved metals analysis were filtered through 0.45 µm filters in the field before being placed in the laboratory-supplied bottles containing acid preservative.
Disposal of Purged Groundwater	Purged water from the monitoring wells was disposed to ground adjacent to each monitoring well.
Decontamination Procedure	Non-disposable monitoring and sampling equipment was decontaminated with Decon 90 solution and rinsed with water (potable or distilled, as required) between monitoring wells. Disposable equipment was used once only before being disposed.
Quality Assurance and Quality Control	In line with established guidelines, quality control samples were collected during the field investigations in order to assess the integrity of the sampling procedures and of the analytical results. These QA samples included field blanks used to identify any potential contamination of the rinsate water or sampling containers supplied by the laboratory, equipment rinsate blanks used to identify any potential cross contamination between samples and potential influences from the sampling equipment used, and duplicate samples to assess repeatability of the laboratory determinations.

Groundwater purge details are presented in **Appendix E** and results of the measurements of the physico-chemical parameters at the end of the purging are discussed in **Section 4.4**.

Extent of Field Investigations

Section 3

All monitoring well and QA/QC samples were sent to ALS, an analytical laboratory in Brisbane that is NATA-accredited for the required analyses, with appropriate Chain of Custody (CoC) forms. All laboratory documentation is provided in **Appendix F** and the analytical results are discussed in **Section 4.4**.

Section 4 Existing Groundwater Environment

4.1 Geology and Groundwater Occurrence

4.1.1 Geology

The proposed Caval Ridge Mine is located on the relatively undisturbed western limb of the northern Bowen Basin which overlies the Collinsville Shelf (part of the Clermont Block) in the area. The Bowen Basin in the area is characterised by a relatively thin accumulation of sediments, gentle easterly dips and minor to moderate deformation.

Regionally, the stratigraphic sequence is summarised as follows: the Permo-Triassic sediments of the Bowen Basin are overlain by a veneer of unconsolidated Quaternary alluvium and colluvium, poorly consolidated Tertiary sediments and, in places, remnants of Tertiary basalt flows.

The litho-stratigraphy of the area is shown in **Table 4-1**. The local geology of the area is presented in **Figure 2**. The Moranbah Coal Measures, which contain the coal seams proposed to be extracted by the project, conformably overlie the German Creek Formation and are conformably overlain by the Fort Cooper Coal Measures.

Table 4-1 Litho-stratigraphy of the Caval Ridge Area

Age	Group	Formation	Description
Quaternary	Undifferentiated alluvium and colluvium		Alluvium, mainly clay, silt, sand and gravel
Tertiary	Undifferentiated basalts		Olivine basalt lava flows
	Undifferentiated sediments		Soil, alluvium, gravel, scree, sand, duricrust
Late Permian	Blackwater Group	Rangal Coal Measures	Sandstone, siltstone, mudstone, coal, tuff, conglomerate
		Fair Hill Formation,Fort Cooper Coal Measures	Sandstone, conglomerate, mudstone, carbonaceous shale, coal, cherty tuff
		Moranbah Coal Measures	Labile sandstone, siltstone, mudstone, coal
	Back Creek Group	German Creek Formation	Sandstone, siltstone, carbonaceous shale, minor coal and sandy coquinite

All units of the Permo-Triassic sequence generally dip from west to east at between 3 and 6 degrees in the vicinity of the site. The sequence within the northern extension of the Peak Downs Mine (located to the south of the Caval Ridge Mine) shows considerable deformation with strata dipping to 30 degrees and along strike flexures in excess of 10 degrees. Faulting and seam splitting is common, producing local steepening of the coal seam dips to over 10 degrees. Minor faulting occurs in the seams in the proposed Caval Ridge Mine area. Vertical displacement along faults ranges from less than 1 metre to 36 metres along the regional Harrow Creek Fault in the Peak Downs Mine.

The lithology of the Moranbah Coal Measures is generally characterised by 300 m of fine-grained sandstone, siltstone, mudstone, claystone and coal, which remains uniform throughout the entire site. The Moranbah Coal Measures are characterised by several laterally persistent, relatively thick, coal seams interspersed with several thin minor seams which commonly split and coalesce. The target seams for the proposed Caval Ridge Mine are

all the seams in the lease that are > 30 cm thick. The primary targets are the Q seam - P seam zone, the Harrow Creek (H) group of seams, and the Dysart (D) seams.

The poorly consolidated Tertiary sediments unconformably overlie an irregular erosion surface of Permian strata. These sediments consist of lenses of river channel gravels and sands separated by sandy silts, sandy clays, and clays. The Tertiary silts and clays are densely compacted, hard and generally dry. Most of the clean sand and gravel lenses are permeable but are of limited lateral and vertical extent. Lag deposits of sand and gravel are found directly on the Tertiary/Permian unconformity, but can also be present related to recent Quaternary deposition from the drainage lines in the area.

In the north remains of Tertiary basalt flows overlay the Permian sequence. The basalt is typically variably weathered.

4.1.2 Groundwater Occurrence

An aquifer is defined as a groundwater bearing formation sufficiently permeable to transmit and yield water in useable quantities. The Quaternary alluvial formations, Tertiary sediment and basalt formations, and the Permian coal measures generally yield low sustainable volumes of poor quality groundwater and are not recognised aquifers in the area. However, as groundwater levels in these formations are likely to be affected by mining, for the purposes of this investigation each unit will be considered as an aquifer.

Quaternary Alluvial Aquifers

Quaternary alluvial deposits in the region occur predominantly along creeks such as Horse Creek and Cherwell Creek. Along Cherwell Creek the alluvium comprises 6 - 9 m of clay and silt at the surface which is underlain by up to 10 m of sand and gravel with varying proportions of clay and silt as observed in monitoring wells Pz07-S and Pz08-S. No alluvium was encountered adjacent to Horse Creek at monitoring well Pz01, and the alluvium encountered at monitoring well Pz11-S (8 m thick) adjacent to Winchester Creek was dry at the time of installation. Potential for groundwater exists within the sand and gravel deposits of the alluvium, and represents an unconfined to semi-confined aquifer. Groundwater movement within the alluvium is predominantly via inter-granular flow.

Recharge to the shallow alluvial aquifer comes from two main sources:

- Recharge from surface water flow or flooding (losing river); and
- Surface infiltration of rainfall and overland flow, where alluvium is exposed and no substantial clay barriers occur in the shallow sub-surface.

Due to their shallow depth and limited extent and continuity, the Quaternary alluvium is not considered a significant aquifer. However, during periods of creek flow, the alluvium may become fully saturated and discharge to sub-cropping coal seams. The groundwater level in the alluvium, measured at Pz07-S and Pz08-S, were approximately 0.5 and 12 m above the piezometric water level in the coal at the same locations (Pz07-D and Pz08-D). This indicates possible slow groundwater movement from the alluvium to the coal seams. It is unlikely that changes in coal water levels would significantly impact on groundwater levels in the alluvium.

Hydraulic testing of the Quaternary alluvium provided hydraulic conductivity rates between 0.09 and 0.4 m/day, which are typical for silt to fine sand. The Quaternary alluvial aquifers are not regionally extensive and, accordingly, groundwater extraction at high rates would not be sustainable in the long term.

Section 4 Existing Groundwater Environment

Tertiary Sediment Aquifers

The Tertiary sediments of the region consist of lenses of palaeochannel gravels and sands separated by sandy silts, sandy clays and clays. A review of the borehole logs for the project showed the Tertiary sediments vary in thickness from non-existent to approximately 30 m. The silts and clays are densely compacted, hard and generally dry. Potential for groundwater exists within sandy and gravely sections of the sediment pile, and represents an unconfined to confined aquifer depending on location. Most of the clean sand and gravel lenses are permeable but are of limited lateral and vertical extent. Groundwater movement within the Tertiary sediment is predominantly via inter-granular flow.

Recharge to the Tertiary sediment aquifers is likely to come from surface infiltration of rainfall and overland flow, where the Tertiary sediments are exposed and no substantial clay barriers occur in the shallow sub-surface. Recharge may also occur by vertical seepage from overlying Quaternary alluvial aquifers.

The nature of the Tertiary sediment aquifers, and hence their permeability and porosity, is likely to be highly variable, depending on the proportion of fine material. A review of borehole logs for the project area showed that the Tertiary stratigraphy is dominated by clays, sandy clays, and compacted sands with isolated areas of loose sand. The drilling program undertaken as part of this study showed that the Tertiary sediments do not contain significant volumes of groundwater locally. However, where the sediment is coarse in composition, the unit may have local zones of moderate to high hydraulic conductivity. Historically mining issues with Tertiary sediment derived groundwater at the Peak Downs Mine to the south of the proposed Caval Ridge Mine appear to have been limited to pit wall stability rather than ongoing problems with groundwater inflow, indicating the limited lateral extent of the more permeable areas.

Tertiary Basalt Aquifers

An aeromagnetic geophysical survey has been undertaken over the proposed Caval Ridge Mine site. The aeromagnetics show that Tertiary basalt extends from north of the project area, along the ridge adjacent to Horse Creek in a north-south direction as shown in **Figure 3**. The interpretation of the aeromagnetic geophysical survey indicated that there is approximately 81.5 Mm^3 of basalt in the area of Horse Creek. The areal extent of the basalt is approximately 7.2 Mm^2, giving the basalt an average thickness of approximately 11 m. Tertiary basalt also occurs in the area between the Peak Downs Highway and Cherwell Creek in the project area, with a stinger of basalt crossing Cherwell Creek in a southeasterly direction toward the Heyford Pit of the Peak Downs Mine.

For the exploration boreholes and monitoring wells that intersected basalt, the basalt is logged as fresh to highly weathered with variable clay, and is up to 35 m thick. The distribution of less-weathered, water-bearing fractured and vesicular basalt is quite variable.

Recharge to the Tertiary basalt aquifers is likely to come from surface infiltration of rainfall and overland flow, where the basalt is exposed and no substantial clay barriers occur in the shallow sub-surface. Recharge may also occur by vertical seepage from overlying Quaternary alluvial aquifers. The generally clayey nature of the weathered upper basalt and the Tertiary sediments associated with the basalt, indicate that the potential of recharge is low. The groundwater level in the alluvium, measured at Pz03-S and Pz06-S, were ± 4 and 6 m above the piezometric water level in the coal at the same locations (Pz03-D and Pz06-D) which indicates groundwater movement is downwards.

The permeability and porosity of the Tertiary basalt aquifers is highly variable, depending on the degree of weathering and the intensity of fracturing. Interpreted hydraulic conductivity values of 5.18×10^{-3} to 1.91×10^{-1} m/day were obtained from the falling/rising head tests for monitoring wells Pz02, Pz03-S and Pz06-S. However,

where the basalt is less weathered and more fractured or vesicular, the unit may have local zones of moderate to high hydraulic conductivity. The drilling program undertaken as part of this study showed that the Tertiary basalt appears to be highly heterogeneous and discontinuous locally. Historically mining issues with Tertiary basalt derived groundwaters at the Peak Downs Mine immediately to the south appear to have been limited to pit wall stability rather than ongoing problems with groundwater inflow, indicating the limited lateral extent of the more permeable areas on site.

Permian Strata Aquifers

Primary porosity in the Permian strata is limited, as even the sandstone beds have a significant clay or cement content. Excluding the larger scale discontinuities such as faults, flow in this unit is likely to be predominantly via fracture flow. Aquifer permeability will be controlled by the spacing, aperture size and interconnectivity of the discontinuities. These parameters are not well defined for the site.

In common with other areas in the Bowen Basin, the coal seams constitute the main aquifers in the Permian strata, but the jointed sandstone overburden and interburden may also be locally important for storage and transmittal of groundwater. The vertical anisotropy in the Permian strata may restrict upward/downward leakage, both between layers within the Permian and from the overlying Tertiary formations and alluvium. Consequently, perched water tables may be present above layers of low permeability material, such as mudstones or unfractured rock within or above the Permian. However there will be local interconnection of aquifers along fault planes.

There are three main coal seams in the proposed Caval Ridge Mine area, the Q seam - P seam zone, the Harrow Creek (H) group of seams and the Dysart (D) seams. These main coal seams form the most extensive aquifers locally. The coal seams subcrop in the western half of the site, and the coal seam aquifers are semi-confined to confined depending on location.

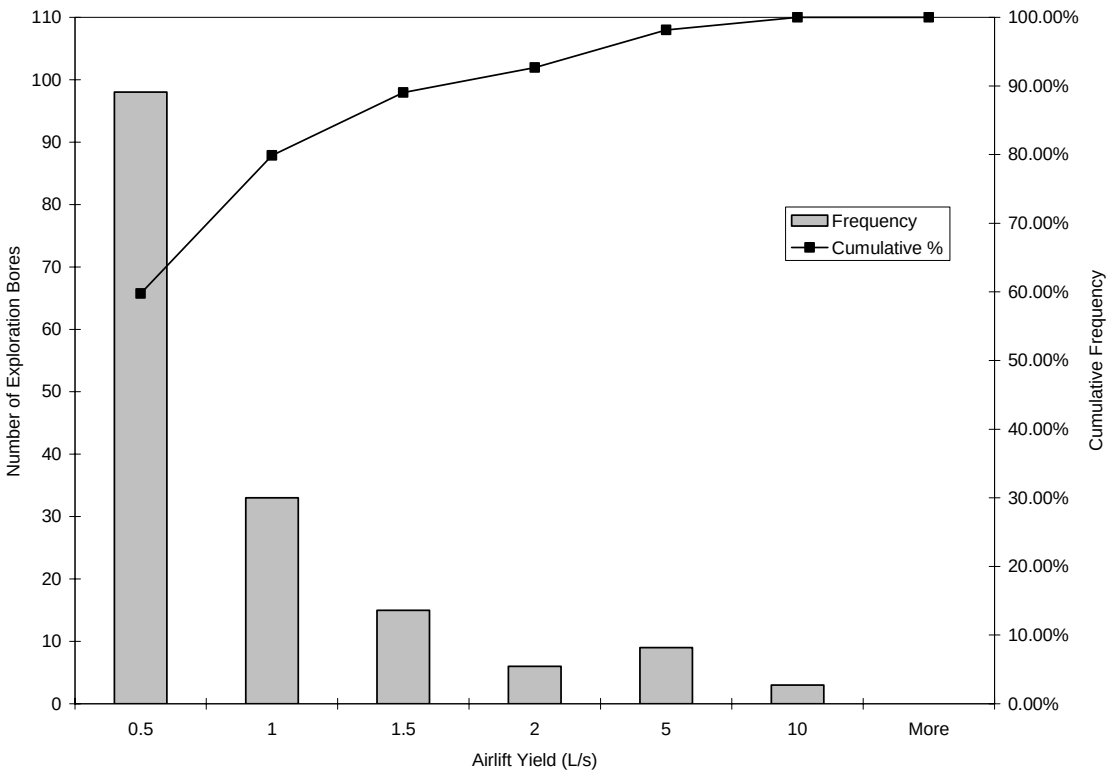
Recharge of coal seams is generally by infiltration of rainfall and overland flow in subcrop areas, and by downward leakage from overlying aquifers in the Tertiary formations and Quaternary alluvium. It is considered that due to the clayey nature of the Tertiary formations unconformably overlying the coal seams, recharge from rainfall infiltration will be limited. Leakage between aquifers through faults is governed by the hydraulic conductivity of the fault, the interburden thickness between the aquifers, and the piezometric level in the aquifers.

Interpreted hydraulic conductivity values determined during investigations as part of this study are presented in **Section 3.2**. The testing indicates that the cleats and joints in the coal are less open with depth, with a corresponding decrease in permeability.

An interrogation of the BMA exploration bore database was undertaken to assess airlift yields determined during drilling. Of the 2427 exploration bores identified on site, 164 had recorded airlift yields. Airlift yields recorded during drilling of the exploration bores are summarised in the histogram presented as **Chart 4-1**.

Section 4 Existing Groundwater Environment

Chart 4-1 Histogram of Airlift Yields of Exploration Bores



The data indicates that approximately 60% of the exploration bores yielded 0.5 L/s or less, with approximately 30% of bores yielding between 0.5 and 2 L/s. Less than 2% of exploration bores yielded greater than 5L/s. Many of the exploration bores that did not have recorded airlift yields in the exploration database may have been dry, thus the histogram may overestimate the yield from the Permian strata. The length of time for which the airlifting was conducted was not available, therefore the sustainability of these yields is not known.

Historically, mining issues with the Permian strata derived groundwaters in the Peak Downs Mine immediately to the south appear to have been limited to pit wall stability rather than ongoing problems with groundwater inflow, indicating the generally low permeability of the Permian strata on site. Groundwater and surface water inflow are removed by pumping from in-pit sumps.

4.2 Groundwater Levels and Flows

The 16 groundwater monitoring wells installed on-site were accessible for level monitoring during three separate events in June 2008, September 2008, and February-March 2009. The locations of these bores are shown on **Figure 3**. A summary of the hydrogeological conditions encountered at each monitoring well site is summarised in **Table 4-2**.

Table 4-2 Summary of Hydrogeological Conditions Observed at Monitoring Wells

Monitoring Bore ID	Aquifer Material	Aquifer Type	Standing Water Level (mbgl)			Standing Water Level (mAHD)[a]		
			June 2008	September 2008	March 2009	June 2008	September 2008	March 2009
Pz01	Coal Seam D04	Confined	8.44	8.39	8.21	210	210	210
Pz02	Basalt	Unconfined	25.65	25.64	25.69	214	214	214
Pz03-S	Basalt	Unconfined	25.49	25.53	25.57	221	220	220
Pz03-D	Coal Seam D04	Confined	31.76	31.73	31.76	214	214	214
Pz04	Coal Seam Q	Confined	67.58	67.53	67.49	211	211	212
Pz05	Coal Seam D04	Confined	37.60	37.57	37.69	217	217	217
Pz06-S	Basalt	Unconfined	26.23	26.25	26.21	216	216	216
Pz06-D	Coal Seam P02	Confined	29.94	29.96	30.00	212	212	212
Pz07-S	Alluvium	Unconfined	13.49	13.67	13.67	213	212	212
Pz07-D	Coal Seam Q01	Confined	14.15	14.22	14.27	212	212	212
Pz08-S	Alluvium	Unconfined	14.05	13.11	13.27	217	218	218
Pz08-D	Sandstone Interburden	Confined	27.05	25.61	25.29	204	205	206
Pz09	Coal Seam P08	Confined	19.68	19.44	19.87	204	205	204
Pz10	Coal Seam H08	Confined	41.56	41.86	Destroyed	192	192	Destroyed
Pz11-S	Alluvium	Unconfined	Dry	Dry	Dry	Dry	Dry	Dry
Pz11-D	Coal Seam P08	Confined	11.78	12.00	12.20	207	207	207

a) The bores had not been surveyed at the time of report preparation; hence the standing water level relative to AHD cannot be accurately determined. The values in this table were developed based on GPS readings and the 1m topographical contours for the site. Exact details will be provided when bores are surveyed.

The main factors influencing natural groundwater levels are groundwater recharge, evapotranspiration, and regional flow patterns. The low number of groundwater wells in the area indicates that groundwater extraction is unlikely to have had a significant impact on historical regional groundwater levels. On a time-frame of years and decades, land-use and land-cover changes may have significantly altered the natural water-balance and groundwater levels. The typical impact in Australia has been a tendency towards deforestation and greater net recharge and therefore higher water-tables.

Quaternary Alluvial, Tertiary Sediment and Tertiary Basalt Aquifers

The depth to water in monitoring wells on-site in the Quaternary alluvium aquifer during this investigation was typically less than 15 m below ground level (mbgl). The depth to water on-site in the Tertiary basalt aquifer was less than 30 mbgl. No depth to groundwater information exists for the Tertiary sediment at this time as the Tertiary sediment encountered during groundwater monitoring well installation was shallow and dry, but is likely to be similar to the depth to groundwater in the Quaternary alluvium and basalt aquifers in areas of thicker sediment accumulation.

Due to the heterogeneity and discontinuity of the Quaternary alluvial aquifers and Tertiary sediment and basalt aquifers, the groundwater flow direction cannot be determined on a regional scale for these aquifers. The groundwater flow direction is likely to be topographically controlled, flowing from higher elevations to lower elevations. The groundwater level in the Cherwell Creek alluvium falls from approximately 218 to 212 mAHD as

it traverses the site (Pz08-S to Pz07-S), indicating that groundwater will generally flow along the line of the creek. The groundwater level in the basalt in the north of the site falls from approximately 220 to 214 mAHD (Pz03-S to Pz02) to the north.

No data exist on the seasonal fluctuations of groundwater level within the Tertiary or Quaternary aquifers. However due to the shallow depth of these aquifers, they are expected to show a relatively rapid response to rainfall in areas where the coarser sediments or fractured basalt are exposed and no substantial clay barriers occur in the shallow sub-surface.

Permian Strata Aquifers

The groundwater flow direction in the coal seam aquifers north of Cherwell Creek appears to be from west to east across the site as shown in **Figure 4**. This flow direction is consistent with recharge to the coal seams occurring at the subcrops in the west of the site. The flow direction has been altered locally with groundwater flow towards the existing mine pits in the Peak Downs Mine to the south of Cherwell Creek.

No data exist on the seasonal fluctuations of groundwater level within the Permian aquifers. However due to the depth and confined nature of these aquifers, they are expected to show a subdued response to recharge.

Effects of Geological Structures on Groundwater Flow Patterns

The effects of faults and dykes on local and regional groundwater flow patterns are not known, but could be substantial. Faults may either restrict or enhance flow, depending on the transmissivity of the fault zones, which is not possible to predict with the current level of information.

4.3 Groundwater Use

In Queensland, a number of areas have been declared as subartesian areas under the Water Act 2000 which is administered by DNRW. The study area is within the Highlands Declared Subartesian Area and there is a requirement for all wells in this area to be licensed with an allocation by the DNRW for uses other than stock and domestic supply. In Queensland, all wells deeper than six metres, including monitoring wells, must be constructed by, or under the supervision of, a licensed water bore driller who has the correct endorsements on their licence for the type of activity being performed. It is a requirement of the Water Act 2000 that a licensed water bore driller submit the records of the drilling and installation of a water well to DNRW within 30 days of completion of the well. These records are entered in the DNRW database.

13 groundwater bores have been installed and registered within a 10 km radius of the proposed project site. Data on registered bores within the vicinity of the study area are presented in **Appendix A** and their locations are shown on **Figure 2**. Of the 13 groundwater bores installed, 9 have been installed for private use, and 4 have been installed by DNRW for groundwater monitoring and assessment. Of the 9 bores installed for private use, none have been installed in the Moranbah Coal Measures, 4 have been installed in the Back Creek Group underlying the coal measures to the west of the site, 4 have been installed to unknown depth by Mitsubishi Gas Company (MGC) for coal seam gas exploration, and 1 (RN 103210) has been installed into the Fort Cooper Coal Measures overlying the Moranbah Coal Measures.

Local groundwater use is primarily for livestock watering purposes owing to the variable salinity levels and generally low yields.

4.4 Groundwater Quality

Groundwater chemistry samples were collected from the monitoring wells installed around the site as discussed in **Section 3.3**. The physico-chemical results have been summarised and presented in **Table 4-3**, and the laboratory analytical results are presented in the attached **Analytical Results Table**.

Table 4-3 Groundwater Physico-Chemical Parameters

Bore ID	Aquifer Type	EC (µS/cm)			pH		
		June 2008	September 2008	February-March 2009	June 2008	September 2008	February-March 2009
Pz01	Coal Seam D04	PDMW	PDMW	15,610	PDMW	PDMW	6.87
Pz02	Basalt	2,580	1,540	2,180	7.94	NR	7.87
Pz03-S	Basalt	13,520	12,470	10,930	6.78	NR	6.96
Pz03-D	Coal Seam D04	19,970	21,450	16,570	7.10	NR	6.72
Pz04	Coal Seam Q	1,529	1,107	1,111	6.74	NR	6.66
Pz05	Coal Seam D04	PDMW	PDMW	13,630	PDMW	PDMW	7.21
Pz06-S	Basalt	NR	1,639	1,688	7.73	NR	7.67
Pz06-D	Coal Seam P02	1,691	1,981	1,813	6.81	NR	6.89
Pz07-S	Alluvium	NR	351	443	6.35	NR	6.51
Pz07-D	Coal Seam Q01	NR	3,890	3,960	6.84	NR	7.15
Pz08-S	Alluvium	NR	1,861	2,129	6.49	NR	6.99
Pz08-D	Sandstone Interburden	NR	12,510	11,380	6.43	NR	6.83
Pz09	Coal Seam P08	PDMW	12,510	9,790	PDMW	7.15	7.26
Pz10	Coal Seam H08	PDMW	9,090	Destroyed	PDMW	7.24	Destroyed
Pz11-D	Coal Seam P08	PDMW	8,650	7,220	PDMW	7.62	7.47
ANZECC (2000) Water Quality Guidelines for Livestock (Beef Cattle) Drinking Water[1] Upper limits Some reluctance to drink No adverse affects		7,500 – 15,000 6,000 – 7,500 0 – 6,000					

NR – Not reported due to equipment failure. An undetected fracture of the glass bulb of the pH probe caused pH readings of approximately pH 4 which are inconsistent with the nature of the aquifers and the pH recorded during the previous monitoring round.
PDMW – Not reported due to suspected poor development of monitoring well.
1 – Electrical Conductivity value based on guideline value of Total Dissolved Solids value for livestock (EC [µS/cm] = 1.5 × TDS [mg/L]).

Poor development and purging of five of the monitoring wells during the first round of sampling and two of the monitoring wells during the second round of sampling is suspected due to inconsistent salinity and dissolved solids compared to the third sampling round. It is believed that water used for flushing the screens during development of these monitoring wells was not completely removed from the surrounding aquifer prior to the first round of sampling. An undetected fracture of the glass bulb of the pH probe during the second monitoring round caused erroneous pH readings (approximately pH 4) after the first day of sampling, which are inconsistent with the nature of the aquifers and the pH recorded during the previous and subsequent monitoring round.

The physico-chemical results indicate the water chemistry is typically of near neutral pH for all formations. The coal seam and basalt formation groundwaters have a variable salinity level (measured as electrical conductivity), ranging from brackish to saline, while the alluvium groundwaters are fresh to brackish.

Section 4 Existing Groundwater Environment

The laboratory analytical results indicate that sodium is the dominant cation in the groundwater from all monitoring wells apart from Pz07-S in the alluvium which is calcium dominant. The dominant anion is chloride in monitoring wells in the coal measures (Pz01, Pz03-D, Pz05, Pz07-D, Pz08-D, Pz09, Pz10 and Pz11), basalt (Pz03-S) and alluvium (Pz08-S) while the dominant anion is bicarbonate in the other monitoring wells in the coal measures (Pz04 and Pz06-D), basalt (Pz02 and Pz06-S) and alluvium (Pz07-S).

4.5 Assessment of Environmental Value

The EPP (Water) identifies environmental values of groundwater to be protected or enhanced in Queensland as discussed in **Section 1.2**. The existing groundwater environment has been assessed against these environmental values.

Biological Integrity of a Pristine or Modified Aquatic Ecosystem

The local area around the proposed Caval Ridge Mine has been cleared and used for agriculture, predominantly beef cattle grazing, since at least 1957. These farming practices modify the landscape, affecting the volume and rate of runoff, the flow characteristics of the creeks, and the recharge to groundwater. As such, the aquatic ecosystems of the area have been modified.

Water available to ecosystems may include a mix of groundwater with soil water (unsaturated zone) and surface water. Groundwater Dependant Ecosystems (GDEs) are ecosystems which have their species composition and natural ecological processes determined in part by groundwater. The groundwater parameters that sustain GDEs are flux, level, pressure and quality, with dependence potentially being a function of one or all of these factors.

The water level measurements undertaken for this study indicate that the water table within the alluvium of Cherwell Creek is approximately 13 to 14 mbgl, and that other areas of alluvium may be dry. The water level in the coal measures is between 8 and 67 mbgl and the water table in the basalt is approximately 25 to 26 mbgl. These depths to groundwater, and the lack of springs or seeps in the area, indicate that GDEs are not likely to exist in the vicinity of the site. The vegetation species and regional soil/geology types suggest that the level of groundwater dependence is likely to be relatively low and vegetation is likely to be able to satisfy plant water requirements using retained soil moisture.

The groundwater analytical results, as presented in the **Analytical Results Table**, have been assessed against the ANZECC (2000) and Queensland (2006) water quality guidelines (for the protection of moderately disturbed freshwater ecosystems, central region, upland streams) to consider the potential effect of discharge of groundwater into surface water bodies. The assessment of groundwater quality using surface water guideline values has an inherent level of conservatism due to the assumptions made regarding the behaviour, fate and transport of the analytes detected in groundwater and the subsequent effects in the surface water ecosystem. The existing concentrations of some dissolved metals and nutrients in the groundwater are above the water quality guidelines for freshwater ecosystems. Exceedence of a guideline value does not indicate that an impact has occurred or is likely to occur, but may warrant further investigation.

Suitability for recreational use

This category of environmental values is considered not applicable to groundwater in the area. There are no groundwater springs or seeps that supply surface water bodies in the area that are used for recreational use.

Suitability for minimal treatment before supply as drinking water

The groundwater analytical results, as presented in the **Analytical Results Table**, have been assessed against the Australian Drinking Water Guidelines (2004) to consider the potential health effects of drinking minimally treated groundwater. The water quality from the monitoring wells indicate that in general, the water is unsuitable for human consumption. This is due to elevated levels of sulphate and some dissolved metals (manganese, nickel and selenium) in some of the groundwaters. The groundwaters also generally have elevated levels of salinity (>1000 mg/L) which are above the guideline for aesthetics based on unsatisfactory taste. The ease of obtaining a mains water or rainwater tank supply, and the generally low yield of the water bores in the area, are also factors which preclude the usage and potential for usage of the groundwater as a drinking water source.

Suitability for primary industry use

The number of registered bores in the area indicate that water quality suitable for some agricultural use is obtainable.

Use of groundwater within the area is generally as drinking water for beef cattle. The groundwater, as presented in the **Analytical Results Table**, has been assessed against the ANZECC (2000) guidelines for stock drinking water quality for beef cattle to consider the potential effect of drinking of groundwater by stock. Compared to the ANZECC (2000) guidelines, groundwater present within the groundwater wells is generally useable for livestock drinking water. The groundwater from some monitoring wells has a slightly elevated level of sulphate and/or selenium above the guideline values. The salinity of the groundwater in some of the monitoring wells, as shown in **Table 4-3**, is above the upper limit for beef cattle, which would cause some loss of production and deterioration in animal health.

The generally low sustainable yield of the water bores in the area precludes the usage and potential for usage of the groundwater as a source of irrigation water or water for aquaculture or the production of aquatic foods.

Suitability for industrial use

It is believed that there are no industrial users of the groundwater within the local area. The potential for industrial usage of the water is considered to be greater than that for either agricultural or drinking water usage. Industrial users generally have the capital required to drill and equip bores and if necessary appropriately treat the water before use. However, industrial users tend to require large volumes of water which would be unsustainable in the area due to the low sustainable yield of the aquifers.

Maintenance of Cultural and Spiritual Values

There are no groundwater springs or seeps that supply surface water bodies in the area that may have significant indigenous and/or non-indigenous cultural heritage.

Section 5 Potential Impacts and Mitigation Measures

The impacts on groundwater from the development, operation, closure and post-closure of the proposed Caval Ridge Mine have been evaluated as follows:

5.1 Potential Impacts during Development and Operation

The proposed Caval Ridge Mine is located adjacent to the BMA operated Peak Downs Mine, along the strike of the Moranbah Coal Measures. Given the close proximity of the two coal mines, this assessment considers the cumulative impact of both mines on the surrounding groundwater resources.

The only other existing mine within a 10 km radius of the proposed Caval Ridge Mine is the Issac Plains Mine operated by Vale Australia Pty Ltd. This mine is located ± 8 km northeast of the proposed Caval Ridge Mine. An EIS has been prepared and submitted for the Integrated Issac Plains Project, a proposed extension to the Issac Plains Mine to be located 7 km east of the proposed Caval Ridge Mine.

The Eagle Downs Coal Mine Project, for which an EIS has not yet been submitted by the proponent Bowen Central Coal Joint Venture Parties, is located approximately 3 km east of the proposed Caval Ridge Mine. The Grosvenor Coal Mine Project, for which an EIS has not yet been submitted by the proponent Anglo Coal (Grosvenor) Pty Ltd, is located approximately 5 km north of the proposed Caval Ridge Mine. Neither of these proposed developments have been included in the assessment of cumulative impacts as their EIS' were not available for review.

The locations of these proposed and existing mines are shown on **Figure 1**.

5.1.1 Impacts on Regional Groundwater Levels

The project area is within the declared Highlands Subartesian Management area; however limited information is available on groundwater users locally. From a search of the NRW groundwater database, 13 registered bores are located within 10 km of the site boundary as discussed in **Section 4.3**.

Impacts on Permian Formation Aquifers

A good indicator for evaluating the potential impacts of the proposed mine on the groundwater regime is to compare historical and current impacts of the existing mining operations in the area.

While the main aquifers within the area are associated with the coal seams, inflow from the seams to the current mine pits at Peak Downs Mine have not been significant. Dewatering in advance of mining is generally not required at the Peak Downs Mine. When wet conditions in the pit (following rainfall) inhibit mining, water is removed from the pit floor by pumping from in-pit sumps. The water collected from these sumps may contain some groundwater inflow but mainly comprises rainwater (direct rainfall and catchment run-off).

Groundwater ingress into the pits will cause drawdown around the pits, which in turn causes regional groundwater levels to lower as seen around the existing Heyford Pit of the Peak Downs Mine, as shown in **Figure 4**. Following the cessation of mining, groundwater will continue to discharge to the final voids until water levels within the surrounding aquifers recover to an equilibrium with the new hydrological regime.

In order to assess the possible impacts of the proposed mining operations on the groundwater resources an estimate of groundwater inflows, and thus dewatering / discharge requirements, was calculated. This estimate is based on the hydrogeological conceptualisation and an assumption of the final pit size.

The available information indicates that the vertical hydrogeology within the Permian formation can be divided into three main zones:

- Zone 1 – the upper weathered overburden which based on drilling results is assumed to act as an aquitard;
- Zone 2 – the interburden sandstone and siltstone which has a permeability an order of magnitude lower than the coal seams and is estimated to be up to 150 m thick; and
- Zone 3 – the coal seams with a coalesced thickness of up to 30 m.

The groundwater ingress model for the proposed mine pits can be likened to a large diameter well, which fully penetrates the coal seams. For the purpose of the model, it is assumed that the base of the pit is impermeable.

To calculate groundwater inflow estimates to the pit, the Thiem-Dupuit steady state equation is used (Kruseman & de Ridder 1991):

$$Q = \frac{\pi k(h_o^2 - h_w^2)}{\ln(R / r_e)}$$

where

Q = inflow (m^3/day),

k = hydraulic conductivity (m/day)

h_o = head at distance R from centre of pit (m),

h_w = head at distance r_e (m) at pit face (seepage face)

R = radius of "influence" or distance to negligible drawdown (m)

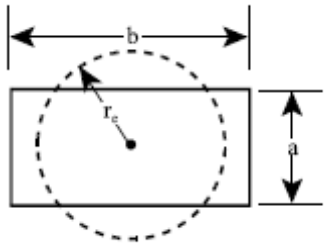
r_e = radius of "well" (m)

For the aquifer R can be estimated as

$R = r_e + 3000(H-h)\sqrt{k}$ (k for this calculation is measured in m/s)

The equivalent radius of the pit as a "well" is estimated from the equation below: -

$$r_e = \sqrt{\frac{ab}{\pi}}$$



In order to calculate an initial estimate of groundwater ingress into the proposed surface mine the following assumptions were made:

- The final surface extent of the pit is assumed for the entire "well" (8000 m x 2000 m for the Horse Pit and 5000 m x 2000 m for the Heyford Pit);
- The removal of the overburden Quaternary and Tertiary formations will allow the underlying aquifer(s) to be unconfined;

Section 5 Potential Impacts and Mitigation Measures

- No groundwater ingress will occur within the Zone 1 aquitard;
- The hydraulic conductivity for Zone 2 is based on the falling head tests at monitoring well Pz08-D (0.03 m/day), with a sensitivity of one order of magnitude above and below this value;
- The hydraulic conductivity for Zone 3 is based on the average falling/rising head tests for monitoring wells in the coal seams, 0.17 m/day, with a sensitivity of one order of magnitude above and below this value; and
- Groundwater ingress through the pit floor will be negligible when compared to the major inflows within the coal seams and overburden.

Based on these assumptions, **Table 5-1** presents a summary of the range of groundwater ingress volumes calculated for the Horse Pit and **Table 5-2** presents a summary of the range of groundwater ingress volumes calculated for the Heyford Pit.

Table 5-1 Groundwater Ingress Data for Horse Pit

Zone	Saturated thickness	K (m/s)	K (m/day)	R (m)	Re (m)	Ingress (m^3/day)
Interburden (expected)	150	3×10^{-7}	0.03	265	2257	19100
Interburden (low case)	150	3×10^{-8}	0.003	84	2257	5800
Interburden (high case)	150	3×10^{-6}	0.3	839	2257	67100
Coal Seams (expected)	30	2×10^{-6}	0.17	126	2257	8800
Coal Seams (low case)	30	2×10^{-7}	0.017	40	2257	2700
Coal Seams (high case)	30	2×10^{-5}	1.7	399	2257	29500

Table 5-2 Groundwater Ingress Data for Heyford Pit

Zone	Saturated thickness	K (m/s)	K m/day)	R (m)	Re (m)	Ingress (m3/day)
Interburden (expected)	150	3×10^{-7}	0.03	265	1784	15300
Interburden (low case)	150	3×10^{-8}	0.003	84	1784	4600
Interburden (high case)	150	3×10^{-6}	0.3	839	1784	55000
Coal Seams (expected)	30	2×10^{-6}	0.17	126	1784	7000
Coal Seams (low case)	30	2×10^{-7}	0.017	40	1784	2200
Coal Seams (high case)	30	2×10^{-5}	1.7	399	1784	23800

As the pit depth increases, the inflow rate into the pit void increases. The estimated hydraulic conductivity (k) values utilised for the three layers indicates that the combined ingress of groundwater to the bottom of the pits, some 180 m below surface, will be ± 27,900 m^3/day (up to ± 96,600 m^3/day) for the Horse Pit and ± 22,300 m^3/day (up to ± 78,800 m^3/day) for the Heyford Pit. These ingress rates equate to ± 2 m^3/day (up to ± 7 m^3/day) per metre of the circumference of both the Horse Pit and Heyford Pit. This ingress rate is calculated for an equivalent well at steady state in an infinite homogeneous aquifer and assumes drawdown to the base of the pit. In reality the mine pits are located in or close to the outcrop of the coal seams such that ingress to the pit from upgradient of the pit will be negligible, and that the seepage face on pit walls will be above the base of the pit, which will decrease the expected ingress into the pits by at least a half of that calculated. Seepage into the pits will be collected in in-pit sumps and used for dust suppression or as process water where suitable.

The radius of influence of the drawdown of the groundwater level (distance to negligible drawdown) is also calculated to extend up to approximately 800 m down dip from the high wall and along strike from the end wall of the pits. This radius of influence is calculated for an equivalent well at steady state in an infinite aquifer. In reality the mine pits are located in the recharge area of the coal seams such that recharge to the coal seams will be reduced, which will have an additional impact on the extent of drawdown of groundwater levels. The extent of the radius of influence of the current Heyford Pit extends approximately 1,800 m from the highwall. The radius of influence of the proposed pits is thus expected to be in the order of 1,800 m, taking into account the reduction of recharge to the coal measures.

The Peak Downs Mine is located along the strike of the Moranbah Coal Measures to the south of the project area. The cumulative impact of the Peak Downs Mine and the proposed Caval Ridge Mine will be to superimpose the drawdown of each mine along strike, resulting in a greater drawdown between the mines. No groundwater users were identified between the mines. The drawdown of the mines down-gradient of each mine will be as a result of that particular mine such that there will be no cumulative impact of drawdown on groundwater levels.

The Integrated Issac Plains Project, a proposed extension to the Issac Plains Mine, is located 7 km east of the proposed Caval Ridge Mine. The Integrated Issac Plains Project proposes to extract coal from the Permian Rangal Coal Measures. The Rangal Coal Measures overlie and are separated from the Moranbah Coal Measures by the Fort Cooper Coal Measures. The low vertical permeability of the Moranbah and Rangal Coal Measures and the separation by the Fort Cooper Coal Measures would limit vertical flow between these formations such that the cumulative impact of the drawdown in the Moranbah Coal Measures due to the proposed Caval Ridge Mine would be negligible in the Rangal Coal Measures.

The groundwater wells identified on neighbouring properties are greater than 2 km from the site, thus it is anticipated that the proposed mine activities and subsequent groundwater drawdown will not have a significant impact on the regional groundwater users of the Permian aquifers.

Impacts on Tertiary and Quaternary Aquifers

All creeks within the study area are ephemeral and there are no perennial water holes or groundwater dependant environments present as discussed in **Section 4.5**. Under dry season conditions, groundwater does not contribute to surface water flow within these creeks. In exceptionally wet years it is possible that the Quaternary alluvium and shallow Tertiary aquifers may contribute some groundwater to the surface water system along water courses. The drawdown of the potentiometric surface of the Permian strata aquifers during mining is unlikely to have an impact on these discharges as the shallow aquifers sit above, and are generally poorly connected to, the aquifers below.

Section 5 Potential Impacts and Mitigation Measures

If the pits encounter the Quaternary alluvium, pit inflow will occur. Due to their shallow depth and lack of continuity and thickness, the Quaternary alluvium is not considered a significant aquifer. However, during periods of creek flow, the alluvium may become fully saturated and discharge to the pits.

Based on the heterogeneity and discontinuous nature of the Tertiary basalt, it is anticipated that the proposed mine activities will not have a significant impact on the isolated areas of basalt. No regional groundwater users of the Tertiary basalt aquifers were identified.

5.1.2 Impacts on Groundwater Quality

The groundwater quality of the Permian strata is brackish to brine and not suitable for human consumption or irrigation, but has some use for stock water (according to the Australian Drinking Water Guidelines (2004) and Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000).

During mining operations, water quality within aquifers surrounding the site is expected to remain the same as pre-mining water quality for these aquifers. No change in water quality during mining operations (as compared to pre-mining) is expected for the following reasons:

- during mining operations, groundwater will be continually extracted from the pit to ensure a safe working environment within the pit. Extraction of groundwater from the pit will create a depression in the potentiometric surface at this location, and groundwater surrounding the mine pit will travel towards this depression. The net movement of groundwater towards the pit during mine operation will prevent the movement of potentially poorer quality water (that may have been impacted by mining) from moving away from the mine operation area and into the surrounding aquifers; and
- aquifers outside of the mine pit area will continue to receive recharge via the same processes that occurred pre-mining.

Groundwater quality data also suggests that groundwater in the alluvial aquifers and basalt are of similar or better quality compared to the Moranbah Coal Measures with respect to major ions and metals. Hence any inadvertent mixing of groundwater (during mining) by downward movement from the upper to lower aquifers is unlikely to result in a deterioration of water quality in either aquifer but lead to an improvement in water quality in the deeper aquifers.

During mine operation, water quality within aquifers surrounding the mine pit will continue to be suitable for the same purposes applicable during the pre-mining period.

A geochemical assessment was undertaken for the Project Site, which is discussed separately in the EIS. The geochemical assessment found that not only are almost all mineral waste materials (overburden and CHPP rejects) non-acid forming (NAF), but the high acid neutralising capacity (ANC) of many of the samples combined with the very low sulphur concentrations, indicates there would be excess alkalinity to buffer the small quantity of acid that could potentially be produced by a very small proportion of the likely mineral waste materials. As the direction of groundwater flow is expected to be towards the pit, buffering capacity of the groundwater is expected to neutralise any oxidation products of the coal seams due to mine dewatering, and any potential for the development of acid mine drainage is low.

The geochemical assessment found that the water extracts from all composite samples of mineral waste have soluble metal concentrations below applied ANZECC (2000) values for livestock drinking water. It also found that the electrical conductivity (EC) of the materials is moderate to high, ranging from 388 to 1970 µS/cm (median 679 µS/cm), and is similar for both overburden and potential rejects. This range of electrical conductivity is comparable to the low end of salinity found in the groundwater monitoring wells (351 to

1861 µS/cm in the alluvium) and indicates that initial water solubility of these materials with respect to salinity in mineral waste materials from Caval Ridge may contribute some salt load to the shallow groundwater through seepage from the waste or CHPP.

The quality of the groundwater in the shallow aquifers that may exist within the study area (i.e. Quaternary alluvium and Tertiary sediments) have the potential to be impacted by chemical or fuel storage facilities. The risks from chemical or fuel storage will be minimised by using the management systems described in **Section 5.1.3** below.

The groundwater quality within the aquifers surrounding the Project Site will be monitored to ensure no marked deterioration in groundwater is occurring as a result of the proposed mining activities.

5.1.3 Other Impacts

Compression of the ground surface associated with the construction of roads and building foundations is not expected to greatly alter the permeability of strata immediately beneath the site, and as such will not markedly hinder the recharge of the underlying aquifers.

During mining, mobile and stationary machinery including excavators, cranes, trucks and other vehicles will be required. There is potential for hydrocarbon contamination of the soil associated with leaks or spills from this machinery (or fuel storage areas for the maintenance of machinery). Dissolved and free-phase hydrocarbon may impact on the shallow aquifers underlying and down-gradient of areas of fuel spillage.

Areas of hydrocarbon and chemical storage will have spill control measures and regular inspection regimes in order to prevent and monitor activities that could potentially lead to contamination of groundwater. Spill control measures for hydrocarbon facilities will include concrete slab bases that are bunded with oil-water separators installed on all hydrocarbon above-ground storage, refuelling and washdown areas.

Any accidental spills will be assessed on a case-by-case basis and remediated, which may include excavation and disposal of any contaminated soil in accordance with the requirements of the EPA.

There may be instances of groundwater restrictions where subsurface permanent structures (building foundations, road embankments) are constructed. This type of subsurface construction can cause groundwater flow to be impeded and pressure heads to build up on the up-gradient area and reduced down-gradient. Pressure head relief engineering solutions will be utilised in subsurface constructions, where required.

5.2 Potential Impacts Post Mining

The main features of the final landform after mining ceases will consist of waste rock dumps to the west, and final voids in the east. The final voids will collect and accumulate water from groundwater ingress through the walls of the final void and from areas of backfill material, direct rainfall into the void and from overland surface flows from the slopes of the waste dumps draining into the void. Typically, the final void will contain long-term water levels and water quality dependent on a number of inter-related hydrological and geochemical processes.

A final void study has not been conducted as part of this investigation. It is recommended that a final void study be undertaken towards the end of mine life to determine backfill and contouring requirements for the final voids, the hydrological regime of the final voids, and the expected water quality of the final voids.

Areas of backfill within the pits will have a higher porosity and permeability than the pre-existing Permian strata, forming unconsolidated and unconfined aquifers. These aquifers will be recharged by rainfall and overland flow, and may interact through lateral flow with the adjacent Permian strata aquifers and the final voids.

Section 5 Potential Impacts and Mitigation Measures

5.2.1 Impacts on Regional Groundwater Levels

After mining is complete, the groundwater system will re-adjust to the new aquifer conditions surrounding the mined area. Water levels/pressures within the regional aquifers will over time attain a new equilibrium level. This new equilibrium for the groundwater system will have a different potentiometric surface from that which was present pre-mining owing to the presence of final voids in the east of the mined area and the different hydrogeological parameters of the backfill material.

Water levels in the pit void will determine whether the void will act as a net groundwater source (if final void water levels are high relative to groundwater levels surrounding the void) or act as a net groundwater sink (if final void water levels are low relative to groundwater levels surrounding the void). Given the climate of the area is semi-arid, experience suggests that a final void water level will form, but the evaporative demand will result in the void behaving as a groundwater sink. Continued evaporation will also produce a rising TDS concentration.

This is likely to result in residual drawdown immediately surrounding the final void area when the potentiometric surface reaches the new equilibrium level. In the Moranbah Coal Measures, drawdown of the potentiometric surface close to the final voids at the cessation of mining is likely to begin to recover immediately following cessation of mining. This initial rise in the potentiometric surface close to the pits is related to the likely rise in the water levels within the final voids as dewatering from in-pit sumps is stopped.

In contrast, outside the immediate vicinity of the final void, the potentiometric surface is likely to continue to fall in the near term following cessation of mining as the groundwater system adjusts to new regional aquifer conditions. This drop in water level at distances away from the final voids (post-mining) occurs as a result of a flattening of the regional hydraulic gradient, as the groundwater system moves towards its new equilibrium state.

5.2.2 Impacts on Groundwater Quality

A rise in the final void water salinities may result from evaporative concentration processes, and from atmospheric weathering of excavated exposed bedrock. Although water quality in the final void is expected to deteriorate over time, this deterioration in water quality is not expected to impact the surrounding aquifers as the voids are expected to operate locally as a groundwater sink (i.e. groundwater flow will be toward the void), so that water within the void will not recharge the groundwater system unless water levels in the void rise above existing groundwater levels in the coal seams.

Current and previous geochemical analysis in the Moranbah Coal Measures lithology show the overburden, coal rejects, and fine tailings have low acid generation potential. Thus there is a low risk that metals will be mobilised from spoil and co-disposal dumps.

Post-mining water quality within all aquifers surrounding the project area is expected to remain the same as pre-mining water quality.

5.3 Mitigation Measures of Potential Impacts

Groundwater monitoring wells installed around the site for this investigation will be maintained to enable the long term monitoring of groundwater levels and quality. Routine monitoring will provide early warning of any variation in response of the groundwater system to that predicted. This will enable the proponent to undertake mitigation measures to minimise impact on surrounding groundwater users and the environment. In addition, the groundwater monitoring will enable the identification of any cumulative groundwater level drawdown impacts as a consequence of other mining operations in the area.

Groundwater level and quality monitoring will initially be undertaken regularly to enable the detection of seasonal fluctuations and any groundwater level or quality trends or impacts. In turn, the monitoring data (level and chemistry) will be entered into a BMA environmental monitoring database to enable a regular assessment and interrogation to evaluate potential groundwater impacts.

Should a detrimental impact on landholder groundwater supplies be detected, and shown to be related to the Caval Ridge mining operations, then the proponent will seek to reach mutually agreeable arrangements with affected neighbouring groundwater users for the provision of alternate supplies throughout the mine life, and after mine closure. Regular groundwater monitoring will enable groundwater level drawdown to be identified prior to any impacts being experienced in surrounding landholder bores. In turn, alternative water supplies can be put in place before supplies from relevant existing landholder bores are adversely affected. Options for alternate supplies include:

- installations of new pumps capable of extracting groundwater from greater depth within existing bores;
- deepening of existing bores;
- installation of a new bore at another location on the property; and
- provision of piped water sourced from the mine (i.e. surplus water from the mine pit void dewatering program, depending on quality).

The specific arrangements for affected properties will be discussed with each relevant landholder with a view to reaching a mutually acceptable agreement.

5.3.1 General Groundwater Monitoring Program

The following monitoring routine will be undertaken:

- Groundwater levels will be monitored monthly, in the entire monitoring network, for the first two years following commencement of construction to assess seasonal, natural, groundwater fluctuations;
- Thereafter, groundwater levels will be monitored quarterly a year, preferably at a similar time of year to eliminate variation from seasonal changes;
- Groundwater sampling will be undertaken on a quarterly basis from all groundwater monitoring bores for analysis of the parameters:- pH, EC, TDS, major cations and anions, nutrients (total N, NOx, ammonia, phosphorous) and selected dissolved metals (boron, chromium, copper, iron, manganese, nickel, selenium and zinc); and
- Measurement of daily precipitation, evaporation and mine dewatering volumes.

An annual review of the monitoring program will be conducted to evaluate the effectiveness of each monitoring location, to assess where new locations and modifications to the monitoring programme may be needed, and to evaluate what impacts may be occurring. A special monitoring round will be considered in the event of a significant environmental incident.

The level of data required for advanced hydrologic modelling of final voids for the mine cannot practically be obtained at the pre-mining stage. As soon as possible, the mining operation should incorporate opportunistic monitoring of temporary pit storages and groundwater within the spoil to assist in the development and calibration of a long-term predictive model. It will be important to commence field trials and monitoring (i.e. water sample collection and analysis) early so that actions necessary at the end of the life of the mine can be

included in planning and scheduling. To model the final void environment there is a need to understand the nature of the spoil hydrology process in order to identify or develop appropriate models to simulate the hydrological behaviour and water quality and to plan field data collection for model validation and calibration.

Post-mining groundwater monitoring will be subject to detailed closure/relinquishment conditions. It is expected that during the operational phase of the Project, the groundwater data collected for the region will be comprehensive enough to accurately predict the long term recovery of the aquifers and the final void water balance and water quality. This will assist in the development and implementation of the closure strategy and the refinement of post-mining groundwater monitoring programs.

5.3.2 Seepage from Stockpiles and Basins

Good environmental practice requires that every reasonable effort be made to minimise the effect of seepage on the groundwater system. Potential sources of seepage, such as sediment basins and water storages, should be lined if the natural material is not of sufficiently low permeability to limit seepage. Additional mitigation measures may include limiting the extent of ponded water in tailings dams, installation of cut-off trenches within the foundation along the alignment of the containment embankments, installation of a seepage collection system, and during construction of the containment embankments any fracture zones identified should be treated to reduce their permeability.

An extensive water management system to prevent discharge of surface storm water contaminants to off-site water bodies is proposed in the surface water section of the EIS. This system will be managed as a non release system under normal operating conditions, with discharge only expected during rainfall events when water courses are underflow conditions. Stockpiles will be contained within hardstand areas and connected via open channel drains to dedicated sediment basins. The project pond system will be designed in accordance with best-practice engineering principles, including being lined with suitable low permeability material to prevent seepage of solutes or contaminants into underlying aquifers.

Early detection of seepage will enable management of any potential problems. Potential seepage from the project ponds and stockpile areas will be regularly assessed through the installation and monitoring of the monitoring bore network on-site, including down-gradient of all potential contaminant sources. This will include monitoring of water in settlement ponds for potential contaminants.

Installation of monitoring bores down-gradient of potential seepage sources is proposed to enable early detection of any leachate entering the shallow Quaternary alluvial or Tertiary sediment aquifers. The key indicator parameters of seepage will be monitored including (but not restricted to) standing water level, salinity (as TDS), dissolved metals, and major ions initially on a three monthly basis.

In the unlikely event of groundwater impact, mitigation strategies will include some or all of the following measures (depending on the specific requirements):

- Investigation of water management system integrity;
- Removal of contaminant source and repair/ redesign of any water management structures as required;
- Installation of and pumping from, groundwater interception wells; and
- Installation of and pumping from groundwater interception trenches.

At mine closure, shaping and rehabilitation of waste piles and infrastructure footprints will be required to limit infiltration and runoff of potentially poor quality water and to monitor the effectiveness of rehabilitation.

5.3.3 Hydrocarbon and Chemical Contamination

Areas of hydrocarbon and chemical storage will have spill control measures and regular inspection regimes in order to prevent and monitor construction and operational activities that could potentially lead to contamination of groundwater. Bunded areas for hydrocarbon and chemicals storage will be provided with spill cleanup kits in accordance with the relevant Australian Standards. All transfers of fuels and chemicals will be controlled and managed to prevent spillage outside bunded areas.

Potential for leaks and spills from operating equipment will be reduced by ensuring that all equipment is well maintained.

Installation and monitoring of the monitoring bore network on-site, including down-gradient of all potential contaminant sources, will enable early detection of any contaminated seepage.

Any accidental spills will be assessed on a case-by-case basis and remediated, which may include excavation and disposal of any contaminated soil to a licensed facility and installation of a groundwater monitoring and remediation system, in accordance with the requirements of the EPA.

5.4 Groundwater Management Strategies and Legislation

The proposed Caval Ridge Mine is situated within the Highlands Subartesian Declared Area as defined under the Queensland Water Act 2000. The site is located within the Isaac River sub-catchment of the Fitzroy Basin. Under the Water Act, the DNRW is planning to advance the sustainable management and allocation of groundwater within the Isaac River sub-catchment to provide secure supplies for both water users and the environment. When the Fitzroy Basin Water Resources Plan (WRP) was finalised in 1999, no provision was made for management of the basin's groundwater resources. However, the demand for groundwater, driven mainly by mining and agriculture, in the Isaac-Connors Rivers catchment has increased significantly. The prolonged drought and record low water levels in some aquifers have raised concerns that the groundwater resource may be at risk of being overcommitted. Under provisions of the Water Act, WRP's at risk in these circumstances must be amended to regulate groundwater. Amending the Fitzroy WRP to include the groundwater resources in the Isaac-Connors catchment will enable the integrated management of the surface water and groundwater resources. The amendment will provide for the sustainable use of the groundwater resource, effective water sharing arrangements, improved definition and security of water entitlements, a framework for tradable water entitlements, water for the environment, salinity management and monitoring and reporting.

In November 2006 the minister for Natural Resources and Water announced a moratorium on the use of subartesian water contained in the alluvial aquifers of the Isaac-Connors catchment. The intent of the moratorium is to ensure the water entitlement *status-quo* remains while the draft amendment to the WRP is being developed. In the project area, the moratorium applies to:

- subartesian water in the alluvial aquifers in the unconsolidated Quaternary deposits in the area associated with the Isaac River, the Connors River and all tributaries of those rivers;
- for that part of the area that is declared as the Highlands Subartesian Area, to all applications for or about water licences to take the subartesian water mentioned above, whether made before or after the moratorium notice date; and
- for that part of the area that is undeclared (i.e. outside the Highlands Subartesian Area), works to take the subartesian water mentioned in the first dot point.

Section 5 Potential Impacts and Mitigation Measures

However, Clause 8 of the moratorium notes that the following works to take water are exempt:

- town water supply;
- stock purposes;
- domestic purposes;
- the construction, operation or maintenance of public assets and utilities;
- mining purposes, to the extent that the water is to be taken for dewatering purposes; or
- a significant project declared under Section 26 of the State Development and Public Works Organisation Act 1979.

The moratorium is expected to apply until the draft amendment has been finalised. In effect, the moratorium does not restrict the development of dewatering activities for the proposed development.

The taking of water from an aquifer within the Declared Highlands Subartesian Area is regulated by the Queensland Water Act 2000 and Water Regulation 2002 and requires a licence. Furthermore, construction and development of bores required to extract water from an aquifer under a licence is an assessable development under the Integrated Planning Act 1997.

If dewatering of the coal measures in advance of mining is required, water licences for the taking of groundwater for the proposed Caval Ridge Mine will have to be obtained by the proponent from DNRW. The licences will stipulate a maximum annual take from each relevant aquifer. Under the Water Act 2000, the DNRW has authority to direct the licensee to provide and maintain access to alternative water supplies for other water entitlement holders who would be affected by the granting of a licence.

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Analytical Results Table

Caval Ridge Project EIS
Groundwater Monitoring Wells
Analytical Results Table

Location						PZ01		PZ02			PZ03-D					
Date Sampled						10/09/2008	3/03/2009	7/06/2008	10/09/2008	3/03/2009	7/06/2008		10/09/2008		3/03/2009	
Sample Type						Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Duplicate Sample	Primary Sample	Duplicate Sample	Primary Sample	Duplicate Sample
Analyte	**LOR**	**Units**	**ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems**	**ANZECC (2000) - Livestock Drinking Water - Beef Cattle**	**ADWG (2004) - Human Drinking Water**											
Major Ions																
Sodium	1	mg/L	ne	ne	ne	1210	3120	243	319	413	3310	3250	3110	3380	3600	3370
Calcium	1	mg/L	ne	1000	ne	177	411	40	29	36	324	324	284	323	322	340
Magnesium	1	mg/L	ne	ne	ne	204	610	52	33	41	708	710	628	701	657	690
Potassium	1	mg/L	ne	ne	ne	7	20	4	8	10	28	28	28	32	28	29
Chloride	1	mg/L	ne	ne	ne	2270	6700	114	131	352	7200	6750	6310	7290	7400	7250
Sulphate	1	mg/L	ne	1000	500	422	860	94	168	92	1000	998	1030	1020	1080	1140
Bicarbonate Alkalinity as CaCO3	1	mg/L	ne	ne	ne	458	670	633	531	538	667	659	599	666	680	670
Carbonate Alkalinity as CaCO3	1	mg/L	ne	ne	ne	21	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hydroxide Alkalinity as CaCO3	1	mg/L	ne	ne	ne	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Fluoride	0.1	mg/L	ne	2	1.5	-	-	1.4	-	-	0.3	0.3	-	-	-	-
Nutrients																
Ammonia as N	0.01	mg/L	0.01	ne	ne	**0.82**	**2.75**	-	**0.24**	**0.07**	-	-	**1.36**	**1.6**	**1.33**	**1.38**
Nitrite + Nitrate as N	0.01	mg/L	0.015	ne	ne	<0.01	**0.17**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen as N	0.1	mg/L	ne	ne	ne	1.4	2.7	-	0.3	<0.1	-	-	1.6	1.9	1.8	1.9
Total Nitrogen as N	0.1	mg/L	0.25	ne	ne	**1.4**	**2.8**	-	**0.3**	<0.1	-	-	**1.6**	**1.9**	**1.8**	**1.9**
Phosphorus (total)	0.01	mg/L	0.03	ne	ne	**0.81**	0.02	-	**10**	**0.48**	-	-	**1.86**	**0.86**	**0.04**	**0.05**
Reactive Phosphorus - Filtered	0.01	mg/L	0.015	ne	ne	-	-	<0.01	-	-	<0.01	<0.01	-	-	-	-

Exceeds the ANZECC/ARMCANZ (2000) and QWQG (2006) trigger values for moderately disturbed upland stream freshwater ecosystems

Exceeds the ANZECC/ARMCANZ (2000) guidelines for livestock watering of beef cattle

Exceeds the ADWG (2004) health based guidelines for drinking water

Caval Ridge Project EIS
Groundwater Monitoring Wells
Analytical Results Table

Location						PZ01		PZ02			PZ03-D					
Date Sampled						10/09/2008	3/03/2009	7/06/2008	10/09/2008	3/03/2009	7/06/2008		10/09/2008		3/03/2009	
Sample Type						Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Duplicate Sample	Primary Sample	Duplicate Sample	Primary Sample	Duplicate Sample
Analyte	**LOR**	**Units**	**ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems**	**ANZECC (2000) - Livestock Drinking Water - Beef Cattle**	**ADWG (2004) - Human Drinking Water**											
Metals (Dissolved)																
Aluminium	0.01	mg/L	0.055	5	ne	<0.01	0.02	-	<0.01	0.02	-	-	<0.01	<0.01	0.02	**0.46**
Antimony	0	mg/L	ne	ne	0.003	<0.001	<0.001	-	<0.001	<0.001	-	-	<0.001	<0.001	<0.001	<0.001
Arsenic	0.001	mg/L	0.013	0.5	0.007	<0.001	0.001	0.001	0.001	0.006	0.004	0.003	<0.001	<0.001	<0.001	<0.001
Barium	0.001	mg/L	ne	ne	0.7	0.077	0.099	0.055	0.069	0.098	0.044	0.044	0.042	0.041	0.042	0.045
Beryllium	0.001	mg/L	ne	ne	ne	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Boron	0.05	mg/L	0.37	5	4	**0.5**	**1.5**	-	0.28	0.29	-	-	**3.17**	**3.09**	**2.79**	**2.88**
Cadmium	0.0001	mg/L	0.0002	0.01	0.002	<0.0001	0.0001	0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001
Chromium	0.001	mg/L	0.001	1	0.05	**0.013**	<0.001	<0.001	**0.007**	**0.002**	**0.002**	**0.002**	**0.013**	**0.019**	**0.002**	**0.002**
Cobalt	0	mg/L	ne	1	ne	<0.001	0.001	0.002	<0.001	<0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Copper	0.001	mg/L	0.0014	1	2	0.001	**0.002**	<0.001	<0.001	<0.001	<0.001	<0.001	**0.003**	**0.003**	**0.002**	**0.002**
Gallium	0.005	mg/L	ne	ne	ne	<0.001	<0.001	-	<0.001	<0.001	-	-	<0.001	<0.001	<0.001	<0.001
Iron	0.05	mg/L	ne	ne	ne	0.44	1.11	-	0.2	0.14	-	-	4.08	0.9	3.26	3.3
Lead	0.001	mg/L	0.0034	0.1	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	0.001	mg/L	ne	ne	ne	0.203	0.619	-	0.073	0.092	-	-	0.419	0.441	0.464	0.475
Manganese	0	mg/L	1.9	ne	0.5	0.162	0.153	0.399	0.399	0.38	0.301	0.173	0.466	0.461	0.482	0.494
Mercury	0.0001	mg/L	0.0006	0.002	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	0.001	mg/L	ne	0.15	0.05	<0.001	<0.001	-	0.024	0.026	-	-	0.001	0.001	0.001	<0.001
Nickel	0.001	mg/L	0.011	1	0.02	0.008	0.009	**0.019**	**0.012**	**0.025**	**0.02**	**0.019**	**0.012**	**0.012**	0.008	0.007
Selenium	0.01	mg/L	0.005	0.02	0.01	**0.011**	<0.01	-	<0.01	<0.01	-	-	**0.038**	**0.042**	<0.01	<0.01
Strontium	0.001	mg/L	ne	ne	ne	10.1	30.1	-	0.558	0.82	-	-	7.55	7.75	7.07	7.13
Thorium	0.001	mg/L	ne	ne	ne	<0.001	<0.001	-	<0.001	<0.001	-	-	<0.001	<0.001	<0.001	<0.001
Titanium	0.01	mg/L	ne	ne	ne	<0.01	<0.01	-	<0.01	<0.01	-	-	0.02	<0.01	<0.01	<0.01
Uranium	0.001	mg/L	ne	0.2	0.02	0.001	0.006	-	0.003	0.002	-	-	<0.001	<0.001	<0.001	<0.001
Vanadium	0.001	mg/L	ne	ne	ne	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.001	mg/L	0.008	20	ne	<0.005	**0.021**	**0.013**	**0.011**	0.006	<0.005	<0.005	**0.01**	**0.008**	**0.037**	**0.038**

freshwater ecosystems

Exceeds the ANZECC/ARMCANZ (2000) guidelines for livestock watering of beef cattle

Exceeds the ADWG (2004) health based guidelines for drinking water

Caval Ridge Project EIS
Groundwater Monitoring Wells
Analytical Results Table

Location						PZ03-S			PZ04			PZ05	PZ06-D			
Date Sampled						7/06/2008	10/09/2008	3/03/2009	8/06/2008	11/09/2008	3/03/2009	28/02/2009	5/06/2008		10/09/2008	27/02/2009
Sample Type						Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Duplicate Sample	Primary Sample	Primary Sample
Analyte	**LOR**	**Units**	**ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems**	**ANZECC (2000) - Livestock Drinking Water - Beef Cattle**	**ADWG (2004) - Human Drinking Water**											
Major Ions																
Sodium	1	mg/L	ne	ne	ne	2100	2200	2250	187	209	207	2720	298	300	347	290
Calcium	1	mg/L	ne	1000	ne	203	184	195	29	33	30	414	36	36	36	33
Magnesium	1	mg/L	ne	ne	ne	571	476	560	11	12	12	435	41	42	43	43
Potassium	1	mg/L	ne	ne	ne	14	13	13	<1	1	1	25	4	4	4	3
Chloride	1	mg/L	ne	ne	ne	4810	4450	4730	135	142	164	5690	256	254	365	312
Sulphate	1	mg/L	ne	1000	500	468	411	497	19	15	3	406	105	105	75	60
Bicarbonate Alkalinity as CaCO3	1	mg/L	ne	ne	ne	866	824	896	314	345	350	667	474	466	484	476
Carbonate Alkalinity as CaCO3	1	mg/L	ne	ne	ne	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hydroxide Alkalinity as CaCO3	1	mg/L	ne	ne	ne	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Fluoride	0.1	mg/L	ne	2	1.5	0.6	-	-	0.2	-	-	-	0.4	0.4	-	-
Nutrients																
Ammonia as N	0.01	mg/L	0.01	ne	ne	-	**0.17**	**0.09**	-	**1.08**	**0.19**	**1.46**	-	-	**0.42**	**0.29**
Nitrite + Nitrate as N	0.01	mg/L	0.015	ne	ne	**0.319**	**0.39**	**0.93**	<0.01	**0.02**	<0.01	**0.03**	<0.01	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen as N	0.1	mg/L	ne	ne	ne	-	0.6	0.1	-	2.1	0.3	1.9	-	-	0.8	2.9
Total Nitrogen as N	0.1	mg/L	0.25	ne	ne	-	**1**	**1**	-	**2.1**	**0.3**	**1.9**	-	-	**0.8**	**2.9**
Phosphorus (total)	0.01	mg/L	0.03	ne	ne	-	**1.65**	**0.8**	-	**0.52**	**0.03**	**0.04**	-	-	**0.51**	**0.08**
Reactive Phosphorus - Filtered	0.01	mg/L	0.015	ne	ne	0.01	-	-	**0.023**	-	-	-	<0.01	<0.01	-	-

Exceeds the ANZECC/ARMCANZ (2000) and QWQG (2006) trigger values for moderately disturbed upland stream freshwater ecosystems

Exceeds the ANZECC/ARMCANZ (2000) guidelines for livestock watering of beef cattle

Exceeds the ADWG (2004) health based guidelines for drinking water

Caval Ridge Project EIS
Groundwater Monitoring Wells
Analytical Results Table

Location						PZ03-S			PZ04			PZ05	PZ06-D			
Date Sampled						7/06/2008	10/09/2008	3/03/2009	8/06/2008	11/09/2008	3/03/2009	28/02/2009	5/06/2008		10/09/2008	27/02/2009
Sample Type						Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Duplicate Sample	Primary Sample	Primary Sample
Analyte	**LOR**	**Units**	**ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems**	**ANZECC (2000) - Livestock Drinking Water - Beef Cattle**	**ADWG (2004) - Human Drinking Water**											
Metals (Dissolved)																
Aluminium	0.01	mg/L	0.055	5	ne	-	<0.01	0.02	-	0.01	0.02	0.03	-	-	<0.01	0.02
Antimony	0	mg/L	ne	ne	0.003	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	-	<0.001	<0.001
Arsenic	0.001	mg/L	0.013	0.5	0.007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.007	0.005	0.005	<0.001	<0.001
Barium	0.001	mg/L	ne	ne	0.7	0.186	0.184	0.12	0.025	0.049	0.065	0.398	0.09	0.09	0.07	0.076
Beryllium	0.001	mg/L	ne	ne	ne	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	0.05	mg/L	0.37	5	4	-	**1.14**	**1.28**	-	0.07	<0.05	**2**	-	-	0.3	0.25
Cadmium	0.0001	mg/L	0.0002	0.01	0.002	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	**0.0003**	<0.0001	0.0002
Chromium	0.001	mg/L	0.001	1	0.05	**0.003**	**0.014**	<0.001	<0.001	**0.008**	**0.001**	**0.002**	<0.001	<0.001	**0.012**	<0.001
Cobalt	0	mg/L	ne	1	ne	0.029	0.037	0.02	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	0.001	mg/L	0.0014	1	2	0.001	**0.002**	**0.002**	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.001
Gallium	0.005	mg/L	ne	ne	ne	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	-	<0.001	<0.001
Iron	0.05	mg/L	ne	ne	ne	-	1.38	0.43	-	1.04	2.23	0.46	-	-	0.4	0.91
Lead	0.001	mg/L	0.0034	0.1	0.01	<0.001	<0.001	**0.004**	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	0.001	mg/L	ne	ne	ne	-	0.211	0.278	-	0.002	0.003	0.485	-	-	0.029	0.028
Manganese	0	mg/L	1.9	ne	0.5	**1.49**	**2.73**	**0.841**	0.061	0.134	0.163	**1.09**	0.061	0.062	0.084	0.077
Mercury	0.0001	mg/L	0.0006	0.002	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	0.001	mg/L	ne	0.15	0.05	-	0.004	0.002	-	<0.001	<0.001	<0.001	-	-	0.004	0.003
Nickel	0.001	mg/L	0.011	1	0.02	**0.031**	**0.041**	**0.023**	0.002	0.002	<0.001	0.007	0.004	0.004	0.006	0.004
Selenium	0.01	mg/L	0.005	0.02	0.01	-	**0.024**	<0.01	-	<0.01	<0.01	<0.01	-	-	<0.01	<0.01
Strontium	0.001	mg/L	ne	ne	ne	-	5.88	6.35	-	0.233	0.281	10.4	-	-	0.989	0.867
Thorium	0.001	mg/L	ne	ne	ne	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	-	<0.001	<0.001
Titanium	0.01	mg/L	ne	ne	ne	-	<0.01	<0.01	-	<0.01	<0.01	0.01	-	-	<0.01	<0.01
Uranium	0.001	mg/L	ne	0.2	0.02	-	0.01	0.013	-	<0.001	<0.001	0.001	-	-	<0.001	<0.001
Vanadium	0.001	mg/L	ne	ne	ne	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.001	mg/L	0.008	20	ne	0.006	**0.012**	**0.018**	<0.005	<0.005	**0.008**	0.007	0.006	**0.016**	<0.005	**0.015**

freshwater ecosystems

Exceeds the ANZECC/ARMCANZ (2000) guidelines for livestock watering of beef cattle

Exceeds the ADWG (2004) health based guidelines for drinking water

Caval Ridge Project EIS
Groundwater Monitoring Wells
Analytical Results Table

Location						PZ06-S			PZ07-D			PZ07-S		
Date Sampled						5/06/2008	10/09/2008	27/02/2009	5/06/2008	9/09/2008	28/02/2009	5/06/2008	9/09/2008	28/02/2009
Sample Type						Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample
Analyte	**LOR**	**Units**	**ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems**	**ANZECC (2000) - Livestock Drinking Water - Beef Cattle**	**ADWG (2004) - Human Drinking Water**									
Major Ions														
Sodium	1	mg/L	ne	ne	ne	245	220	223	563	646	682	15	14	20
Calcium	1	mg/L	ne	1000	ne	51	30	42	75	79	83	27	29	33
Magnesium	1	mg/L	ne	ne	ne	90	73	77	74	83	87	17	16	19
Potassium	1	mg/L	ne	ne	ne	4	4	4	6	7	7	6	6	7
Chloride	1	mg/L	ne	ne	ne	336	296	265	814	936	928	26	34	41
Sulphate	1	mg/L	ne	1000	500	58	30	37	150	151	168	6	6	15
Bicarbonate Alkalinity as CaCO3	1	mg/L	ne	ne	ne	494	462	554	489	503	546	130	127	134
Carbonate Alkalinity as CaCO3	1	mg/L	ne	ne	ne	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hydroxide Alkalinity as CaCO3	1	mg/L	ne	ne	ne	<1	<1	<1	<1	<1	<1	<1	<1	<1
Fluoride	0.1	mg/L	ne	2	1.5	0.2	-	-	0.2	-	-	0.3	-	-
Nutrients														
Ammonia as N	0.01	mg/L	0.01	ne	ne	-	**0.5**	**0.04**	-	**0.71**	**0.64**	-	**0.16**	<0.01
Nitrite + Nitrate as N	0.01	mg/L	0.015	ne	ne	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	**0.076**	<0.01	<0.01
Total Kjeldahl Nitrogen as N	0.1	mg/L	ne	ne	ne	-	0.7	<0.1	-	2.4	2.1	-	25.4	<0.1
Total Nitrogen as N	0.1	mg/L	0.25	ne	ne	-	**0.7**	<0.1	-	**2.4**	**2.1**	-	**25.4**	<0.1
Phosphorus (total)	0.01	mg/L	0.03	ne	ne	-	**2.03**	**0.23**	-	**0.45**	**0.11**	-	**3.24**	**0.12**
Reactive Phosphorus - Filtered	0.01	mg/L	0.015	ne	ne	<0.01	-	-	<0.01	-	-	<0.01	-	-

Exceeds the ANZECC/ARMCANZ (2000) and QWQG (2006) trigger values for moderately disturbed upland stream freshwater ecosystems

Exceeds the ANZECC/ARMCANZ (2000) guidelines for livestock watering of beef cattle

Exceeds the ADWG (2004) health based guidelines for drinking water

Caval Ridge Project EIS
Groundwater Monitoring Wells
Analytical Results Table

Location						PZ06-S			PZ07-D			PZ07-S		
Date Sampled						5/06/2008	10/09/2008	27/02/2009	5/06/2008	9/09/2008	28/02/2009	5/06/2008	9/09/2008	28/02/2009
Sample Type						Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample
Analyte	**LOR**	**Units**	**ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems**	**ANZECC (2000) - Livestock Drinking Water - Beef Cattle**	**ADWG (2004) - Human Drinking Water**									
Metals (Dissolved)														
Aluminium	0.01	mg/L	0.055	5	ne	-	<0.01	0.03	-	<0.01	0.02	-	0.04	0.03
Antimony	0	mg/L	ne	ne	0.003	-	<0.001	**0.004**	-	<0.001	<0.001	-	<0.001	<0.001
Arsenic	0.001	mg/L	0.013	0.5	0.007	0.004	0.002	0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	0.001	mg/L	ne	ne	0.7	0.089	0.067	0.09	0.046	0.065	0.067	0.082	0.138	0.137
Beryllium	0.001	mg/L	ne	ne	ne	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	0.05	mg/L	0.37	5	4	-	0.24	0.25	-	0.35	0.32	-	0.09	0.07
Cadmium	0.0001	mg/L	0.0002	0.01	0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	**0.0003**	<0.0001	<0.0001	<0.0001
Chromium	0.001	mg/L	0.001	1	0.05	<0.001	**0.012**	<0.001	<0.001	**0.007**	<0.001	<0.001	<0.001	<0.001
Cobalt	0	mg/L	ne	1	ne	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	0.001	mg/L	0.0014	1	2	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
Gallium	0.005	mg/L	ne	ne	ne	-	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
Iron	0.05	mg/L	ne	ne	ne	-	0.13	<0.05	-	0.7	0.47	-	0.23	0.63
Lead	0.001	mg/L	0.0034	0.1	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001
Lithium	0.001	mg/L	ne	ne	ne	-	0.014	0.014	-	0.066	0.076	-	0.025	0.031
Manganese	0	mg/L	1.9	ne	0.5	0.279	0.186	0.123	0.009	0.031	0.027	<0.001	0.151	0.224
Mercury	0.0001	mg/L	0.0006	0.002	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	0.001	mg/L	ne	0.15	0.05	-	0.014	0.012	-	<0.001	0.002	-	<0.001	<0.001
Nickel	0.001	mg/L	0.011	1	0.02	0.011	0.01	0.002	0.002	0.006	0.004	<0.001	<0.001	<0.001
Selenium	0.01	mg/L	0.005	0.02	0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01
Strontium	0.001	mg/L	ne	ne	ne	-	1.22	1.42	-	4.88	4.39	-	0.233	0.267
Thorium	0.001	mg/L	ne	ne	ne	-	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
Titanium	0.01	mg/L	ne	ne	ne	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01
Uranium	0.001	mg/L	ne	0.2	0.02	-	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
Vanadium	0.001	mg/L	ne	ne	ne	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.001	mg/L	0.008	20	ne	**0.008**	<0.005	**0.014**	<0.005	<0.005	0.007	<0.005	0.006	**0.008**

freshwater ecosystems

Exceeds the ANZECC/ARMCANZ (2000) guidelines for livestock watering of beef cattle

Exceeds the ADWG (2004) health based guidelines for drinking water

Caval Ridge Project EIS
Groundwater Monitoring Wells
Analytical Results Table

Location						PZ08-D			PZ08-S			PZ09		
Date Sampled						6/06/2008	9/09/2008	28/02/2009	6/06/2008	9/09/2008	28/02/2009	8/09/2008	2/03/2009	
Sample Type						Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Duplicate Sample
Analyte	**LOR**	**Units**	**ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems**	**ANZECC (2000) - Livestock Drinking Water - Beef Cattle**	**ADWG (2004) - Human Drinking Water**									
Major Ions														
Sodium	1	mg/L	ne	ne	ne	1700	1880	2050	288	242	283	1600	1830	1760
Calcium	1	mg/L	ne	1000	ne	327	346	378	105	52	69	460	475	459
Magnesium	1	mg/L	ne	ne	ne	327	337	360	82	46	60	295	325	313
Potassium	1	mg/L	ne	ne	ne	35	42	42	23	18	19	17	16	16
Chloride	1	mg/L	ne	ne	ne	3420	3650	3510	695	335	391	3800	-	4230
Sulphate	1	mg/L	ne	1000	500	**1090**	**1250**	**1350**	84	88	136	**817**	-	**719**
Bicarbonate Alkalinity as CaCO3	1	mg/L	ne	ne	ne	401	407	433	272	317	348	111	-	99
Carbonate Alkalinity as CaCO3	1	mg/L	ne	ne	ne	<1	<1	<1	<1	<1	<1	<1	-	<1
Hydroxide Alkalinity as CaCO3	1	mg/L	ne	ne	ne	<1	<1	<1	<1	<1	<1	<1	-	<1
Fluoride	0.1	mg/L	ne	2	1.5	0.2	-	-	0.3	-	-	-	-	-
Nutrients														
Ammonia as N	0.01	mg/L	0.01	ne	ne	-	**1.53**	**1.54**	-	**0.05**	<0.01	**2.77**	**2.31**	**2.47**
Nitrite + Nitrate as N	0.01	mg/L	0.015	ne	ne	<0.01	<0.01	<0.01	<0.01	**0.08**	**0.02**	<0.01	**0.26**	<0.01
Total Kjeldahl Nitrogen as N	0.1	mg/L	ne	ne	ne	-	1.6	2	-	6.4	<0.1	3.1	3.8	2.4
Total Nitrogen as N	0.1	mg/L	0.25	ne	ne	-	**1.6**	**2**	-	**6.5**	<0.1	**3.1**	**4**	**2.4**
Phosphorus (total)	0.01	mg/L	0.03	ne	ne	-	**0.22**	0.01	-	**3.72**	**0.12**	**0.36**	**0.08**	<0.01
Reactive Phosphorus - Filtered	0.01	mg/L	0.015	ne	ne	<0.01	-	-	0.011	-	-	-	-	-

Exceeds the ANZECC/ARMCANZ (2000) and QWQG (2006) trigger values for moderately disturbed upland stream freshwater ecosystems

Exceeds the ANZECC/ARMCANZ (2000) guidelines for livestock watering of beef cattle

Exceeds the ADWG (2004) health based guidelines for drinking water

Caval Ridge Project EIS
Groundwater Monitoring Wells
Analytical Results Table

Location						PZ08-D			PZ08-S			PZ09		
Date Sampled						6/06/2008	9/09/2008	28/02/2009	6/06/2008	9/09/2008	28/02/2009	8/09/2008	2/03/2009	
Sample Type						Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Duplicate Sample
Analyte	**LOR**	**Units**	**ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems**	**ANZECC (2000) - Livestock Drinking Water - Beef Cattle**	**ADWG (2004) - Human Drinking Water**									
Metals (Dissolved)														
Aluminium	0.01	mg/L	0.055	5	ne	-	<0.01	0.02	-	<0.01	0.02	<0.01	0.02	0.02
Antimony	0	mg/L	ne	ne	0.003	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	0.001	mg/L	0.013	0.5	0.007	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	0.001	mg/L	ne	ne	0.7	0.038	0.032	0.03	0.272	0.174	0.235	0.061	0.051	0.05
Beryllium	0.001	mg/L	ne	ne	ne	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	0.05	mg/L	0.37	5	4	-	**0.73**	**0.67**	-	**0.46**	**0.38**	0.13	0.11	0.08
Cadmium	0.0001	mg/L	0.0002	0.01	0.002	<0.0001	<0.0001	**0.0006**	<0.0001	<0.0001	0.0002	<0.0001	**0.0003**	**0.0006**
Chromium	0.001	mg/L	0.001	1	0.05	<0.001	**0.011**	<0.001	<0.001	**0.004**	<0.001	**0.002**	**0.002**	**0.002**
Cobalt	0	mg/L	ne	1	ne	<0.001	<0.001	<0.001	0.006	<0.001	<0.001	0.002	0.001	0.001
Copper	0.001	mg/L	0.0014	1	2	<0.001	**0.003**	<0.001	<0.001	<0.001	<0.001	**0.002**	0.001	0.001
Gallium	0.005	mg/L	ne	ne	ne	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	0.05	mg/L	ne	ne	ne	-	0.84	2.95	-	0.11	<0.05	3.31	2.56	2.5
Lead	0.001	mg/L	0.0034	0.1	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	0.001	mg/L	ne	ne	ne	-	0.53	0.62	-	0.149	0.182	0.413	0.47	0.396
Manganese	0	mg/L	1.9	ne	0.5	0.119	0.218	0.126	0.673	0.009	0.009	0.335	0.196	0.19
Mercury	0.0001	mg/L	0.0006	0.002	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	0.001	mg/L	ne	0.15	0.05	-	<0.001	<0.001	-	<0.001	<0.001	0.001	<0.001	<0.001
Nickel	0.001	mg/L	0.011	1	0.02	0.008	0.01	**0.015**	0.005	0.002	<0.001	**0.012**	0.002	0.003
Selenium	0.01	mg/L	0.005	0.02	0.01	-	**0.025**	<0.01	-	<0.01	<0.01	**0.028**	<0.01	<0.01
Strontium	0.001	mg/L	ne	ne	ne	-	6.94	6.43	-	0.568	0.749	39.2	34.4	34
Thorium	0.001	mg/L	ne	ne	ne	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	0.01	mg/L	ne	ne	ne	-	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium	0.001	mg/L	ne	0.2	0.02	-	<0.001	<0.001	-	0.002	0.003	<0.001	<0.001	<0.001
Vanadium	0.001	mg/L	ne	ne	ne	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.001	mg/L	0.008	20	ne	<0.005	<0.005	**0.025**	<0.005	<0.005	**0.01**	<0.005	**0.008**	**0.008**

freshwater ecosystems

Exceeds the ANZECC/ARMCANZ (2000) guidelines for livestock watering of beef cattle

Exceeds the ADWG (2004) health based guidelines for drinking water

Caval Ridge Project EIS
Groundwater Monitoring Wells
Analytical Results Table

Location	PZ10	PZ11-D	
Date Sampled	8/09/2008	8/09/2008	2/03/2009
Sample Type	Primary Sample	Primary Sample	Primary Sample

Analyte	LOR	Units	ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems	ANZECC (2000) - Livestock Drinking Water - Beef Cattle	ADWG (2004) - Human Drinking Water			
Major Ions								
Sodium	1	mg/L	ne	ne	ne	771	1280	1410
Calcium	1	mg/L	ne	1000	ne	140	275	293
Magnesium	1	mg/L	ne	ne	ne	124	128	137
Potassium	1	mg/L	ne	ne	ne	11	9	8
Chloride	1	mg/L	ne	ne	ne	1210	2770	2920
Sulphate	1	mg/L	ne	1000	500	**626**	247	320
Bicarbonate Alkalinity as CaCO3	1	mg/L	ne	ne	ne	139	79	117
Carbonate Alkalinity as CaCO3	1	mg/L	ne	ne	ne	<1	<1	<1
Hydroxide Alkalinity as CaCO3	1	mg/L	ne	ne	ne	<1	<1	<1
Fluoride	0.1	mg/L	ne	2	1.5	-	-	-
Nutrients								
Ammonia as N	0.01	mg/L	0.01	ne	ne	**1.02**	**2.39**	**2.54**
Nitrite + Nitrate as N	0.01	mg/L	0.015	ne	ne	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen as N	0.1	mg/L	ne	ne	ne	1.8	2.5	3.2
Total Nitrogen as N	0.1	mg/L	0.25	ne	ne	**1.8**	**2.5**	**3.2**
Phosphorus (total)	0.01	mg/L	0.03	ne	ne	**1.78**	**3.13**	**0.04**
Reactive Phosphorus - Filtered	0.01	mg/L	0.015	ne	ne	-	-	-

Exceeds the ANZECC/ARMCANZ (2000) and QWQG (2006) trigger values for moderately disturbed upland stream freshwater ecosystems

Exceeds the ANZECC/ARMCANZ (2000) guidelines for livestock watering of beef cattle

Exceeds the ADWG (2004) health based guidelines for drinking water

Caval Ridge Project EIS
Groundwater Monitoring Wells
Analytical Results Table

Location	PZ10	PZ11-D	
Date Sampled	8/09/2008	8/09/2008	2/03/2009
Sample Type	Primary Sample	Primary Sample	Primary Sample

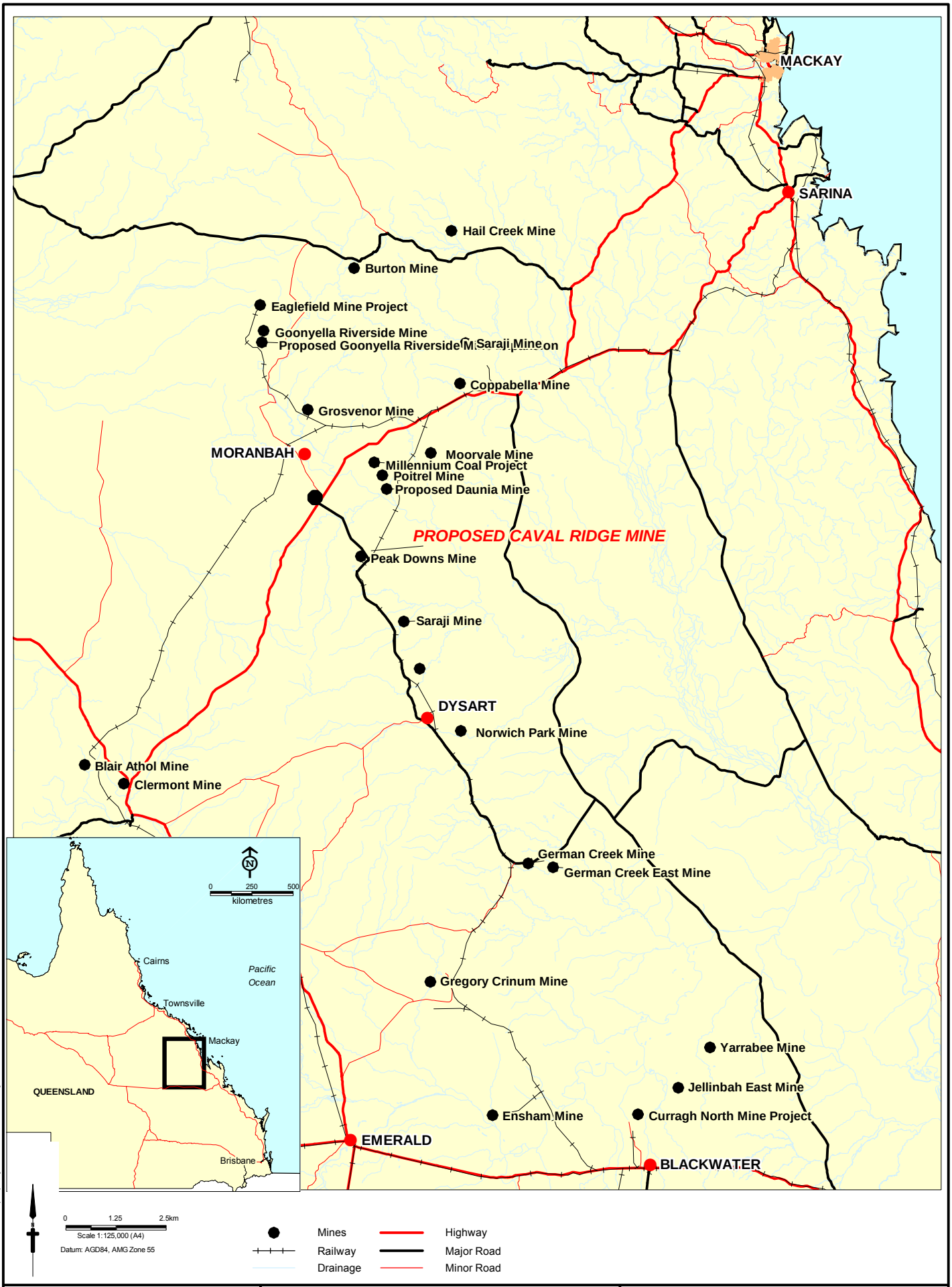
Analyte	LOR	Units	ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems	ANZECC (2000) - Livestock Drinking Water - Beef Cattle	ADWG (2004) - Human Drinking Water			
Metals (Dissolved)								
Aluminium	0.01	mg/L	0.055	5	ne	<0.01	0.01	0.02
Antimony	0	mg/L	ne	ne	0.003	<0.001	<0.001	<0.001
Arsenic	0.001	mg/L	0.013	0.5	0.007	0.001	0.003	<0.001
Barium	0.001	mg/L	ne	ne	0.7	0.036	0.081	0.074
Beryllium	0.001	mg/L	ne	ne	ne	<0.001	<0.001	<0.001
Boron	0.05	mg/L	0.37	5	4	**0.5**	0.15	0.11
Cadmium	0.0001	mg/L	0.0002	0.01	0.002	<0.0001	<0.0001	<0.0001
Chromium	0.001	mg/L	0.001	1	0.05	**0.004**	**0.002**	**0.002**
Cobalt	0	mg/L	ne	1	ne	<0.001	<0.001	<0.001
Copper	0.001	mg/L	0.0014	1	2	**0.002**	0.001	<0.001
Gallium	0.005	mg/L	ne	ne	ne	<0.001	<0.001	<0.001
Iron	0.05	mg/L	ne	ne	ne	1.58	1.76	1.32
Lead	0.001	mg/L	0.0034	0.1	0.01	<0.001	<0.001	<0.001
Lithium	0.001	mg/L	ne	ne	ne	0.326	0.715	0.81
Manganese	0	mg/L	1.9	ne	0.5	0.197	0.032	0.034
Mercury	0.0001	mg/L	0.0006	0.002	0.001	<0.0001	<0.0001	<0.0001
Molybdenum	0.001	mg/L	ne	0.15	0.05	0.003	0.002	0.004
Nickel	0.001	mg/L	0.011	1	0.02	0.009	0.006	0.003
Selenium	0.01	mg/L	0.005	0.02	0.01	**0.019**	**0.019**	<0.01
Strontium	0.001	mg/L	ne	ne	ne	11.4	47.3	42.7
Thorium	0.001	mg/L	ne	ne	ne	<0.001	<0.001	<0.001
Titanium	0.01	mg/L	ne	ne	ne	<0.01	<0.01	<0.01
Uranium	0.001	mg/L	ne	0.2	0.02	<0.001	<0.001	<0.001
Vanadium	0.001	mg/L	ne	ne	ne	<0.01	<0.01	<0.01
Zinc	0.001	mg/L	0.008	20	ne	<0.005	0.006	**0.008**

freshwater ecosystems

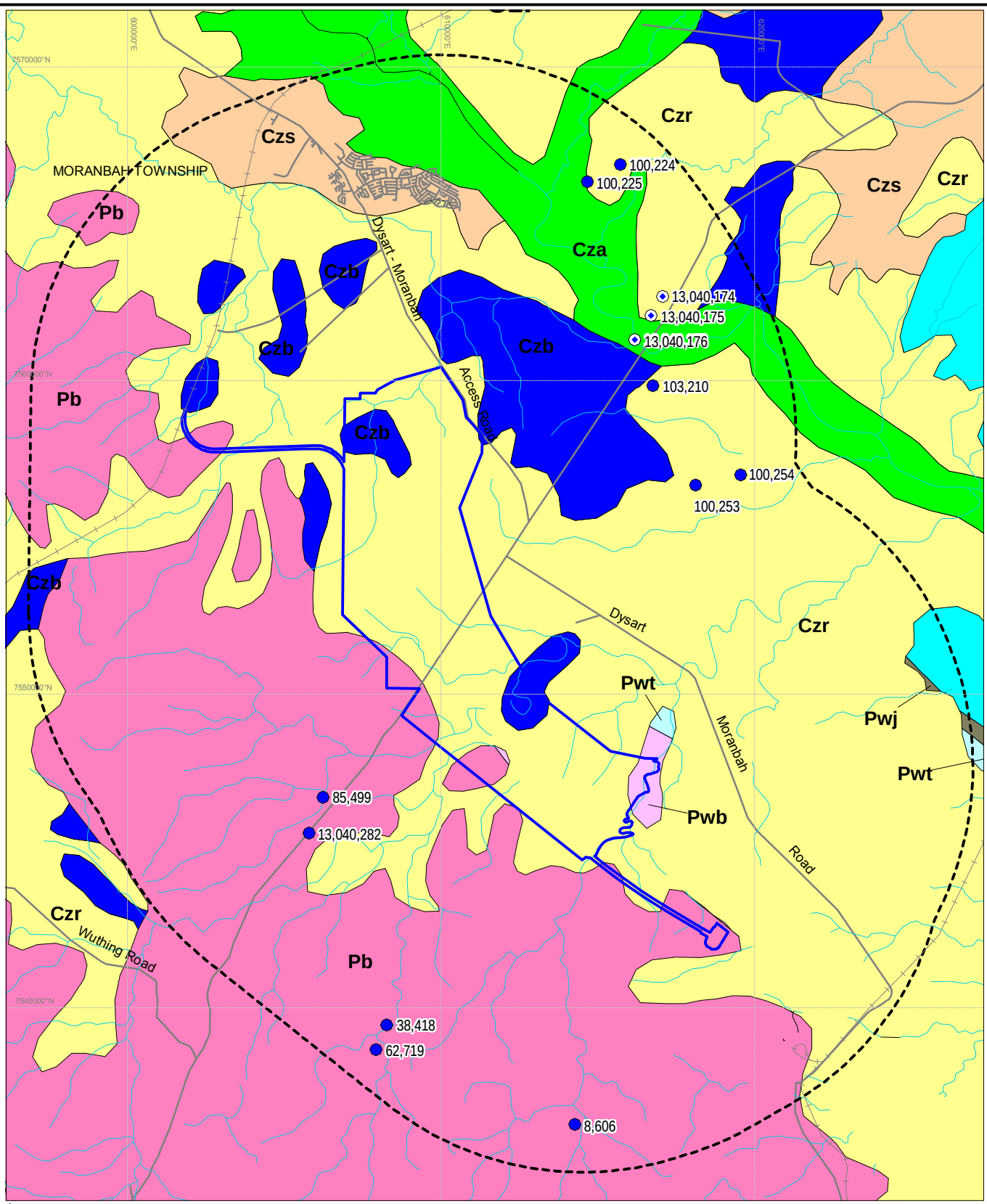
Exceeds the ANZECC/ARMCANZ (2000) guidelines for livestock watering of beef cattle

Exceeds the ADWG (2004) health based guidelines for drinking water

Figures



Client: BMA / BHP Billiton Mitsubishi Alliance	Project: CAVAL RIDGE PROJECT GROUNDWATER REPORT		Title: **STUDY AREA LOCALITY**
URS	Drawn: VH	Approved: SD	Date: 12-02-2009
	Job No: **4262 6158**	File No: 42626158-g-138.wor	Figure: **1**
			Rev:A A4



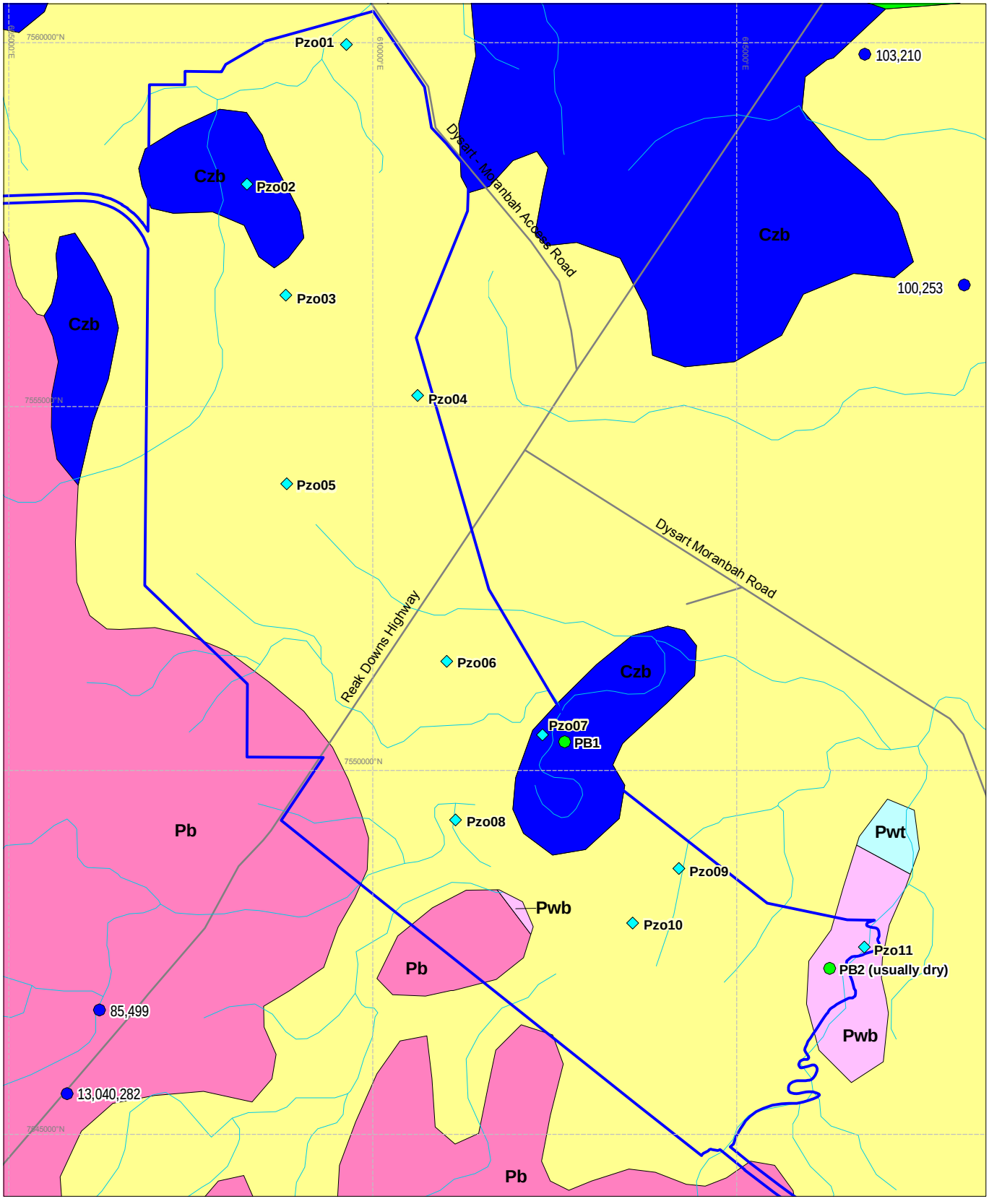
Source: Client Supplied Data (December 2007), Qld Gov. DME Geological Mapping, 2007

Client: BHP Billiton Mitsubishi Alliance

Project: CAVAL RIDGE PROJECT
GROUNDWATER IMPACT ASSESSMENT

Title: **LOCATION OF BORES WITHIN 10km OF SITE - REGISTERED WITH DNRW OVERLAIN ON GEOLOGY**

Drawn: VH	Approved: SD	Date: 12-02-2009	Figure: 2	Rev:A
Job No: **4262 6158**	File No: 42626158-g-139.wor			A4



0 1 2km

Scale 1:75,000 (A4)

Datum: AGD84, AMG Zone 55

Czb	Undifferentiated Tertiary Basalts	◆	Monitoring Wells Installed
Czr	Undifferentiated Tertiary Sediments	●	Monitoring Wells - Peak Downs
Pwt	Fair Hill Formation	●	DNRW Registered Bore
Pwb	Moranbah Coal Measures	Pb	Geological Boundary and Geological Regime
Pb	Back Creek Group		Project Area

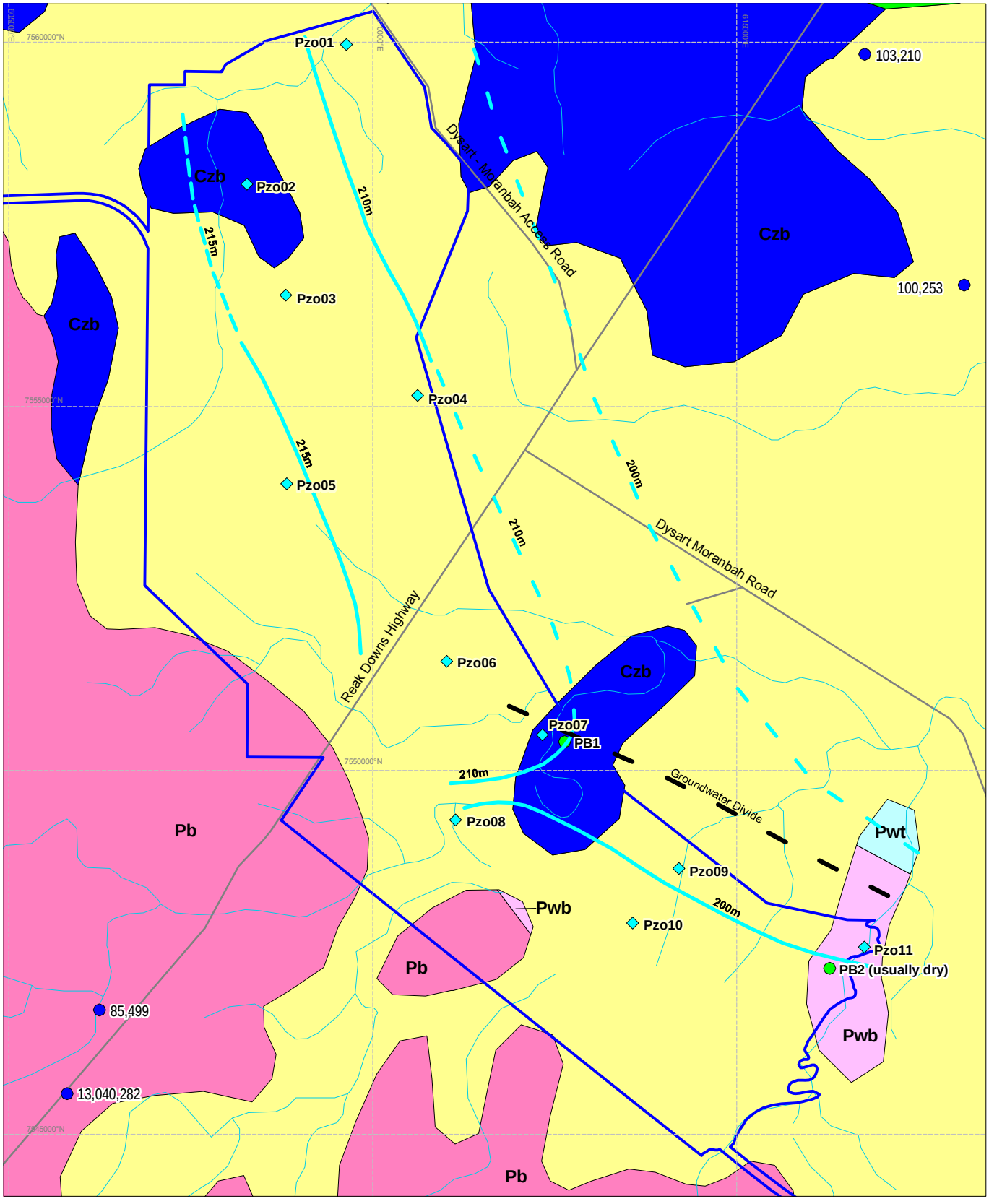
Source: Client Supplied Data (December 2007), Qld Gov. DME Geological Mapping, 2007

Client: BHP Billiton Mitsubishi Alliance

Project: CAVAL RIDGE PROJECT
GROUNDWATER IMPACT ASSESSMENT

Title: **LOCATION OF GROWNDWATER MONITORING WELLS INSTALLED AROUND THE PROJECT AREA**

Drawn: VH	Approved: SD	Date: 12-02-2009	Figure: **3**
Job No: **4262 6158**	File No: 42626158-g-140.wor		Rev:A A4



Source: Client Supplied Data (December 2007), Qld Gov. DME Geological Mapping, 2007

Client: BHP Billiton Mitsubishi Alliance

Project: CAVAL RIDGE PROJECT
GROUNDWATER IMPACT ASSESSMENT

Title: **GROUNDWATER ELEVATION CONTOURS OF PERMIAN MORANBAH COAL MEASURES**

Drawn: VH	Approved: SD	Date: 12-02-2009	Figure: 4	Rev:A
Job No: **4262 6158**	File No: 42626158-g-141.wor			A4

DNRW Database Search Results

Appendix A

Caval Ridge Project EIS
DNRW Registered Bores

Registered Number	Facility Owner	Facility Name	Status	Easting (m)	Northing (m)	Zone (GDA)
8606	Cherwell Holding	Folsters	Existing	614390	7536451	55
38418	Cherwell Holding	Coal Hole Bore	Existing	608380	7539621	55
62719	Cherwell Holding	Coal Hole Bore	Existing	608044	7538841	55
85499	Skyville	Shellys Bore	Existing	606359	7546888	55
100224	Mitsubishi Gas Company	MGC Moranbah 1	Existing	615843	7567074	55
100225	Mitsubishi Gas Company	MGC Moranbah 2	Existing	614778	7566528	55
100253	Mitsubishi Gas Company	MGC River Paddock 1	Existing	618233	7556847	55
100254	Mitsubishi Gas Company	MGC River Paddock 2	Existing	619668	7557174	55
103210			Existing	616869	7560018	55
13040174	Department of Natural Resources and Water	B1S1	Abandoned and destroyed	617190	7562863	55
13040175	Department of Natural Resources and Water	B2S2	Abandoned and destroyed	616813	7562251	55
13040176	Department of Natural Resources and Water	B3S3	Abandoned and destroyed	616291	7561486	55
13040282	Department of Natural Resources and Water	NAP Issac River Site 1	Existing	605910	7545740	55

Registered Number	Elevation of Ground Level (mAHD)	Elevation of Reference Point (mAHD)	Date Drilled	Lithology Log Available	Stratigraphy
8606	na	na	na	No	
38418	na	na	1/01/1957	Yes	Blenheim Sandstone
62719	na	na	1/01/1986	No	
85499	na	na	30/05/1992	Yes	Blenheim Subgroup
100224	na	na	5/11/1993	No	
100225	na	na	10/10/1994	No	
100253	na	na	25/08/1993	No	
100254	na	na	16/09/1994	No	
103210	na	na	22/09/1999	Yes	
13040174	207.62	na	na	Yes	
13040175	207.94	na	na	Yes	
13040176	204.08	na	na	Yes	
13040282	275.2	275.56	27/08/2004	Yes	Undefined Quaternary, Back Creek Group

Registered Number	Aquifers	Casing Description Available	Water Chemistry Available	Water Levels
8606		No		
38418	Blenheim Sandstone	Yes		1957
62719		Yes		
85499	Blenheim Subgroup	Yes	Field parameters and laboratory results for 1992, 1997	
100224		No		
100225		No		
100253		No		
100254		No		
103210	Blackwater Group	No		
13040174		Abandoned and destroyed		
13040175		Abandoned and destroyed		
13040176		Abandoned and destroyed		
13040282	Back Creek Group	Yes		2004 to 2007

BMA Peak Downs Monitoring Well Data

Appendix B

Caval Ridge Project EIS
Peak Downs Monitoring Bore Data

Sample Point	Easting (m)	Northing (m)	Sample Date	pH	EC (µS/cm)	Depth to Water (mBTOC)
PB1	612634.076	7550391.974	27/11/2007 9:50	7.06	1474	16.99
			12/09/2007 13:30	6.83	1721	17.14
			25/05/2007 8:55	7.01	1840	16.85
			21/02/2007 8:55	6.96	1810	16.43
			14/11/2006	7.02	2030	16.7
			21/02/2006	7.09	2090	16.24
			9/11/2005	6.99	2490	16.22
			11/08/2005	6.93	2730	16.15
PB2	616273.772	7547283.398	12/09/2007 13:45	Dry	Dry	Dry
			25/05/2007 9:50	Dry	Dry	Dry
			21/02/2007 8:20	Dry	Dry	Dry
			14/11/2006	Dry	Dry	Dry

Installed Monitoring Well Logs

Appendix C

URS

MONITORING WELL Pz01

URS Australia Pty Ltd
Level 14, 240 Queen St, Brisbane QLD
Phone +61 7 3243 2111
Fax +61 7 3243 2199

Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**85.50 m**	Coordinates:	**mN**
Date Started:	**12-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**13-5-08**			Permit No:	

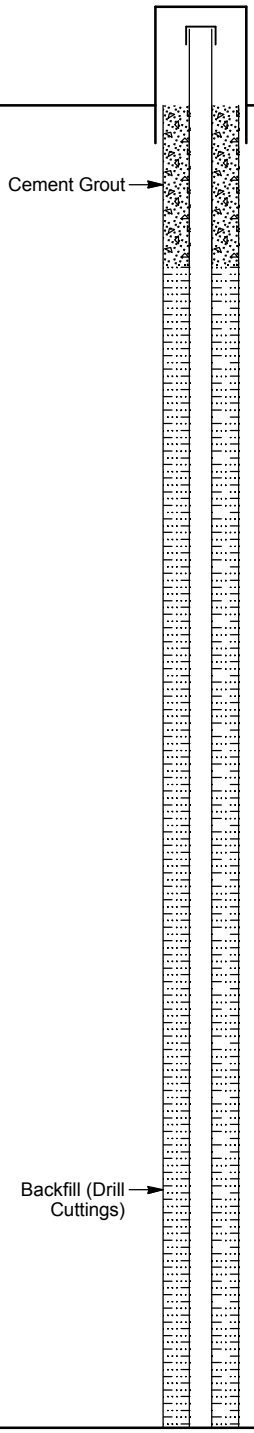
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Dark brown sandy CLAY and weathered SILTSTONE		0–1
				Cream, light brown, light grey weathered and fractured SILTSTONE		1–3
				Cream, light grey SILTSTONE		3–5
				Light brown, cream SILTSTONE		5–7
				Light brown, dark brown SILTSTONE		7–8
				Light grey, light blue SILTSTONE		8–11
				Dark grey, light blue SILTSTONE		11–12
				COAL		12–13
				Dark grey CARBONACEOUS MUDSTONE		13–14
				Dark grey, black CARBONACEOUS MUDSTONE and COAL		14–15
				COAL		15–18
				Dark grey SILTSTONE		18–19
				Dark grey CARBONACEOUS MUDSTONE		19–20
				COAL		20–21
				Dark grey SILTSTONE		21–22
				Dark grey, light blue SILTSTONE		22–23
				Light grey, light blue SILTSTONE		23–25
				Dark grey SILTSTONE		25–26
				Light grey fine to medium SANDSTONE		26–27
				Light grey very fine SANDSTONE		27–37
				Light grey fine to medium SANDSTONE		37–39
				Dark grey very fine SANDSTONE		39–42
				Light grey very fine SANDSTONE		42–48
				Light grey, dark grey SILTSTONE		48–49
				Dark grey CARBONACEOUS MUDSTONE		49

WELL CONSTRUCTION DETAILS



URS

MONITORING WELL Pz01

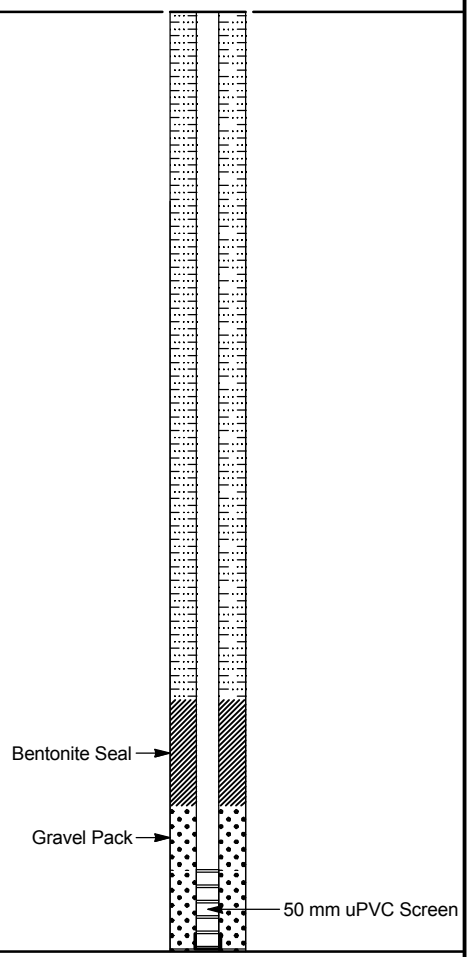
URS Australia Pty Ltd
Level 14, 240 Queen St, Brisbane QLD
Phone +61 7 3243 2111
Fax +61 7 3243 2199

Project No.: **42626162**

Project Reference: **Caval Ridge EIS**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Dark grey, black CARBONACEOUS MUDSTONE and COAL		50–51
				COAL		51–54
				Dark grey CARBONACEOUS MUDSTONE		54–55
				Dark grey SILTSTONE		55–58
				Light grey very fine SANDSTONE		58–60
				Dark grey fine to medium SANDSTONE		60–71
				Dark grey fine SANDSTONE		71–73
				Light grey, dark grey fine to medium SANDSTONE		73–74
				Dark grey fine SANDSTONE		74–76
				Light grey fine to medium SANDSTONE		76–77
				Dark grey fine SANDSTONE		77–80
				Dark grey SILTSTONE		80–82
				Dark grey, light brown CARBONACEOUS MUDSTONE		82–83
				COAL		83–85
				Dark grey, black CARBONACEOUS MUDSTONE		85–109

WELL CONSTRUCTION DETAILS



URS

MONITORING WELL Pz02

URS Australia Pty Ltd
Level 14, 240 Queen St, Brisbane QLD
Phone +61 7 3243 2111
Fax +61 7 3243 2199

Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**DG**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**35.00 m**	Coordinates:	**mN**
Date Started:	**20-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**20-5-08**			Permit No:	

Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Brown hard CLAY and GRAVEL		0
				Light brown, yellow CLAY and BASALT		1
				Light brown yellow gravelly CLAY		2
				Yellow, grey gravelly sandy CLAY with 10-50 mm gravel		3
				Grey sandy, clayey GRAVEL		4
				Grey sandy silty GRAVEL		5
				Yellow, grey silty GRAVEL <20 mm		6
				Yellow silty CLAY		7
				Yellow, grey sandy SILT		8
				Yellow gravelly silty fine sand		9
				Grey BASALT some weathered/fractured		10
				Grey BASALT		11
				Grey, yellow sandy silty BASALT		12
				Brown gravelly SILT		13
				Brown silty CLAY		14
				Light brown silty CLAY		15
				Light brown silty SAND		16
				Brown SILT		17
				Brown CLAY		18
				Brown CLAY and weathered BASALT		19
				Dark brown clayey SAND and weathered BASALT		20
				Light grey BASALT		21
				Grey BASALT		22
						23
						24
						25
						26
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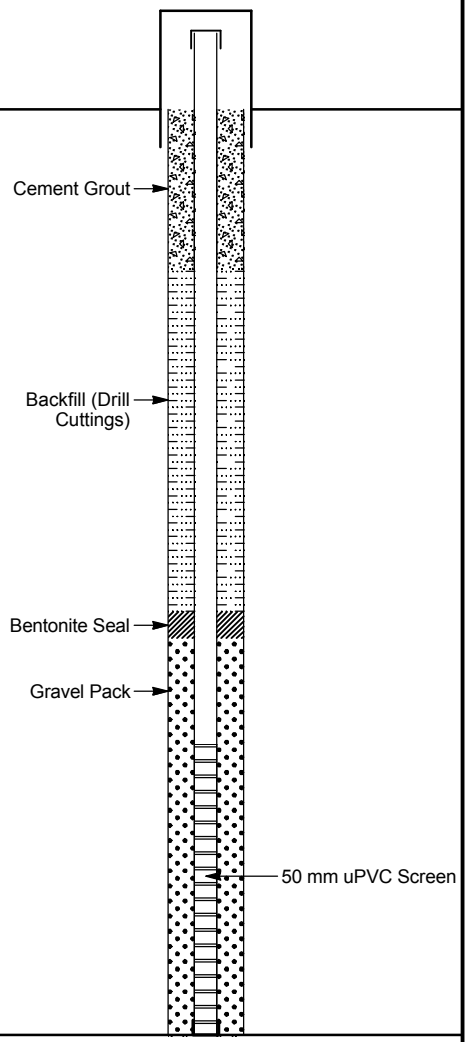
						47
						48
						49

WELL CONSTRUCTION DETAILS



MOD_WELL CAVAL RIDGE BORE LOGS.GPJ WCC_AUS.GDT 7/10/08

URS

MONITORING WELL Pz03-D

URS Australia Pty Ltd
Level 14, 240 Queen St, Brisbane QLD
Phone +61 7 3243 2111
Fax +61 7 3243 2199

Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**42.80 m**	Coordinates:	**mN**
Date Started:	**15-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**16-5-08**			Permit No:	

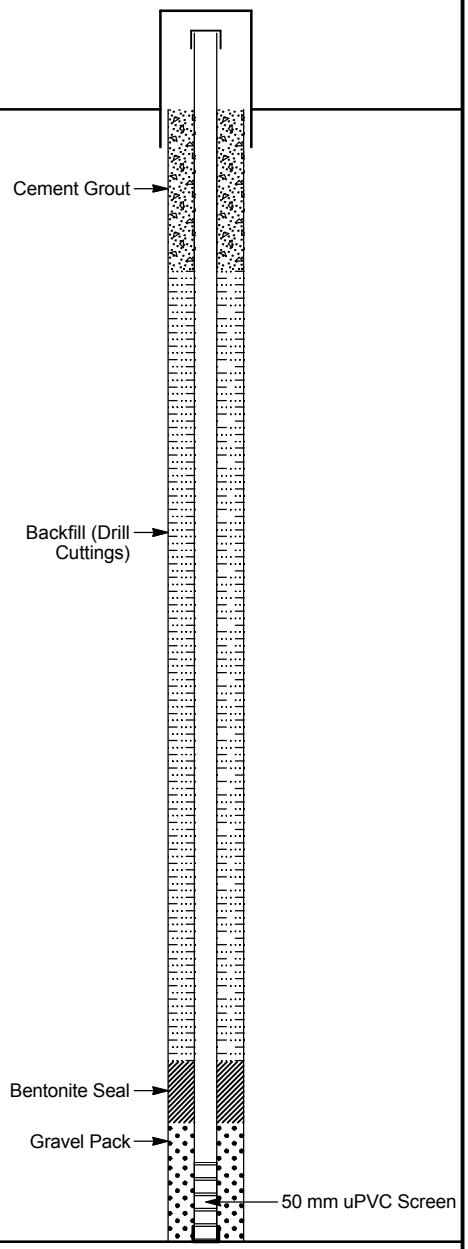
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA (Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations)	Moisture	Depth (m)
				Topsoil		0
				Cream, light brown highly to extremely weathered BASALT		1
						2
				Grey slightly weathered BASALT		3
				Beige, cream extremely weathered BASALT		4
				Light brown extremely weathered BASALT with clasts of moderately weathered BASALT		5
						6
				Grey slightly weathered BASALT		7
				Beige, light grey clayey extremely weathered BASALT		8
				Cream, light grey clayey extremely weathered BASALT		9
				Grey fresh BASALT		10
				Dark yellow, orange extremely weathered SILTSTONE		11
						12
				Mauve, brown, light grey moderately to extremely weathered SILTSTONE		13
				Light grey moderately to extremely weathered SILTSTONE		14
						15
				Grey, green, fractured moderately weathered BASALT		16
				Grey, green moderately weathered BASALT		17
				Dark grey, green BASALT		18
				Dark grey BASALT		19
						20
						21
						22
						23
				Dark grey, orange, light brown BASALT		24
						25
				Dark brown, light grey extremely weathered SILTSTONE		26
						27
				Light grey extremely weathered SILTSTONE		28
				Dark grey, dark brown highly to extremely weathered CARBONACEOUS MUDSTONE		29
						30
				Light grey extremely weathered SILTSTONE		31
						32
						33
				Light grey very fine extremely weathered SANDSTONE to SILTSTONE		34
						35
				Light brown, light grey extremely weathered SILTSTONE		36
						37
				Dark grey CARBONACEOUS SILTSTONE		38
				Dark grey CARBONACEOUS SILTSTONE and COAL		39
				COAL		40
						41
				Dark grey CARBONACEOUS SILTSTONE and COAL		42
				Dark grey SILTSTONE		43
						44
						45
						46
						47
						48
						49

WELL CONSTRUCTION DETAILS



MOD_WELL CAVAL RIDGE BORE LOGS.GPJ WCC_AUS.GDT 7/10/08

URS

MONITORING WELL Pz03-S

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Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**26.50 m**	Coordinates:	**mN**
Date Started:	**16-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**16-5-08**			Permit No:	

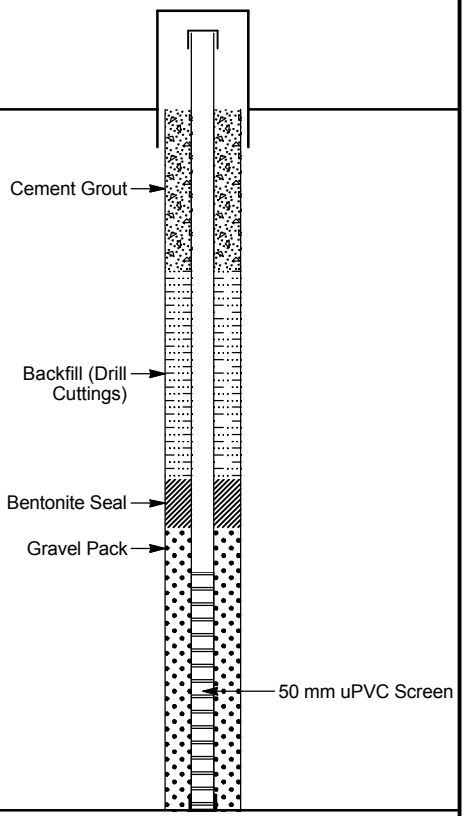
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Topsoil		0
				Cream, light brown highly to extremely weathered BASALT		1
				Grey slightly weathered BASALT		2
				Beige, cream extremely weathered BASALT		3
				Light brown extremely weathered BASALT with clasts of moderately weathered BASALT		4
				Grey slightly weathered BASALT		5
				Beige, light grey clayey extremely weathered BASALT		6
				Cream, light grey clayey extremely weathered BASALT		7
				Grey fresh BASALT		8
				Dark yellow, orange extremely weathered SILTSTONE		9
				Mauve, brown, light grey highly to extremely weathered SILTSTONE		10
				Light grey highly to extremely weathered SILTSTONE		11
				Grey, green, fractured moderately weathered BASALT		12
				Grey, green moderately weathered BASALT		13
				Dark grey, green BASALT		14
				Dark grey BASALT		15
						16
						17
						18
						19
						20
						21
						22
						23
				Dark grey, orange, light brown BASALT		24
						25
						26
				Dark brown, light grey extremely weathered SILTSTONE		27
						28
						29
						30
						31
						32
						33
						34
						35
						36
						37
						38
						39
						40
						41
						42
						43
						44
						45
						46
						47
						48
						49

WELL CONSTRUCTION DETAILS



MOD_WELL CAVAL RIDGE BORE LOGS.GPJ WCC_AUS.GDT 7/10/08

URS

MONITORING WELL Pz04

URS Australia Pty Ltd
Level 14, 240 Queen St, Brisbane QLD
Phone +61 7 3243 2111
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Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**93.10 m**	Coordinates:	**mN**
Date Started:	**14-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**15-4-08**			Permit No:	

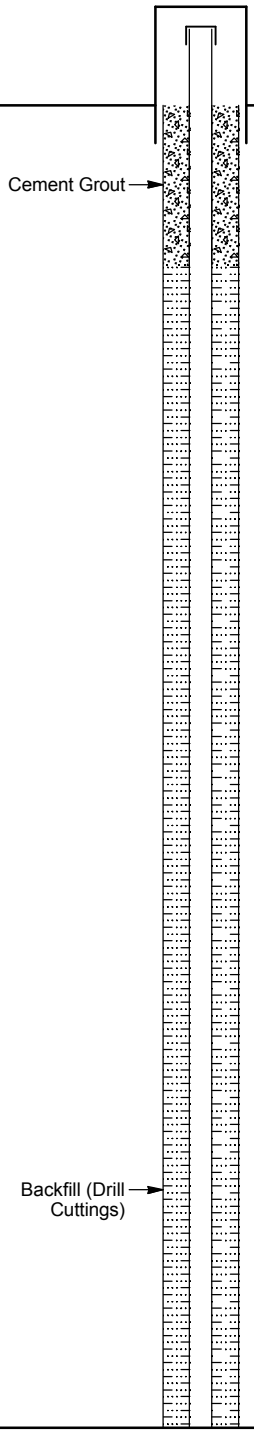
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Dark brown, light brown soil		0
				Light grey, white CLAYSTONE		1
				Dark red IRONSTONE		2
				Light grey CLAYSTONE		3
				Light grey, light blue CLAYSTONE		4
				Dark yellow, light grey CLAYSTONE		5
				Light yellow CLAYSTONE		6
				Light grey CLAYSTONE		7
						8
						9
						10
						11
				Light grey, purple CLAYSTONE		12
						13
				Light grey, white CLAYSTONE		14
						15
						16
				Light grey, dark yellow (limonite staining) CLAYSTONE		17
						18
				Light grey, light blue CLAYSTONE		19
						20
						21
				Dark grey CLAYSTONE		22
				Light grey, dark yellow (limonite staining) CLAYSTONE		23
						24
				Light brown, dark grey CLAYSTONE		25
						26
						27
				Light yellow, dark brown CLAYSTONE		28
						29
				Light brown CLAYSTONE		30
						31
						32
						33
				Light brown, dark grey CLAYSTONE		34
				Dark grey CARBONACEOUS MUDSTONE		35
				Light grey, light blue SILTSTONE		36
						37
						38
						39
						40
				Light blue, light grey SILTSTONE		41
						42
						43
						44
						45
						46
						47
						48
						49

WELL CONSTRUCTION DETAILS



URS

MONITORING WELL Pz04

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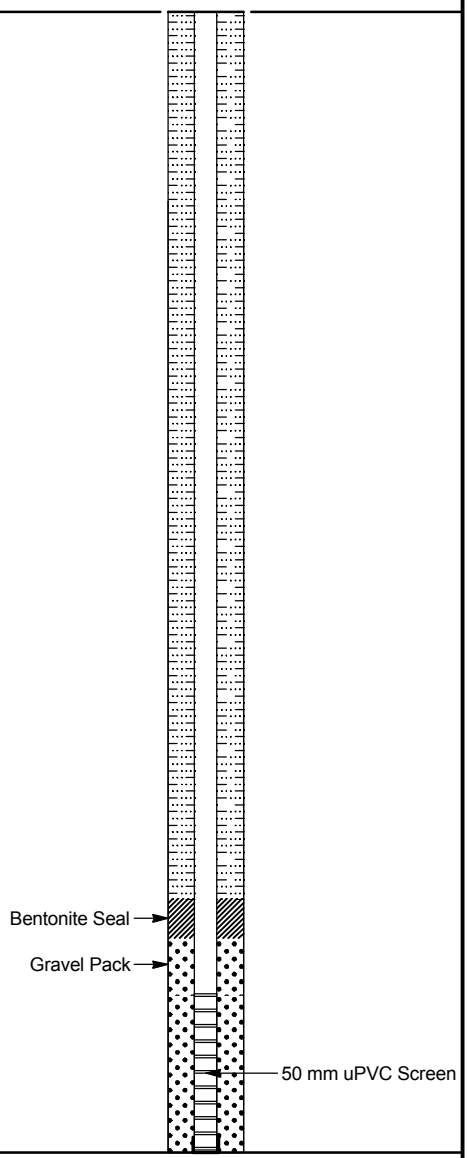
Project No.: **42626162**

Project Reference: **Caval Ridge EIS**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Dark grey SILTSTONE		50
				Dark grey CARBONACEOUS SILTSTONE		51
				COAL		52–53
				Dark grey CARBONACEOUS SILTSTONE		54
				Dark grey SILTSTONE		55
				COAL		56
				Dark grey, black CARBONACEOUS SILTSTONE		57–58
				COAL		59–61
				Light grey, light blue SILTSTONE		62
				Light blue, light grey SILTSTONE		63–88
				Dark grey SILTSTONE		89
				COAL		90–92
				Dark grey CARBONACEOUS SILTSTONE		93–109

WELL CONSTRUCTION DETAILS



URS

MONITORING WELL Pz05

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Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**118.00 m**	Coordinates:	**mN**
Date Started:	**16-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**17-5-08**			Permit No:	

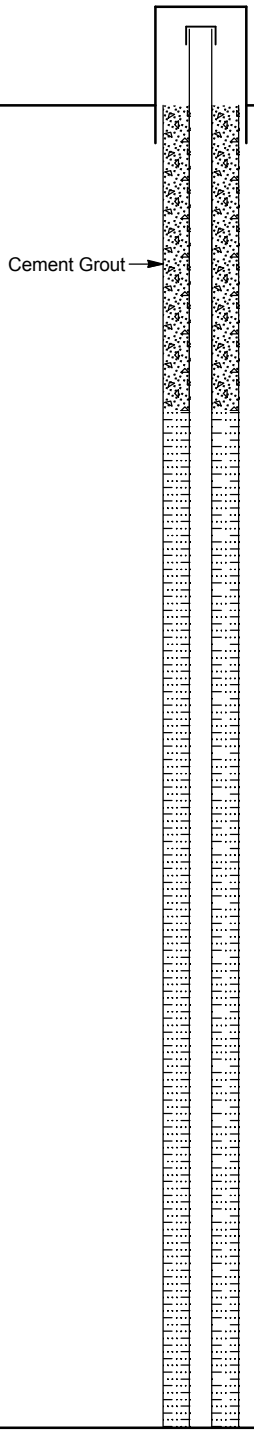
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Light brown CLAY, low plasticity		0
				Dark yellow, light brown CLAY, low plasticity		2
				Light brown highly to extremely weathered CLAYSTONE		3
				Cream, light grey highly to extremely weathered CLAYSTONE		4
				Light brown, tan highly to extremely weathered CLAYSTONE		6
				Dark brown, light grey highly to extremely weathered CLAYSTONE		7
				Cream, light grey highly to extremely weathered CLAYSTONE		9
				Dark grey, purple CLAYSTONE		10
				Dark grey, dark brown CARBONACEOUS CLAYSTONE		11
				Dark grey CLAYSTONE		12
				Light grey CLAYSTONE		13
				Light brown CLAYSTONE		15
				Light brown, dark grey CLAYSTONE with carbonaceous material		18
				Dark brown, light grey CLAYSTONE		19
				Dark grey, light grey CLAYSTONE		22
				COAL		30
				Light grey CLAYSTONE		31
				Dark grey, light grey CLAYSTONE		35
				Light grey CLAYSTONE		36
				Dark grey, light grey CLAYSTONE		40
				Dark grey CLAYSTONE		41
				Dark grey, black CARBONACEOUS SILTSTONE		42
				COAL		43
				Light grey SILTSTONE		44
				Dark grey SILTSTONE		45
				Light grey SILTSTONE		46
				Dark grey SILTSTONE		49

WELL CONSTRUCTION DETAILS



MOD_WELL CAVAL RIDGE BORE LOGS.GPJ WCC_AUS.GDT 7/10/08

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MONITORING WELL Pz05

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Project No.: **42626162**

Project Reference: **Caval Ridge EIS**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)	WELL CONSTRUCTION DETAILS
				Light grey SILTSTONE		50	
						51	
						52	
						53	
						54	
				Light grey SILTSTONE and very fine SANDSTONE		55	
						56	
				Light grey very fine to medium SANDSTONE		57	
						58	
						59	
				Dark grey SILTSTONE		60	Backfill (Drill Cuttings) →
				Light grey very fine to medium SANDSTONE		61	
						62	
						63	
						64	
						65	
						66	
						67	
						68	
						69	
						70	
						71	
						72	
						73	
						74	
				Dark grey CARBONACEOUS MUDSTONE and COAL		75	
						76	
				Dark grey very fine to medium CARBONACEOUS SANDSTONE		77	
				Light grey very fine to medium SANDSTONE		78	
				Light grey SILTSTONE		79	
						80	
						81	
						82	
						83	
						84	
				Dark grey slightly CARBONACEOUS SILTSTONE		85	
						86	
				Dark grey SILTSTONE		87	
						88	
				Light grey SILTSTONE		89	
						90	
						91	
						92	
						93	
						94	
						95	
						96	
				Light grey sandy SILTSTONE		97	
				Light grey SILTSTONE		98	
						99	
						100	
				Dark grey fine CARBONACEOUS SANDSTONE and COAL		101	
				Dark grey SILTSTONE		102	
						103	
						104	
				Light grey SILTSTONE		105	
				Dark grey SILTSTONE		106	
				Light grey SILTSTONE		107	
				Dark grey SILTSTONE		108	
				Light grey SILTSTONE		109	

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MONITORING WELL Pz05

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Project No.: **42626162**

Project Reference: **Caval Ridge EIS**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)	WELL CONSTRUCTION DETAILS
						110	
						111	Bentonite Seal
				Dark grey, black CARBONACEOUS MUDSTONE		112	
				Dark grey, black CARBONACEOUS SILTSTONE		113	Gravel Pack
						114	
				COAL		115	
				Dark grey, black CARBONACEOUS SILTSTONE and COAL		116	
						117	50 mm uPVC Screen
				~~Dark grey, black CARBONACEOUS SILTSTONE~~		118	
						119	
						120	
						121	
						122	
						123	
						124	
						125	
						126	
						127	
						128	
						129	
						130	
						131	
						132	
						133	
						134	
						135	
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						156	
						157	
						158	
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						166	
						167	
						168	
						169	

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MONITORING WELL Pz06-D

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Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**84.00 m**	Coordinates:	**mN**
Date Started:	**19-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**19-5-08**			Permit No:	

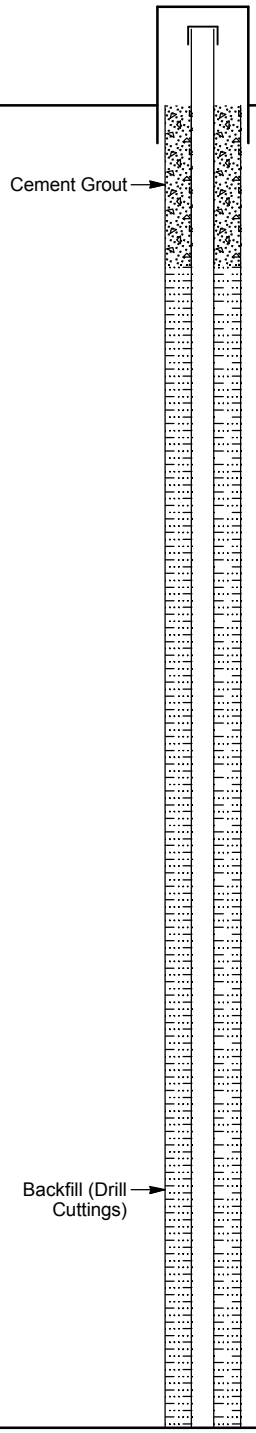
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Dark brown stiff CLAY, low plasticity		0
				Light brown, light grey highly to extremely weathered BASALT		2
				Light grey, light brown moderately weathered BASALT		3
				Dark grey, green, light brown moderately weathered BASALT		7
				Light brown, dark grey SILT with clasts of highly weathered BASALT		8
				Beige, light brown, green SILT with clasts of highly weathered BASALT		10
				Dark grey, light brown moderately weathered BASALT		12
				Purple, brown moderately to highly weathered BASALT		13
				Light grey, light brown moderately weathered BASALT		14
				Dark grey, light red moderately weathered BASALT		15
				Purple, brown moderately to highly weathered BASALT		16
				Light brown silty highly to extremely weathered BASALT		17
				Dark brown, light red moderately weathered BASALT		18
				Dark grey, green, light brown moderately weathered BASALT		19
				Dark grey slightly weathered BASALT		20
				Dark grey BASALT		21
				Dark grey BASALT and dark green, dark grey clayey basalt, slightly moist		22
				Dark grey BASALT		23
				Dark grey, black CLAY and extremely weathered MUDSTONE		24
				Light grey SILTSTONE		25
				Dark green SILTSTONE		26
				Dark green, light grey SILTSTONE		27
				Light grey SILTSTONE		28
				Dark green SILTSTONE		29
				Light grey SILTSTONE		30
				Light grey SILTSTONE		31
						32
						33
						34
						35
						36
						37
						38
						39
						40
						41
						42
						43
						44
						45
						46
						47
						48
						49

WELL CONSTRUCTION DETAILS



MOD_WELL CAVAL RIDGE BORE LOGS.GPJ WCC_AUS.GDT 7/10/08

URS

MONITORING WELL Pz06-D

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Project No.: **42626162**

Project Reference: **Caval Ridge EIS**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)	WELL CONSTRUCTION DETAILS
						50	
						51	
						52	
						53	
						54	
						55	
						56	
						57	
						58	
						59	
						60	
						61	
				Light grey fine SANDSTONE		62	
						63	
						64	
				Light grey fine to medium SANDSTONE		65	
				Light grey fine SANDSTONE		66	
						67	
				Dark grey fine SANDSTONE		68	
						69	
						70	
						71	
						72	
						73	
						74	
						75	
						76	Bentonite Seal
						77	
				Black, dark grey CARBONACEOUS SILTSTONE and COAL		78	
				COAL		79	Gravel Pack
						80	
						81	
						82	
						83	50 mm uPVC Screen
				Dark grey SILTSTONE		84	
						85	
						86	
						87	
						88	
						89	
						90	
						91	
						92	
						93	
						94	
						95	
						96	
						97	
						98	
						99	
						100	
						101	
						102	
						103	
						104	
						105	
						106	
						107	
						108	
						109	

URS

MONITORING WELL Pz06-S

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Level 14, 240 Queen St, Brisbane QLD
Phone +61 7 3243 2111
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Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**31.00 m**	Coordinates:	**mN**
Date Started:	**19-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**19-5-08**			Permit No:	

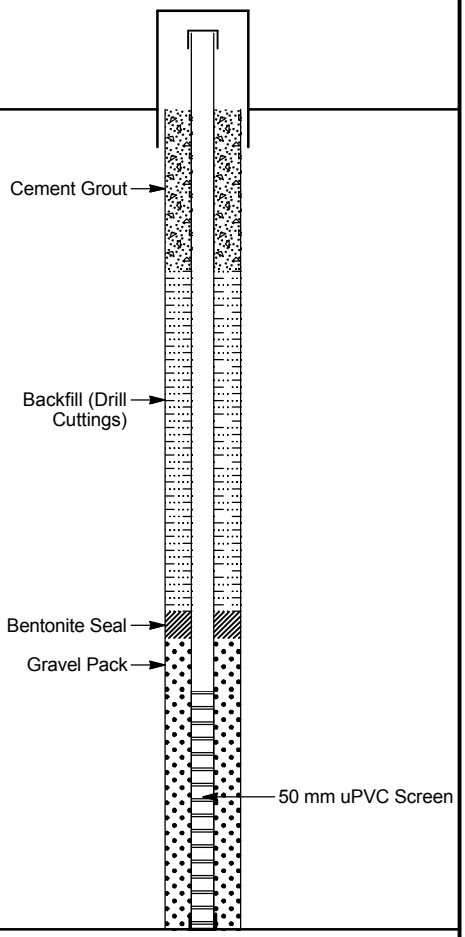
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Dark brown stiff CLAY, low plasticity		0–2
				Light brown, light grey highly to extremely weathered BASALT		2–3
				Light grey, light brown moderately weathered BASALT		3–7
				Dark grey, green, light brown moderately weathered BASALT		7–8
				Light brown, dark grey SILT with clasts of highly weathered BASALT		8–10
				Beige, light brown, green SILT with clasts of highly weathered BASALT		10–12
				Dark grey, light brown moderately weathered BASALT		12–14
				Purple, brown moderately to highly weathered BASALT		14–15
				Light grey, light brown moderately weathered BASALT		15–17
				Dark grey, light red moderately weathered BASALT		17–19
				Purple, brown moderately to highly weathered BASALT		19–20
				Light brown silty highly to extremely weathered BASALT		20–22
				Dark brown, light red moderately weathered BASALT		22–23
				Dark grey, green, light brown moderately weathered BASALT		23–25
				Dark grey slightly weathered BASALT		25–26
				Dark grey BASALT		26–27
				Dark grey BASALT and dark green, dark grey clayey basalt, slightly moist		27–28
				Dark grey BASALT		28–29
				Dark grey, black CLAY and extremely weathered MUDSTONE		29–31

WELL CONSTRUCTION DETAILS



MOD_WELL CAVAL RIDGE BORE LOGS.GPJ WCC_AUS.GDT 7/10/08

URS

MONITORING WELL Pz07-D

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Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**44.00 m**	Coordinates:	**mN**
Date Started:	**18-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**18-5-08**			Permit No:	

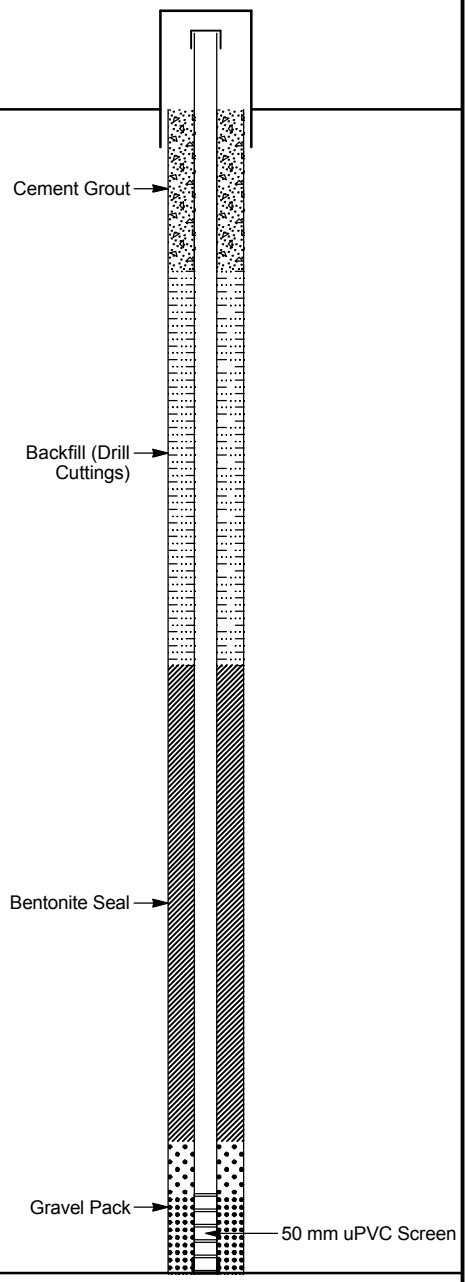
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Light brown, tan SILT		0
				Light brown, light red gravelly CLAY, low plasticity, gravel clasts of chalcedony, basalt and ironstone, angular to sub-round, up to 20 mm		1
				Light brown, gravelly silty CLAY, low plasticity, gravel clasts of chalcedony, basalt and ironstone, sub-angular to round, up to 50 mm		2
				Beige, dark yellow SILT		3
				Light brown silty CLAY		4
				Light brown, beige SILT		5
				Light brown, beige, very fine to medium SAND		6
				Light brown, silty very fine SAND		7
				Light brown, beige, silty very fine SAND		8
				Light brown, light grey, very fine silty SAND		9
				Cream, white, orange very fine to coarse quartz SAND with minor medium gravel, sub-angular to round, well sorted		10
				Orange, white, medium to coarse quartz SAND with minor gravel clasts up to 10 mm, sub-angular to round, well sorted, moist		11
				Dark brown, orange medium to coarse quartz SAND with minor coarse gravel clasts up to 20 mm, sub-angular to round, well sorted, moist		12
				Light grey, light brown fine to coarse SAND, sub-angular to round, well sorted, moist		13
				Dark grey, black sandy clayey extremely weathered SILTSTONE		14
				Light grey, highly weathered CLAYSTONE		15
				Dark grey, CARBONACEOUS CLAYSTONE		16
				Dark grey SILTSTONE		17
				Dark grey, black CARBONACEOUS MUDSTONE		18
				Dark grey SILTSTONE		19
				Dark grey sandy SILTSTONE		20
				Light grey fine SANDSTONE		21
				Light grey, light brown CARBONACEOUS SILTSTONE		22
				Light grey fine to medium SANDSTONE		23
				Light grey SILTSTONE		24
				Light grey fine SANDSTONE		25
				Dark grey SILTSTONE		26
				Dark grey, black CARBONACEOUS MUDSTONE		27
				COAL		28
				Dark grey SILTSTONE		29
						30
						31
						32
						33
						34
						35
						36
						37
						38
						39
						40
						41
						42
						43
						44
						45
						46
						47
						48
						49

WELL CONSTRUCTION DETAILS



MOD_WELL CAVAL RIDGE BORE LOGS.GPJ WCC_AUS.GDT 7/10/08

URS

MONITORING WELL Pz07-S

URS Australia Pty Ltd
Level 14, 240 Queen St, Brisbane QLD
Phone +61 7 3243 2111
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Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**16.00 m**	Coordinates:	**mN**
Date Started:	**18-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**18-5-08**			Permit No:	

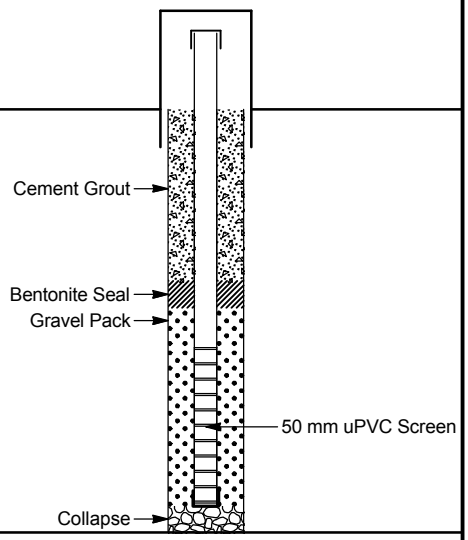
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Light brown SILT		0
				Light brown, red silty CLAY		1
				Light grey, beige CLAY, moderate plasticity, moist		2
				Light grey, beige CLAY, low plasticity		3
				Light brown silty CLAY		4
				Beige silty fine SAND		5
				Light brown SILT		6
				Light brown, orange fine to medium SAND		7
				Light brown SILT		8
				Beige fine SAND		9
				Cream, dark yellow fine to medium SAND		10
				Light brown, light grey fine to coarse SAND, angular to sub-round		11
				Brown, orange, clayey fine to coarse SAND, sub-angular to round, well sorted, with minor gravel clasts up to 10 mm, moist		12
				Brown, orange clayey fine to coarse SAND, sub-angular to round, well sorted with minor gravel clasts up to 20 mm, moist		13
				Dark grey, black SANDY CLAY, moderate to high plasticity, moist to wet - weathered CARBONACEOUS MUDSTONE		14
						15
						16
						17
						18
						19
						20
						21
						22
						23
						24
						25
						26
						27
						28
						29
						30
						31
						32
						33
						34
						35
						36
						37
						38
						39
						40
						41
						42
						43
						44
						45
						46
						47
						48
						49

WELL CONSTRUCTION DETAILS



URS

MONITORING WELL Pz08-D

URS Australia Pty Ltd
Level 14, 240 Queen St, Brisbane QLD
Phone +61 7 3243 2111
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Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**63.00 m**	Coordinates:	**mN**
Date Started:	**17-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**17-5-08**			Permit No:	

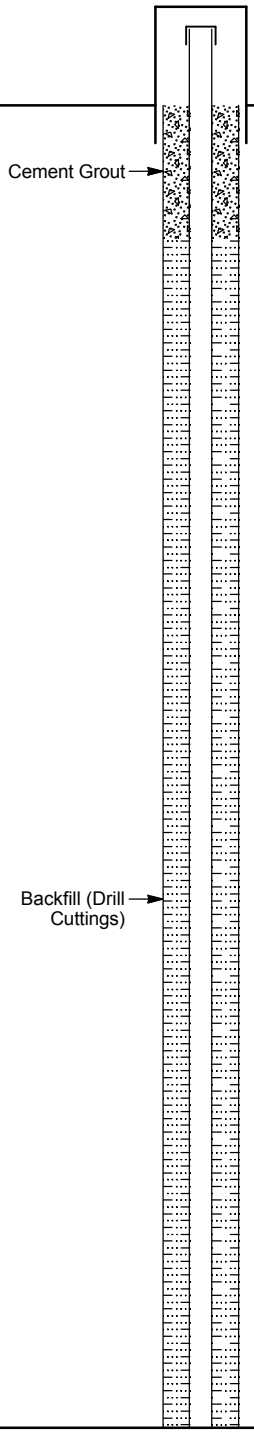
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Light brown, orange fine silty SAND		0
				Brown SILT		2
				Brown clayey SILT		3
				Light brown SILT		4
				Light brown, orange fine SAND		6
				Light brown, orange SILT		7
				Light brown SILT		8
				Light brown fine SAND		9
				Light brown, beige fine SAND		11
				Light grey fine to medium SAND		12
				Beige fine to medium SAND		13
				Light brown, orange, light grey fine to medium SAND		14
				Dark brown, light grey CLAYSTONE		15
				Dark grey CLAYSTONE		18
				Dark grey SILTSTONE		20
				Light grey SILTSTONE		22
				Dark grey SILTSTONE		23
				COAL		28
				Dark grey, black CARBONACEOUS SILTSTONE		30
				COAL		31
				Dark grey, black CARBONACEOUS SILTSTONE		34
				Dark grey SILTSTONE		35
				COAL		38
				COAL and dark grey, black CARBONACEOUS SILTSTONE		39
				Dark grey, black CARBONACEOUS SILTSTONE		40
				Light grey SILTSTONE		41
				Dark grey, black CARBONACEOUS SILTSTONE and COAL		46
				Dark grey CARBONACEOUS SILTSTONE		47
				Dark grey SILTSTONE		48

WELL CONSTRUCTION DETAILS



URS

MONITORING WELL Pz08-D

URS Australia Pty Ltd
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Fax +61 7 3243 2199

Project No.: **42626162**

Project Reference: **Caval Ridge EIS**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)	WELL CONSTRUCTION DETAILS
						50	
						51	
						52	
						53	
				Light grey SILTSTONE		54	
						55	
				Light grey very fine sandy SILTSTONE		56	Bentonite Seal
				Light grey SANDSTONE		57	
						58	Gravel Pack
						59	
				Dark grey, black CARBONACEOUS SILTSTONE		60	
						61	
				Dark grey SILTSTONE, possibly fractured, water		62	50 mm uPVC Screen
				Dark grey SILTSTONE possibly fractured		63	
						64	
						65	
						66	
						67	
						68	
						69	
						70	
						71	
						72	
						73	
						74	
						75	
						76	
						77	
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						105	
						106	
						107	
						108	
						109	

URS

MONITORING WELL Pz08-S

URS Australia Pty Ltd
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Phone +61 7 3243 2111
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Project Reference: **Caval Ridge EIS**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Project No.: **42626162**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**16.00 m**	Coordinates:	**mN**
Date Started:	**17-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**17-5-08**			Permit No:	

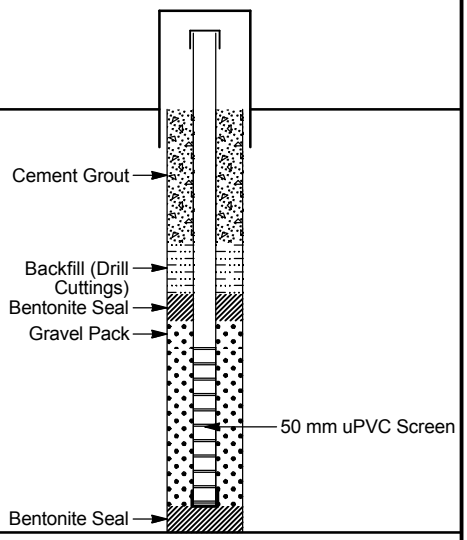
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Light brown, orange fine silty SAND		0
				Brown SILT		2
				Brown clayey SILT		3
				Light brown SILT		4
				Light brown, orange fine SAND		6
				Light brown, orange SILT		7
				Light brown SILT		8
				Light brown fine SAND		9
				Light brown, beige fine SAND		11
				Light grey fine to medium SAND		12
				Beige fine to medium SAND		13
				Light brown, orange, light grey fine to medium SAND		14
				Dark brown, light grey CLAYSTONE		15
						16
						17
						18
						19
						20
						21
						22
						23
						24
						25
						26
						27
						28
						29
						30
						31
						32
						33
						34
						35
						36
						37
						38
						39
						40
						41
						42
						43
						44
						45
						46
						47
						48
						49

WELL CONSTRUCTION DETAILS



MOD_WELL CAVAL RIDGE BORE LOGS.GPJ WCC_AUS.GDT 7/10/08

URS

MONITORING WELL Pz09

URS Australia Pty Ltd
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Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**77.00 m**	Coordinates:	**mN**
Date Started:	**21-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**23-5-08**			Permit No:	

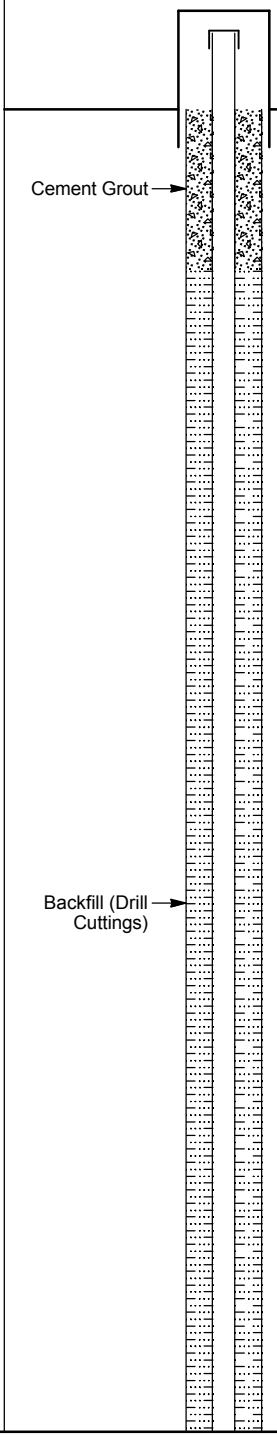
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Dark brown silty CLAY, low plasticity with abundant organic matter		0–1
				Dark brown silty clayey SAND		1–2
				Beige SILT and extremely weathered SILTSTONE		2–6
				Light brown, light grey silty clayey extremely weathered SILTSTONE		6–7
				Light brown clayey SILT and extremely weathered SILTSTONE		7–9
				Brown, red silty CLAY and extremely weathered SILTSTONE		9–11
				Light brown silty CLAY and extremely weathered SILTSTONE		11–12
				Beige SILT and extremely weathered SILTSTONE		12–14
				Light brown silty CLAY and extremely weathered SILTSTONE		14–16
				Dark brown, dark grey SILT with clasts of moderately weathered SILTSTONE		16–17
				Light brown, light grey SILT and highly to extremely weathered SILTSTONE		17–19
				Dark brown, light grey SILT and highly to extremely weathered SILTSTONE		19–20
				Light grey SILT		20–21
				Light grey, blue moderately weathered SILTSTONE		21–23
				Dark grey SILT and clasts of dark grey moderately to highly weathered SILTSTONE		23–24
				Dark grey, black CARBONACEOUS SILTSTONE		24–26
				Dark grey, black CARBONACEOUS SILTSTONE and COAL		26–27
				Dark grey slightly weathered SILTSTONE		27–28
				Dark grey SILTSTONE		28–29
				Light grey SILTSTONE		29–30
				Dark grey SILTSTONE and dark grey CLAY, moist		30–31
				Light grey SILTSTONE		31–32
				Dark grey SILTSTONE		32–42
				Light grey SILTSTONE		42–43
				Dark grey SILTSTONE		43–44
				Light grey SILTSTONE		44–45
				Dark grey SILTSTONE		45–48
				Dark grey SILTSTONE and dark grey CLAY		48–49

WELL CONSTRUCTION DETAILS



MOD_WELL CAVAL RIDGE BORE LOGS.GPJ WCC_AUS.GDT 7/10/08

URS

MONITORING WELL Pz09

URS Australia Pty Ltd
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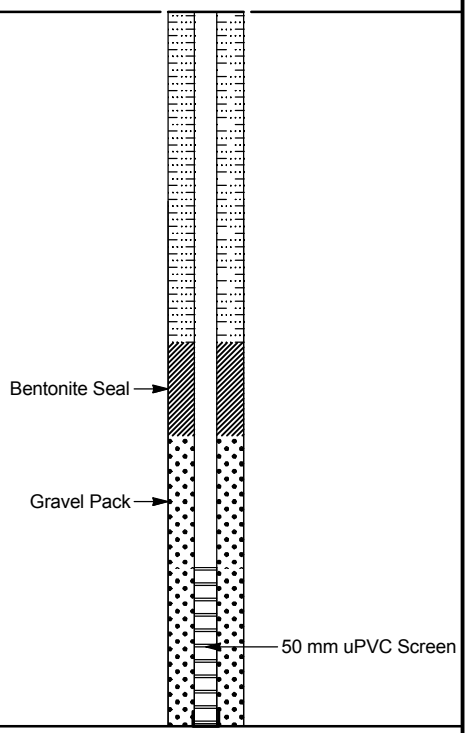
Project No.: **42626162**

Project Reference: **Caval Ridge EIS**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)	WELL CONSTRUCTION DETAILS
				Light grey SILTSTONE		50	
				Light grey, black SILTSTONE		53	
				Light grey SILTSTONE		54	
				Dark grey SILTSTONE		55	
				Dark grey SILTSTONE		56	
				Light grey SILTSTONE		60	
				Light grey, dark grey CLAY, moist		61	
				Light grey SILTSTONE		63	
				Dark grey SILTSTONE - hard		65	
				Light grey SILTSTONE		66	
				Light grey CLAY, slightly moist		67	
				Light grey moderately weathered SILTSTONE		68	
				Dark grey SILTSTONE		69	
				COAL		70	
				Dark grey, black, light brown CARBONACEOUS SILTSTONE		73	
				COAL		75	
				Light grey SILTSTONE		76	



MOD_WELL CAVAL RIDGE BORE LOGS.GPJ WCC_AUS.GDT 7/10/08

URS

MONITORING WELL Pz10

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Level 14, 240 Queen St, Brisbane QLD
Phone +61 7 3243 2111
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Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**83.00 m**	Coordinates:	**mN**
Date Started:	**20-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**21-5-08**			Permit No:	

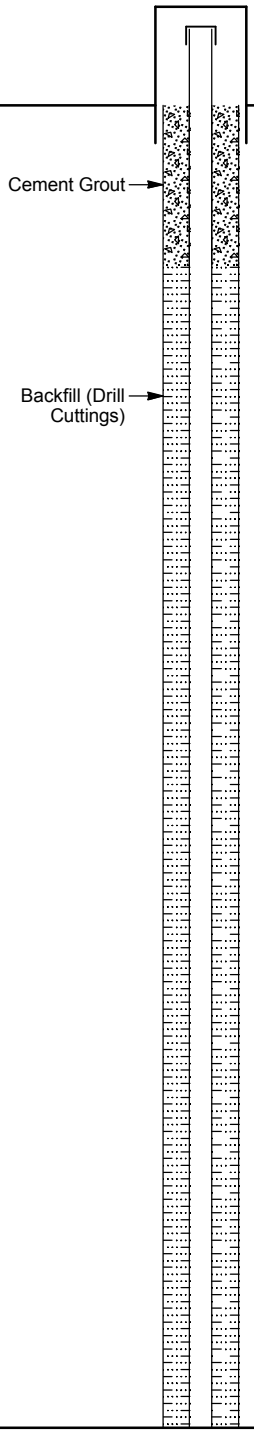
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Dark grey, orange CLAY, low plasticity		0
				Light brown silty CLAY		1
						2
				Beige light brown SILT		3
						4
						5
						6
				Light brown SILT		7
						8
						9
				Light grey, dark brown CLAY and SILT		10
				Light brown SILT		11
				Light brown, beige SILT		12
				Light grey CLAYSTONE		13
				Dark grey, light brown CLAYSTONE		14
				COAL		15
						16
				Light grey CLAYSTONE		17
				Dark grey CLAYSTONE		18
				Light grey CLAYSTONE		19
						20
						21
						22
						23
						24
				Light grey SILTSTONE		25
						26
						27
						28
						29
						30
						31
						32
						33
						34
				Light grey fine sandy SILTSTONE		35
				Dark grey SILTSTONE		36
						37
						38
						39
						40
						41
						42
				Dark grey slightly CARBONACEOUS SILTSTONE		43
						44
				Light grey SILTSTONE		45
				Dark grey SILTSTONE		46
				Dark grey, black highly CARBONACEOUS SILTSTONE		47
						48
				Light grey SILTSTONE		49

WELL CONSTRUCTION DETAILS



URS

MONITORING WELL Pz10

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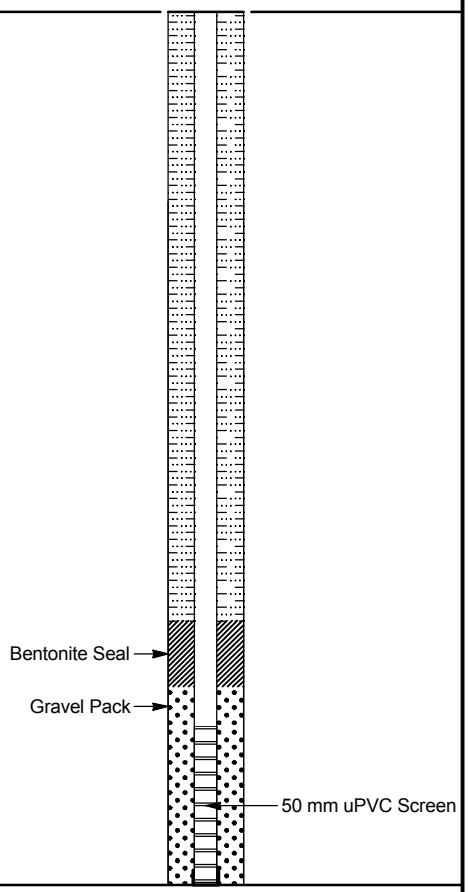
Fax +61 7 3243 2199

Project No.: **42626162**

Project Reference: **Caval Ridge EIS**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				COAL		50
				COAL and CARBONACEOUS SILTSTONE		53
				Light grey SILTSTONE		54
				Dark grey SILTSTONE		55
				Light grey SILTSTONE		56
				Dark grey clayey slightly CARBONACEOUS MUDSTONE		77
				Dark brown MUDSTONE		78
				COAL with some highly CARBONACEOUS MUDSTONE		79

WELL CONSTRUCTION DETAILS



MOD_WELL CAVAL RIDGE BORE LOGS.GPJ WCC_AUS.GDT 7/10/08

URS

MONITORING WELL Pz11-S and Pz11D

URS Australia Pty Ltd
Level 14, 240 Queen St, Brisbane QLD
Phone +61 7 3243 2111
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Project Reference: **Caval Ridge EIS**

Project No.: **42626162**

Client: **BMA Coal**

Location: **Peak Downs QLD**

Drilling Contractor: **Capricorn Weston Drilling**

Logged By:	**AW**	Bore Size:	**165 mm**	Relative Level:	**mRL**
Checked By:	**SD**	Total Depth:	**58.00 m**	Coordinates:	**mN**
Date Started:	**21-5-08**	Casing Size:	**50 mm**		**mE**
Date Finished:	**21-5-08**			Permit No:	

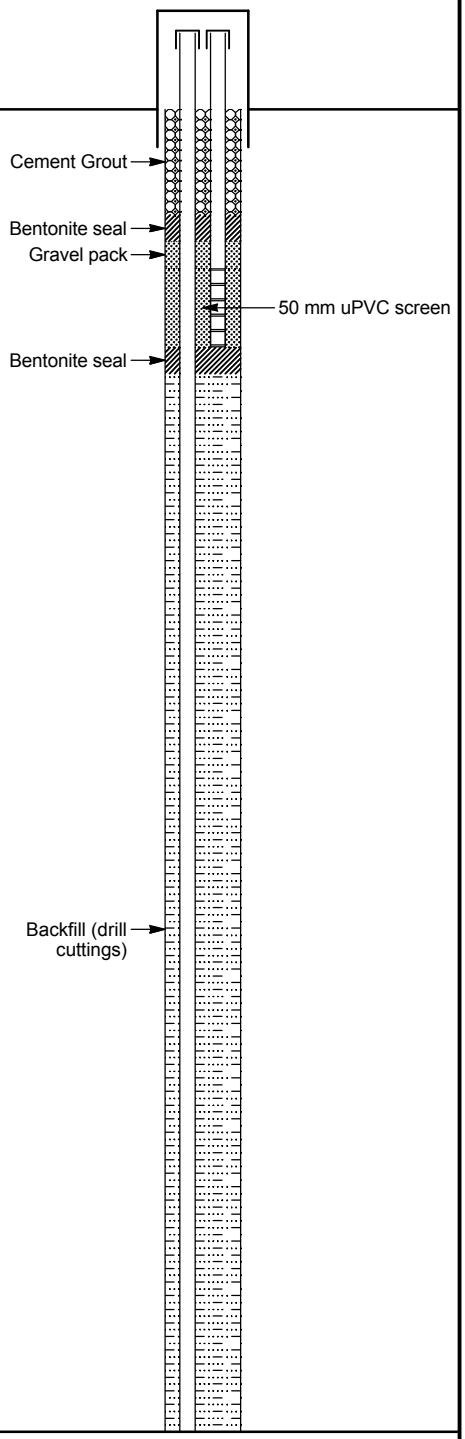
Drill Type: **Rotary Air**

Drill Model: **UDR**

Drill Fluid: **Air**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)
				Light brown, dark brown very fine sandy SILT		0
				Orange, red, brown very sandy CLAY		1
				Dark brown, fine to medium SAND		2
				Dark brown, light brown fine to coarse SAND and minor fine GRAVEL, angular to sub-round		3 4 5
				Dark brown, light brown fine to coarse SAND and minor fine GRAVEL, sub-angular to sub-round, well sorted, very clean		6 7
				Tan fine sandy SILT with some clayey bands		8
				Cream, light brown fine to coarse SAND with minor GRAVEL clasts up to 15 mm, sub-angular to sub-round, well sorted		9 10
				Dark brown, light grey moderately to highly weathered CLAYSTONE, slightly moist		11 12
				Dark brown, light grey moderately weathered CLAYSTONE		13
				Light grey slightly weathered SILTSTONE		14
				Light grey SILTSTONE		15 16 17 18 19 20 21
				Light grey very fine sandy SILTSTONE		22 23 24 25
				Light grey SILTSTONE		26
				Dark grey SILTSTONE		27 28 29
				Dark grey, black SILTSTONE		30
				Dark grey, black CARBONACEOUS SILTSTONE		31
				COAL		32 33 34
				Dark grey, black CARBONACEOUS SILTSTONE		35
				Dark grey SILTSTONE		36 37 38 39
				Light grey SILTSTONE		40
				Dark grey SILTSTONE		41 42
				Dark grey SILTSTONE and dark grey CLAY, slightly moist		43 44
				Dark grey SILTSTONE		45 46 47 48
				Light grey SILTSTONE and dark grey CLAY,		49

WELL CONSTRUCTION DETAILS



MOD_WELL CAVAL RIDGE BORE LOGS.GPJ WCC_AUS.GDT 7/10/08

URS

MONITORING WELL Pz11-S and Pz11D

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Fax +61 7 3243 2199

Project No.: **42626162**

Project Reference: **Caval Ridge EIS**

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)	WELL CONSTRUCTION DETAILS
				slightly moist Light grey SILTSTONE		50	
				Light grey SILTSTONE, very soft		53	Bentonite seal
				Light grey SILTSTONE and dark grey CLAY, moist		55	Gravel pack
						57	50 mm uPVC screen
						58	

Falling/Rising Head Test Data

Appendix D

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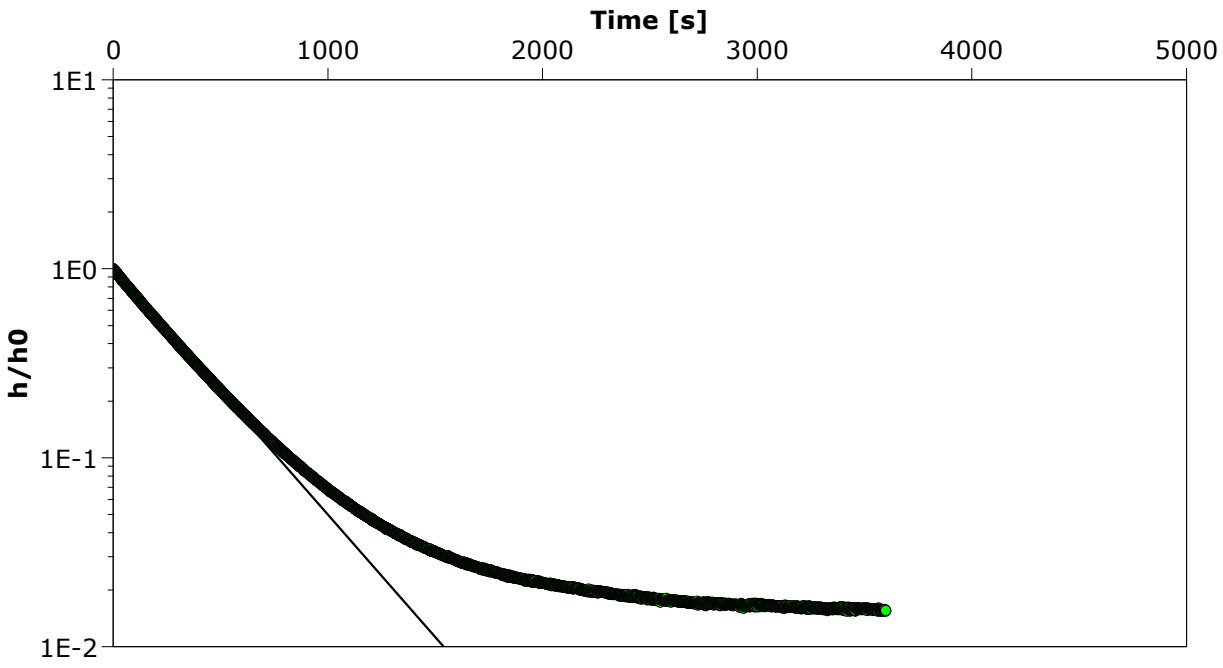
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz01	Test Well: Pz01
Test conducted by: AW		Test date: 8/06/2008
Analysis performed by: AW	Pz01 Bouwer & Rice	Date: 30/06/2008
Aquifer Thickness: 3.50 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz01	1.00×10^{-1}	

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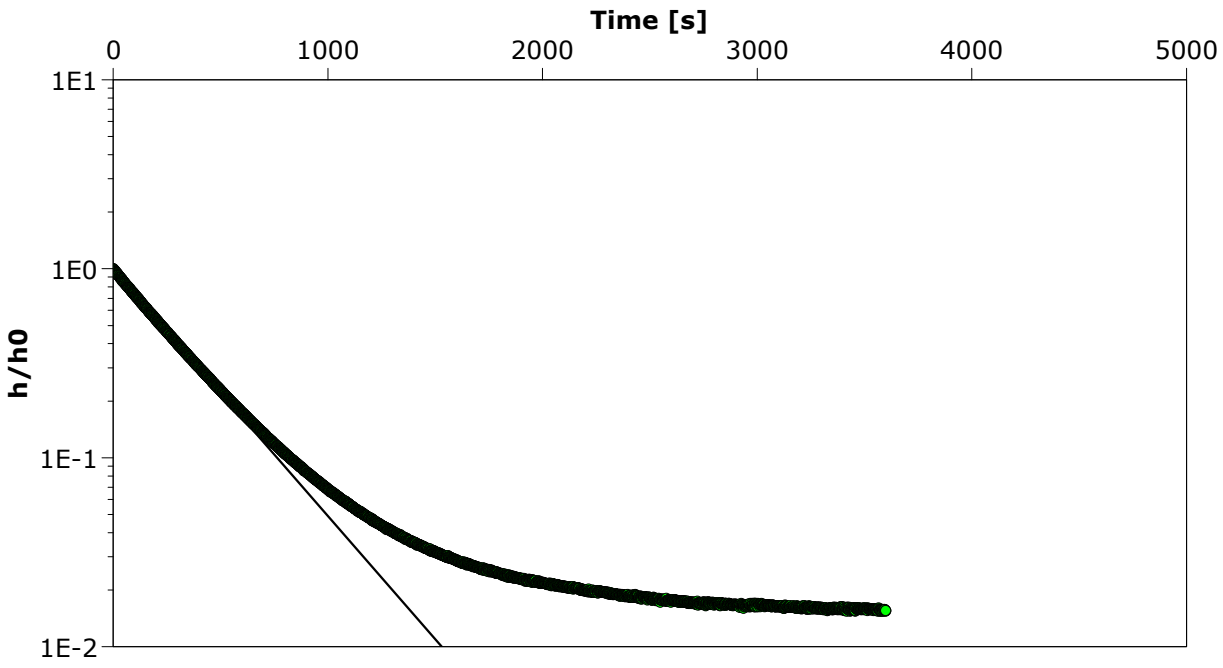
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz01	Test Well: Pz01
Test conducted by: AW		Test date: 8/06/2008
Analysis performed by: AW	Pz01 Hvorslev	Date: 30/06/2008
Aquifer Thickness: 3.50 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz01	1.30×10^{-1}	

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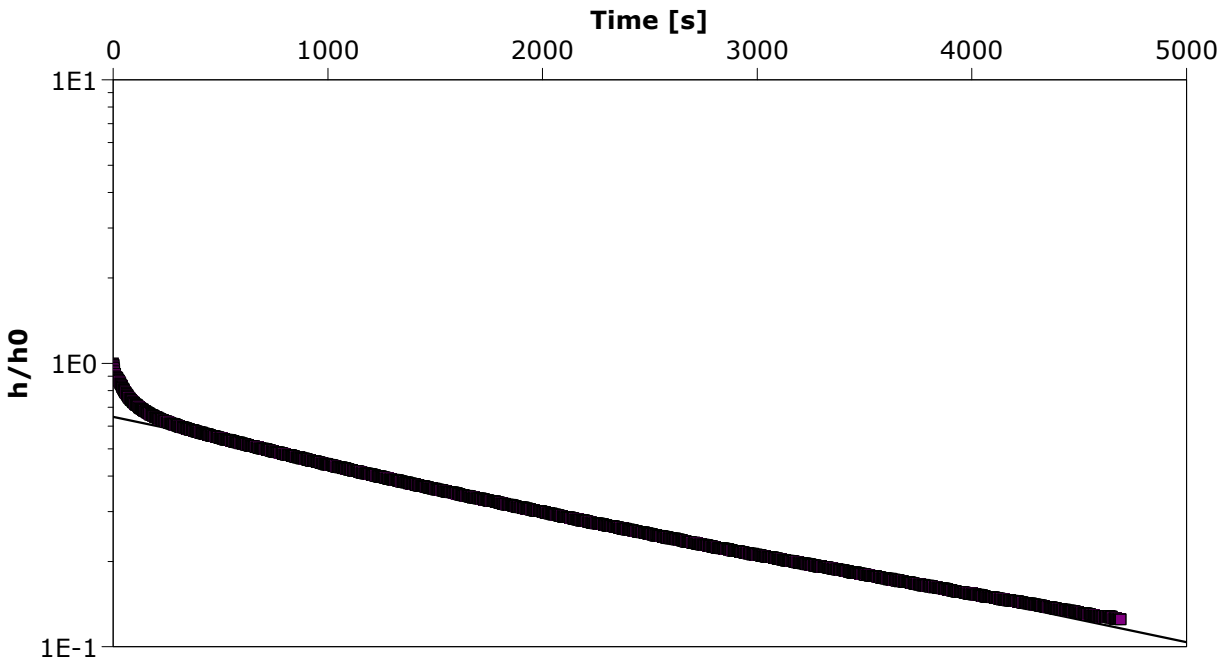
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz02	Test Well: Pz02
Test conducted by: AW		Test date: 8/06/2008
Analysis performed by: AW	Pz02 Bouwer & Rice	Date: 1/07/2008
Aquifer Thickness: 10.00 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz02	5.18×10^{-3}	

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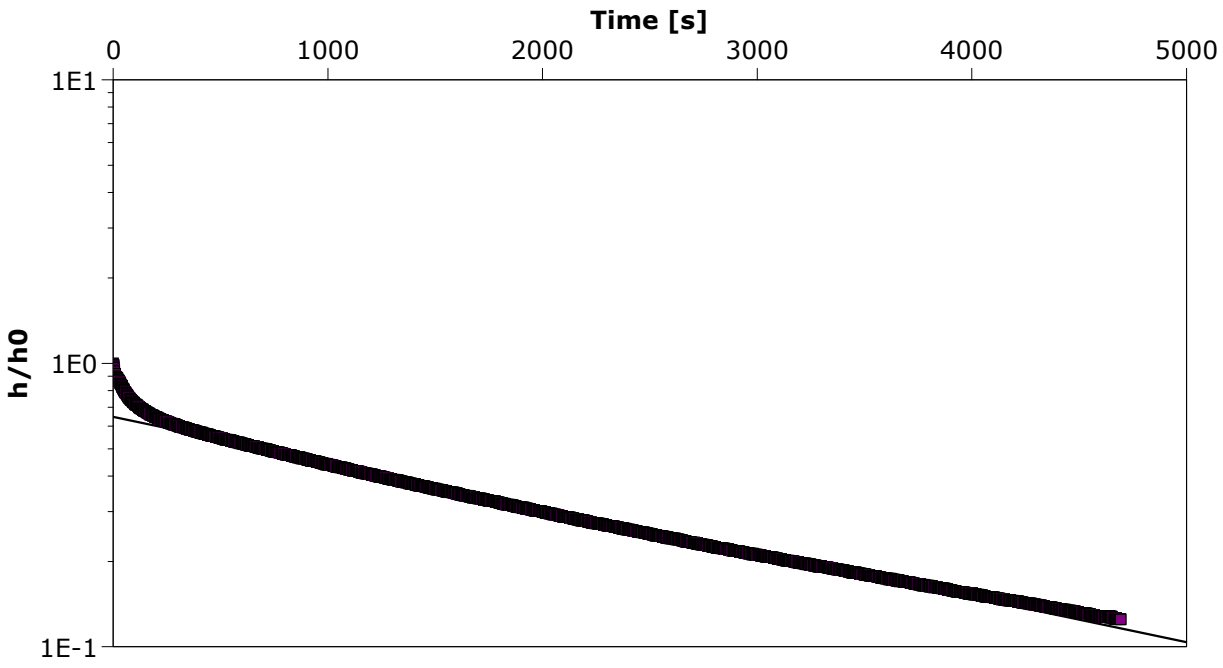
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz02	Test Well: Pz02
Test conducted by: AW		Test date: 8/06/2008
Analysis performed by: AW	Pz02 Hvorslev	Date: 1/07/2008
Aquifer Thickness: 10.00 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz02	6.49×10^{-3}	

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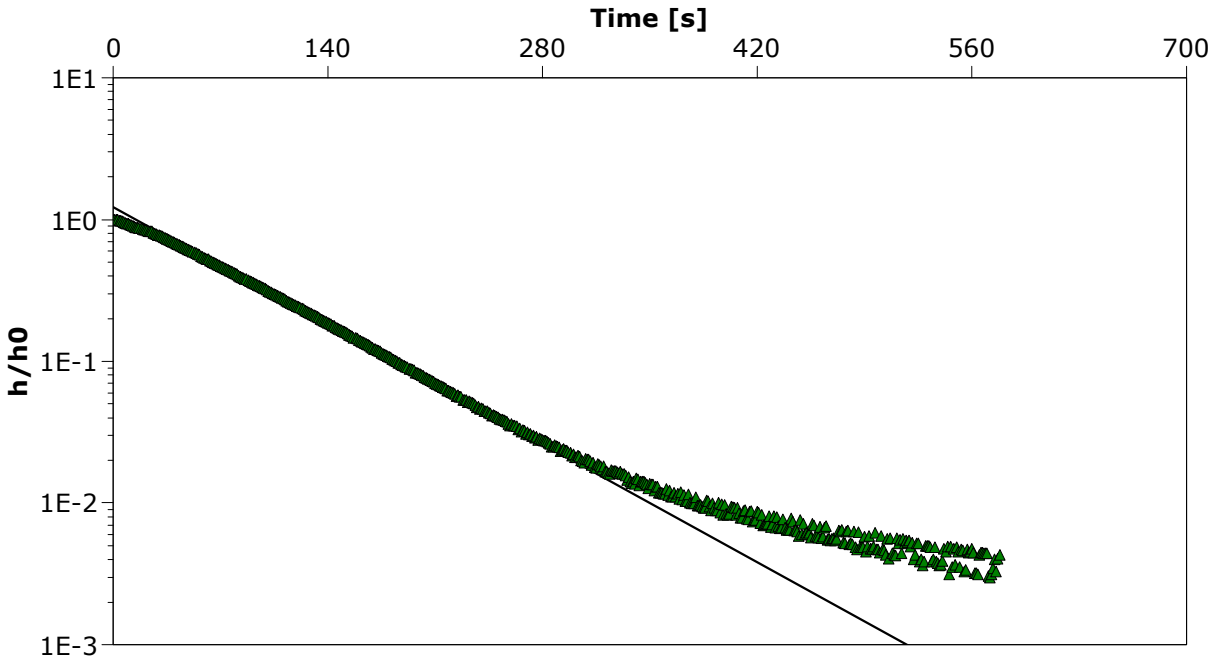
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz03-D	Test Well: Pz03-D
Test conducted by: AW		Test date: 7/06/2008
Analysis performed by: AW	Pz03-D Bouwer & Rice	Date: 1/07/2008
Aquifer Thickness: 4.50 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz03-D	4.60×10^{-1}	

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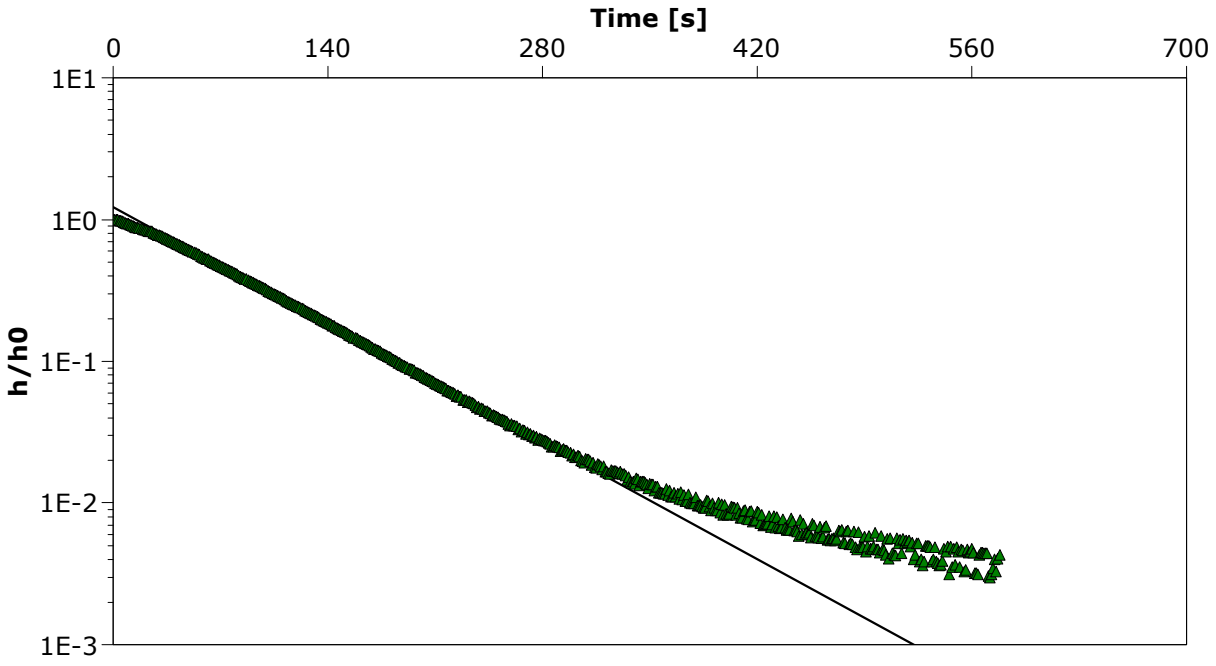
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz03-D	Test Well: Pz03-D
Test conducted by: AW		Test date: 7/06/2008
Analysis performed by: AW	Pz03-D Hvorslev	Date: 1/07/2008
Aquifer Thickness: 4.50 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz03-D	5.90×10^{-1}	

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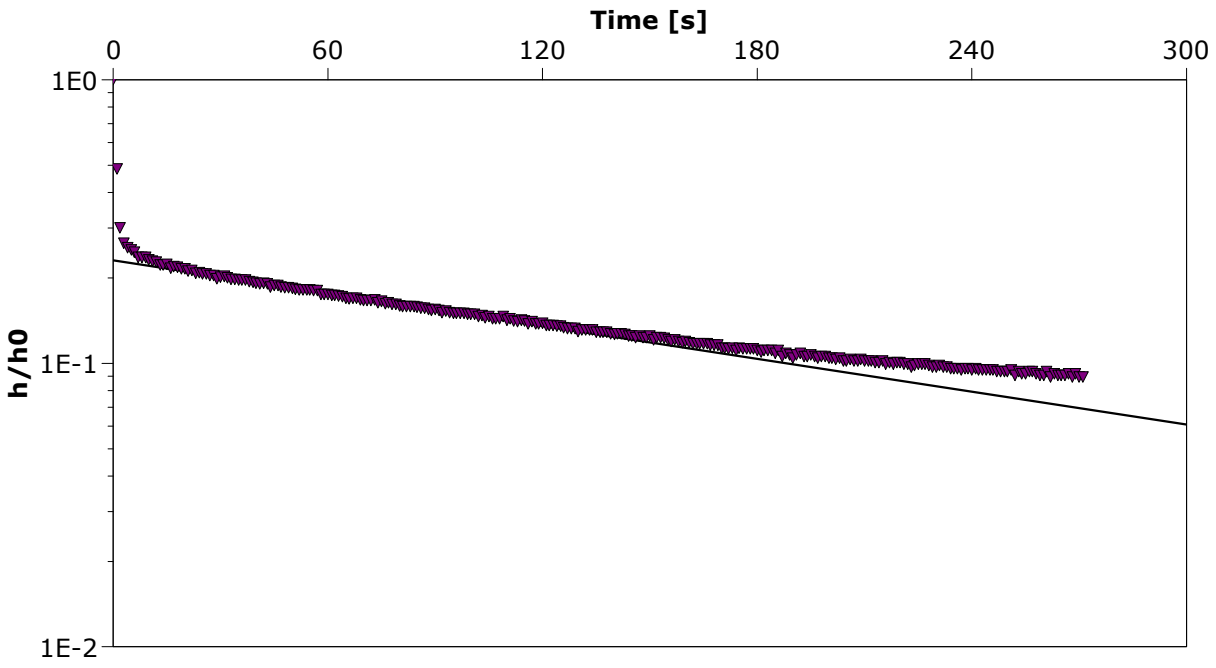
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz03-S	Test Well: Pz03-S
Test conducted by: AW		Test date: 10/09/2008
Analysis performed by: SD	Bouwer & Rice	Date: 9/10/2008
Aquifer Thickness: 1.50 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz03-S	8.25×10^{-2}	

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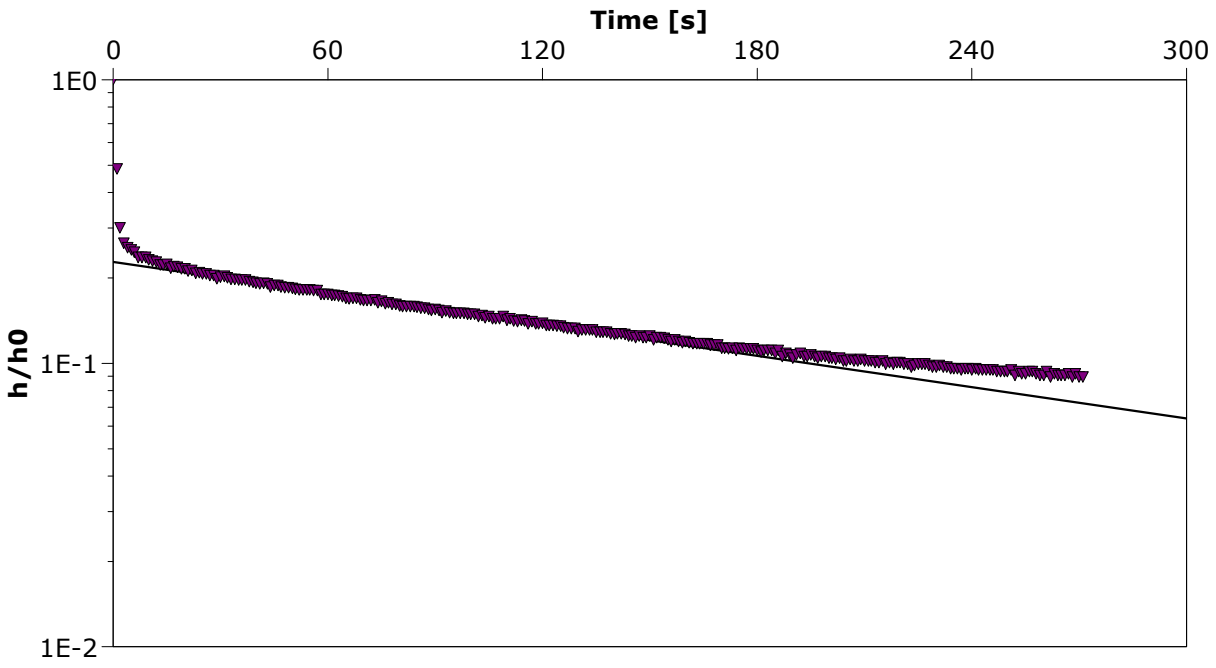
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz03-S	Test Well: Pz03-S
Test conducted by: AW		Test date: 10/09/2008
Analysis performed by: SD	Hvorslev	Date: 9/10/2008
Aquifer Thickness: 1.50 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz03-S	1.11×10^{-1}	

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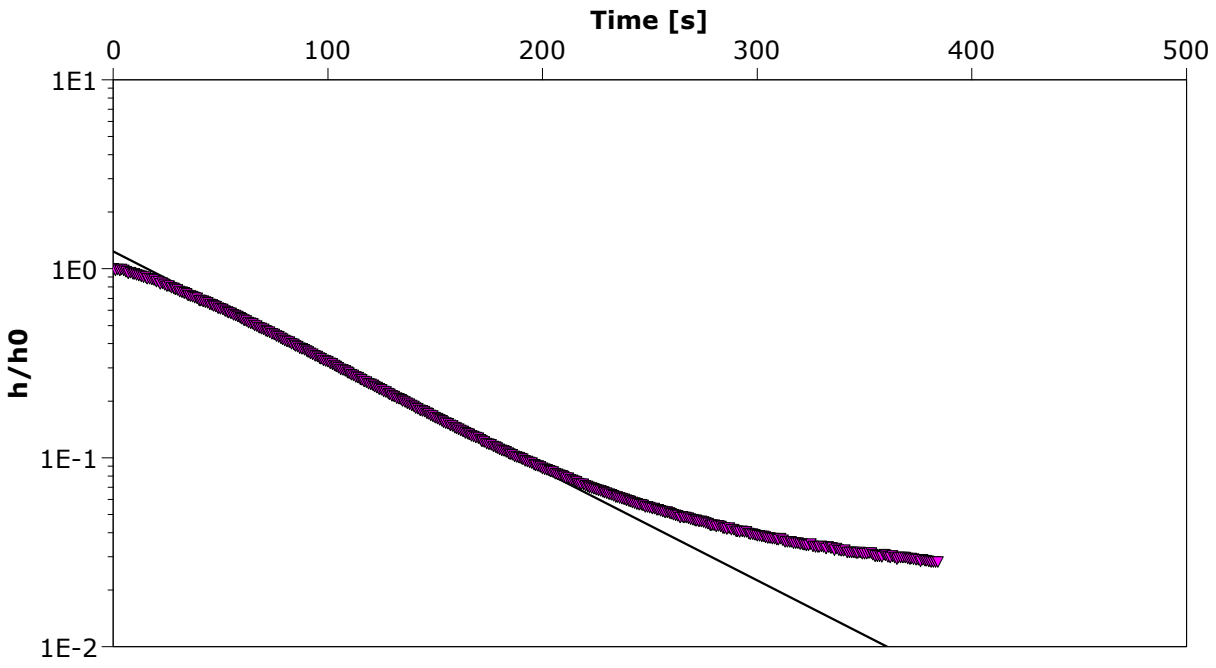
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz04	Test Well: Pz04
Test conducted by: AW		Test date: 3/06/2008
Analysis performed by: AW	Pz04 Bouwer & Rice	Date: 1/07/2008
Aquifer Thickness: 3.00 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz04	2.60×10^{-1}	

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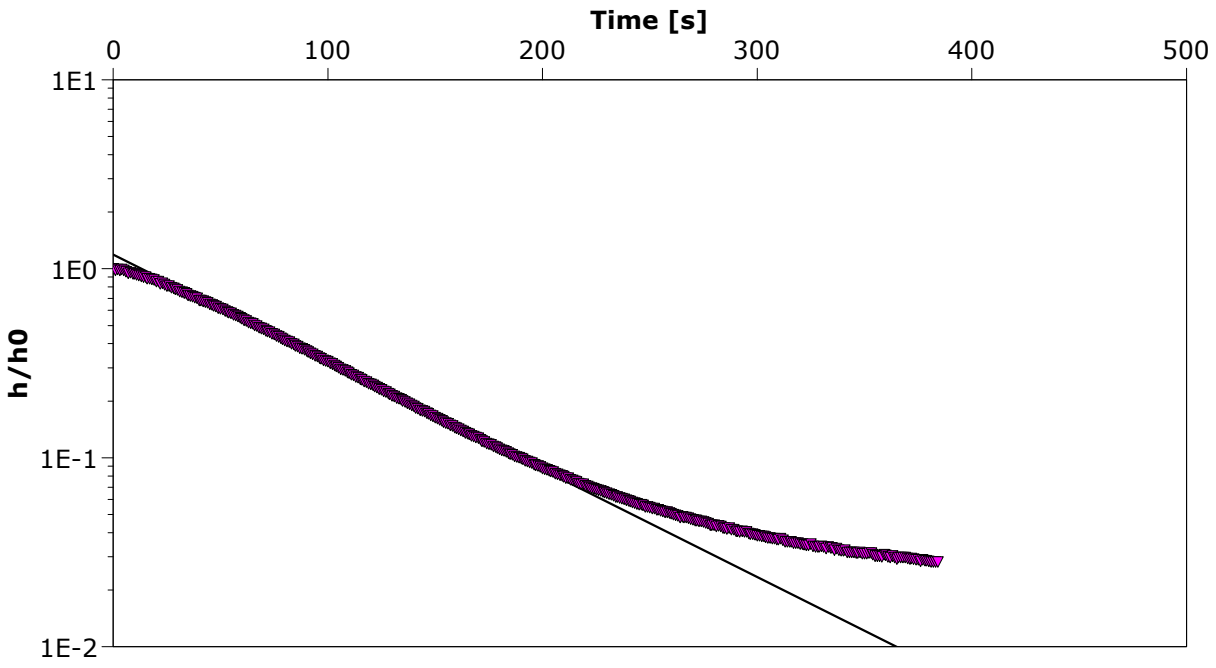
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz04	Test Well: Pz04
Test conducted by: AW		Test date: 3/06/2008
Analysis performed by: AW	Pz04 Hvorslev	Date: 1/07/2008
Aquifer Thickness: 3.00 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz04	3.25×10^{-1}	

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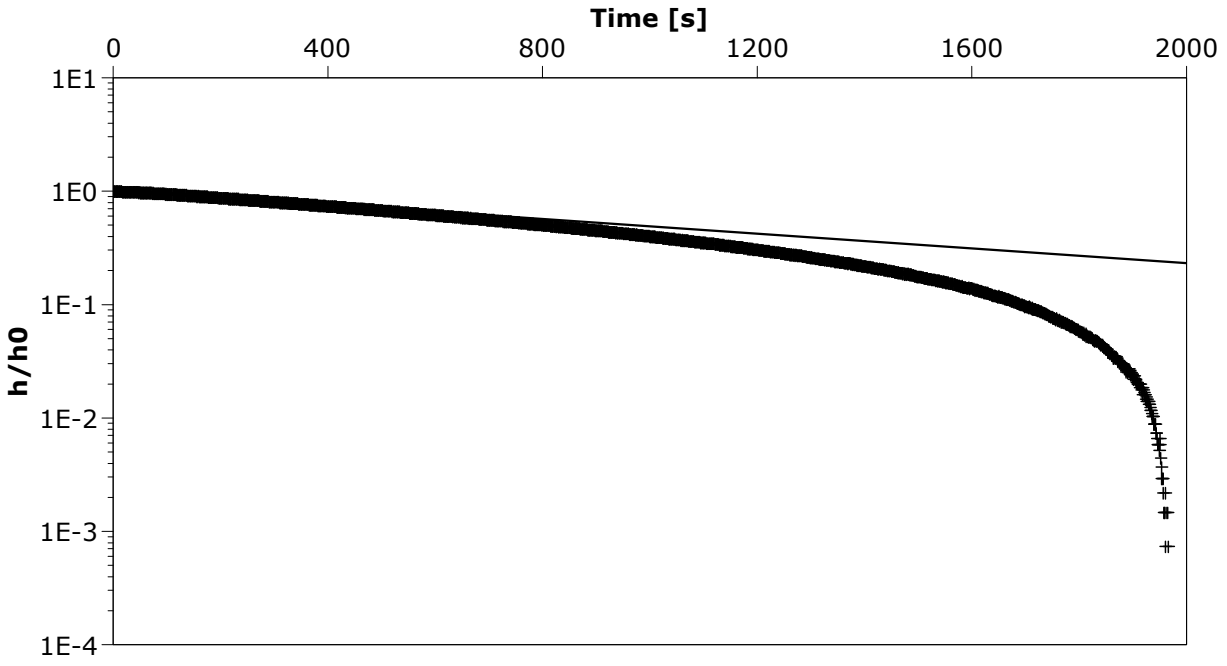
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz05	Test Well: Pz05
Test conducted by: AW		Test date: 10/09/2008
Analysis performed by: SD	Pz05 Bouwer & Rice	Date: 9/10/2008
Aquifer Thickness: 6.50 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz05	2.49×10^{-2}	

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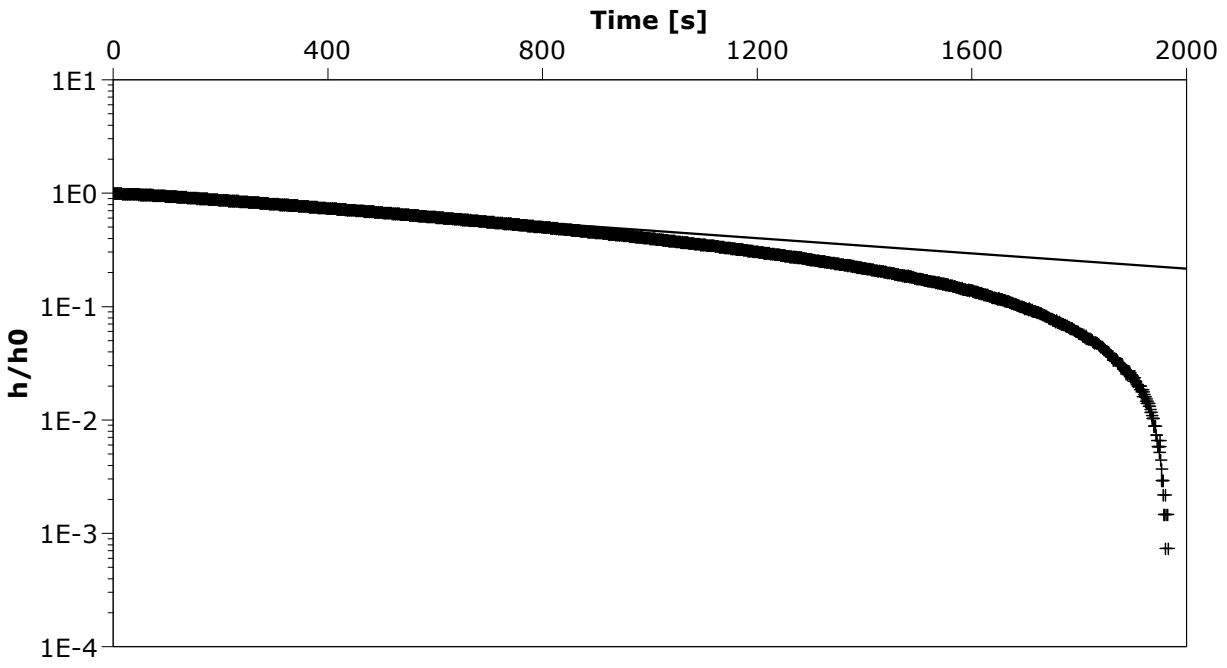
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz05	Test Well: Pz05
Test conducted by: AW		Test date: 10/09/2008
Analysis performed by: SD	Pz05 Hvorslev	Date: 9/10/2008
Aquifer Thickness: 6.50 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz05	3.36×10^{-2}	

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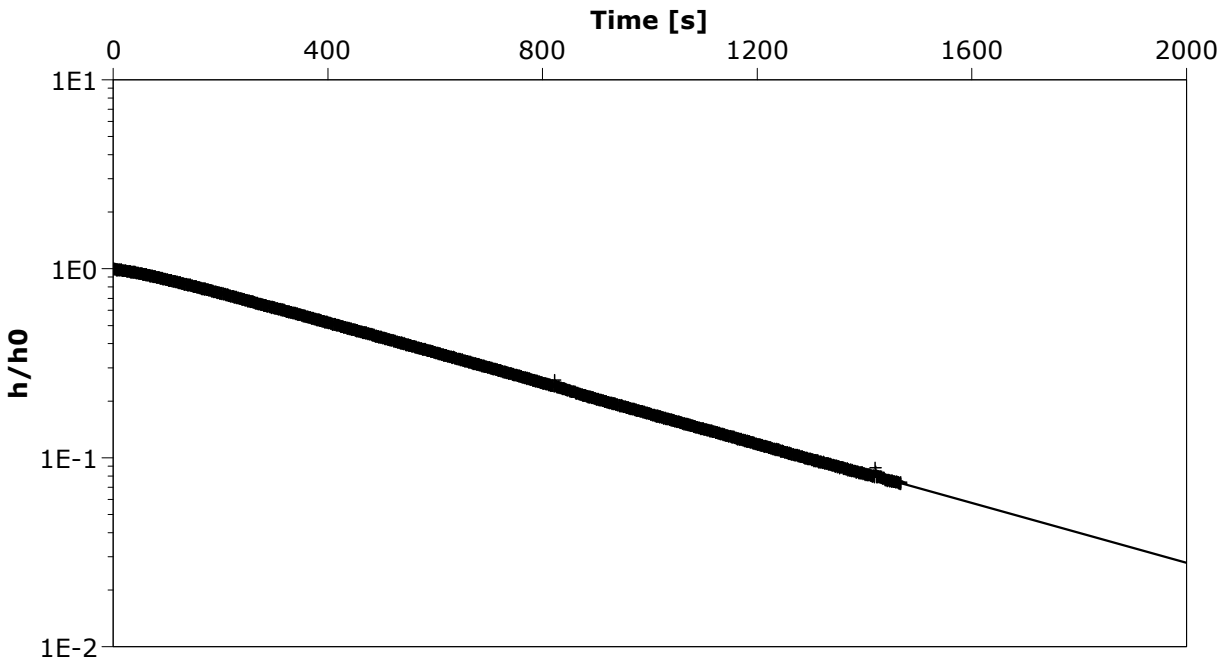
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz06-D	Test Well: Pz06-D
Test conducted by: AW		Test date: 5/06/2008
Analysis performed by: AW	Pz06-D Bouwer & Rice	Date: 2/07/2008
Aquifer Thickness: 2.50 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz06-D	6.12×10^{-2}	

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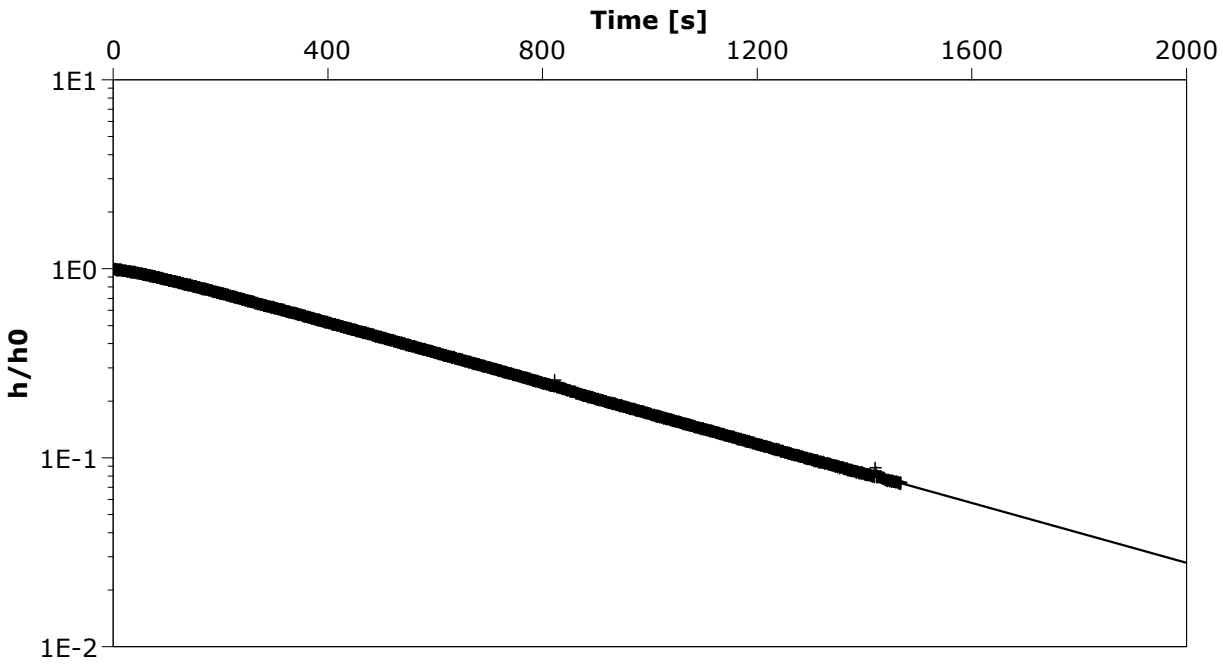
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz06-D	Test Well: Pz06-D
Test conducted by: AW		Test date: 5/06/2008
Analysis performed by: AW	Pz06-D Hvorslev	Date: 2/07/2008
Aquifer Thickness: 2.50 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz06-D	7.92×10^{-2}	

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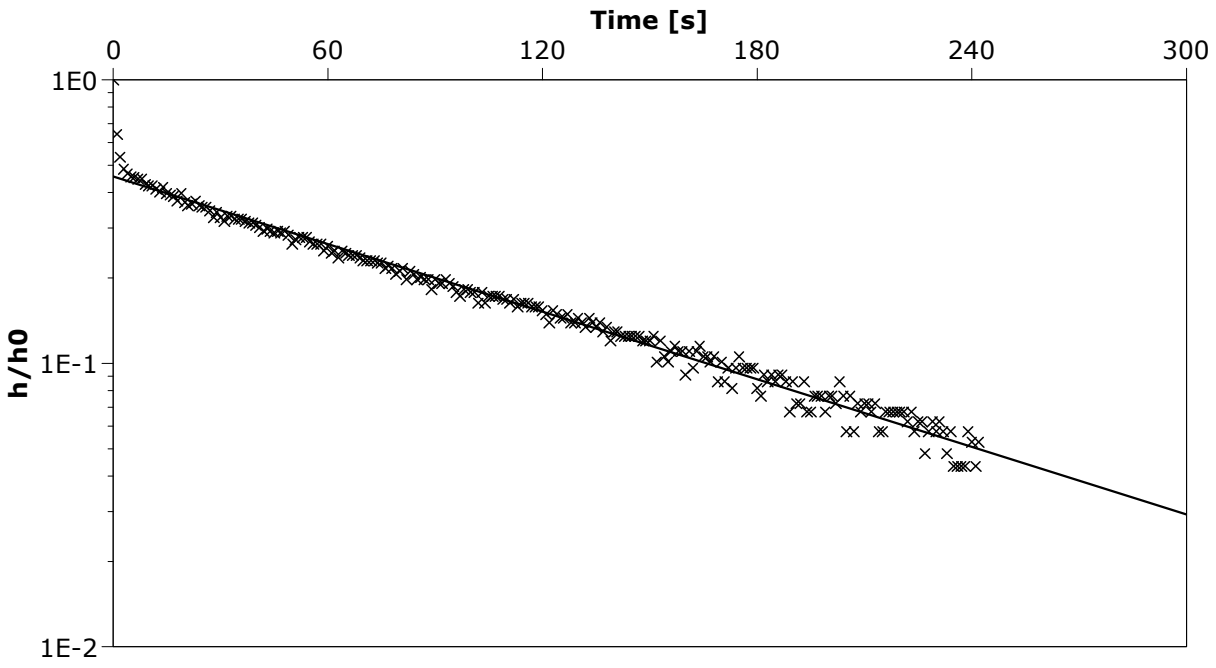
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz06-Sb	Test Well: Pz06-S
Test conducted by: AW		Test date: 10/09/2008
Analysis performed by: SD	Pz06-S Bouwer & Rice	Date: 9/10/2008
Aquifer Thickness: 2.60 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz06-S	1.38×10^{-1}	

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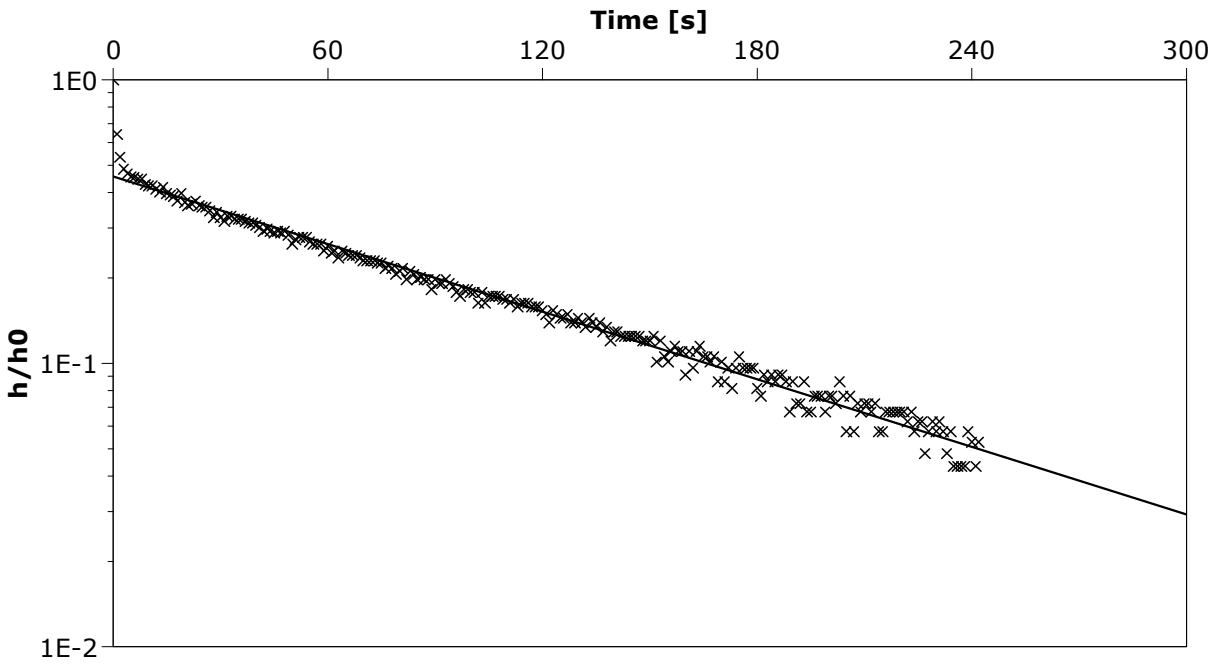
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz06-Sb	Test Well: Pz06-S
Test conducted by: AW		Test date: 10/09/2008
Analysis performed by: SD	Pz06-S Hvorslev	Date: 9/10/2008
Aquifer Thickness: 2.60 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz06-S	1.91×10^{-1}	

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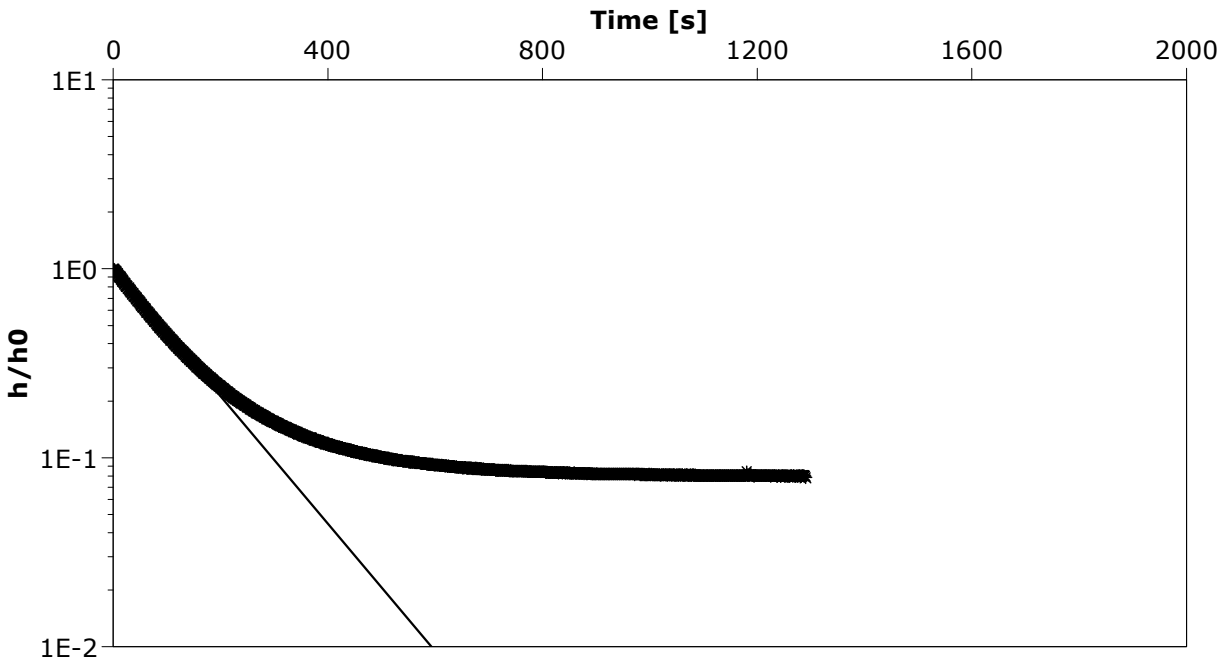
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz07-D	Test Well: Pz07-D
Test conducted by: AW		Test date: 5/06/2008
Analysis performed by: AW	Pz07-D Bouwer & Rice	Date: 1/07/2008
Aquifer Thickness: 1.50 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz07-D	2.60×10^{-1}	

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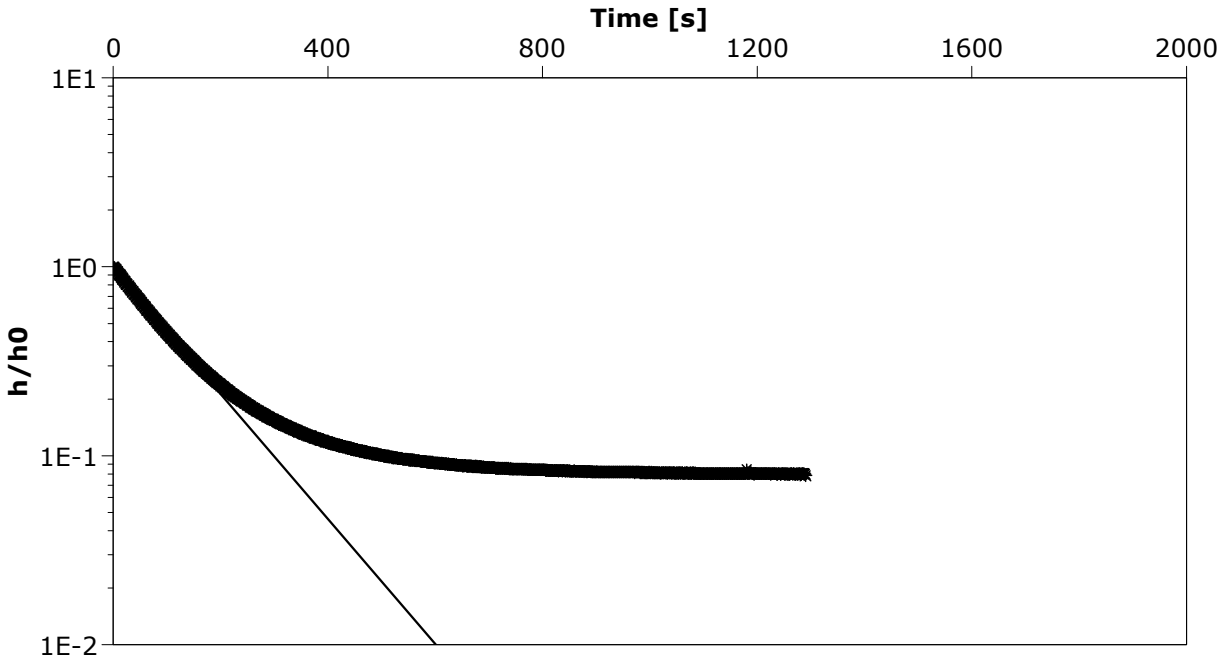
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz07-D	Test Well: Pz07-D
Test conducted by: AW		Test date: 5/06/2008
Analysis performed by: AW	Pz07-D Hvorslev	Date: 1/07/2008
Aquifer Thickness: 1.50 m		

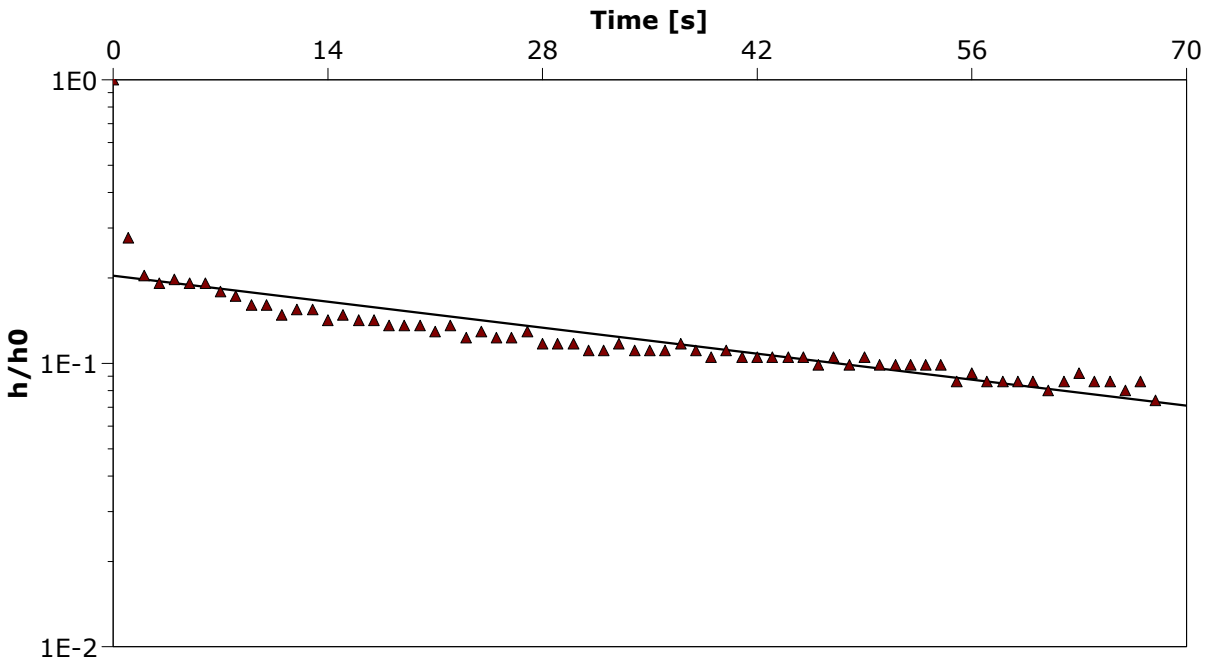


Calculation after Hvorslev

Observation well	K [m/d]	
Pz07-D	3.30×10^{-1}	

URS Australia Pty Ltd Level 14, 240 Queen St Brisbane, QLD, 4000 Phone: +61 7 3243 2111	**Slug Test Analysis Report**
	Project: Caval Ridge EIS
	Number: 42626162
	Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz07-Sb	Test Well: Pz07-S
Test conducted by: AW		Test date: 9/09/2008
Analysis performed by: SD	Pz07-S Bouwer & Rice	Date: 9/10/2008
Aquifer Thickness: 1.70 m		

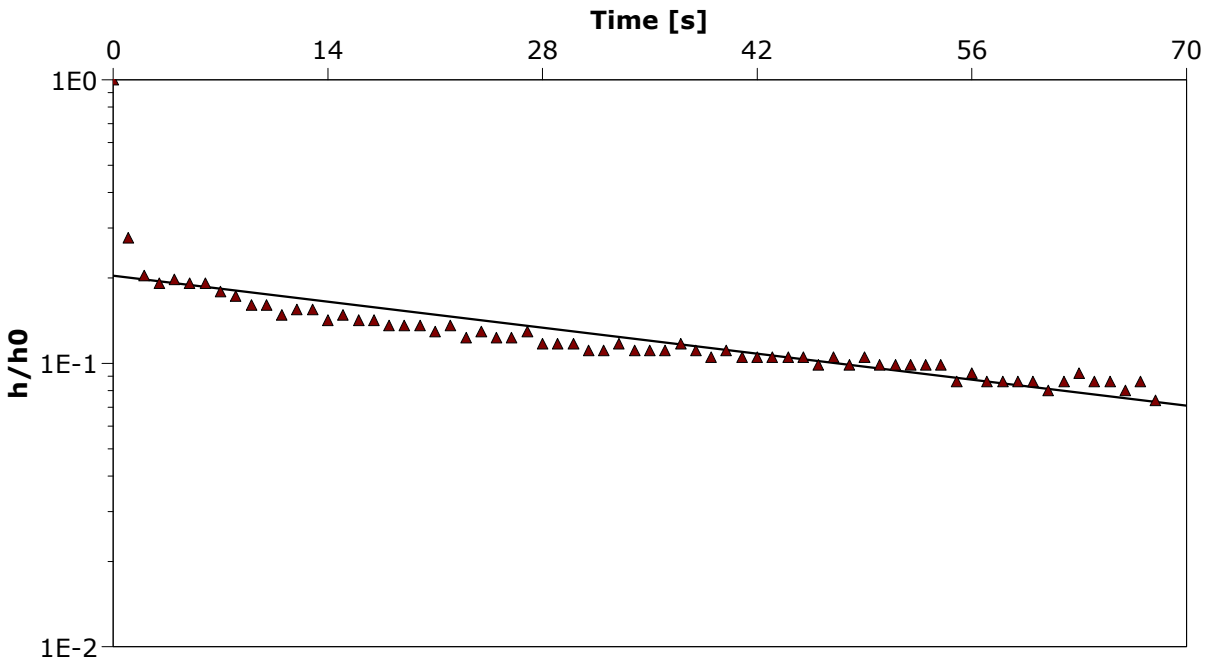


Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz07-S	2.69×10^{-1}	

URS Australia Pty Ltd Level 14, 240 Queen St Brisbane, QLD, 4000 Phone: +61 7 3243 2111	**Slug Test Analysis Report**
	Project: Caval Ridge EIS
	Number: 42626162
	Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz07-Sb	Test Well: Pz07-S
Test conducted by: AW		Test date: 9/09/2008
Analysis performed by: SD	Pz07-S Hvorslev	Date: 9/10/2008
Aquifer Thickness: 1.70 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz07-S	3.79×10^{-1}	

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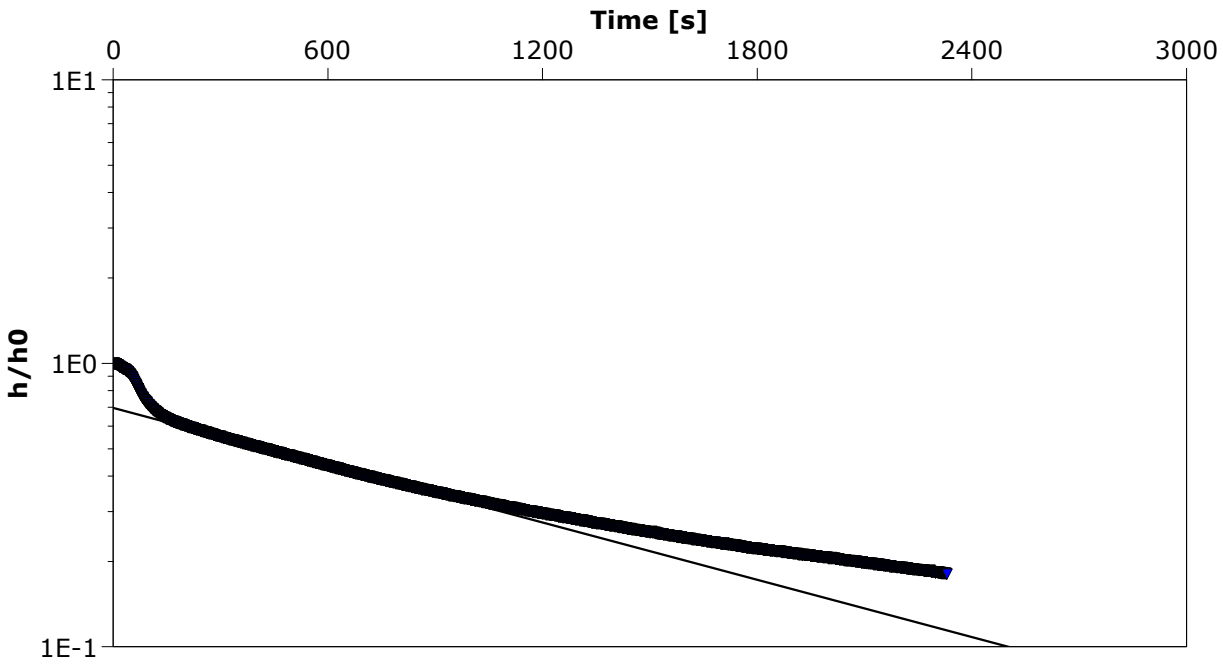
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz08-D	Test Well: Pz08-D
Test conducted by: AW		Test date: 6/06/2008
Analysis performed by: AW	Pz08-D Bouwer & Rice	Date: 1/07/2008
Aquifer Thickness: 6.00 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz08-D	2.60×10^{-2}	

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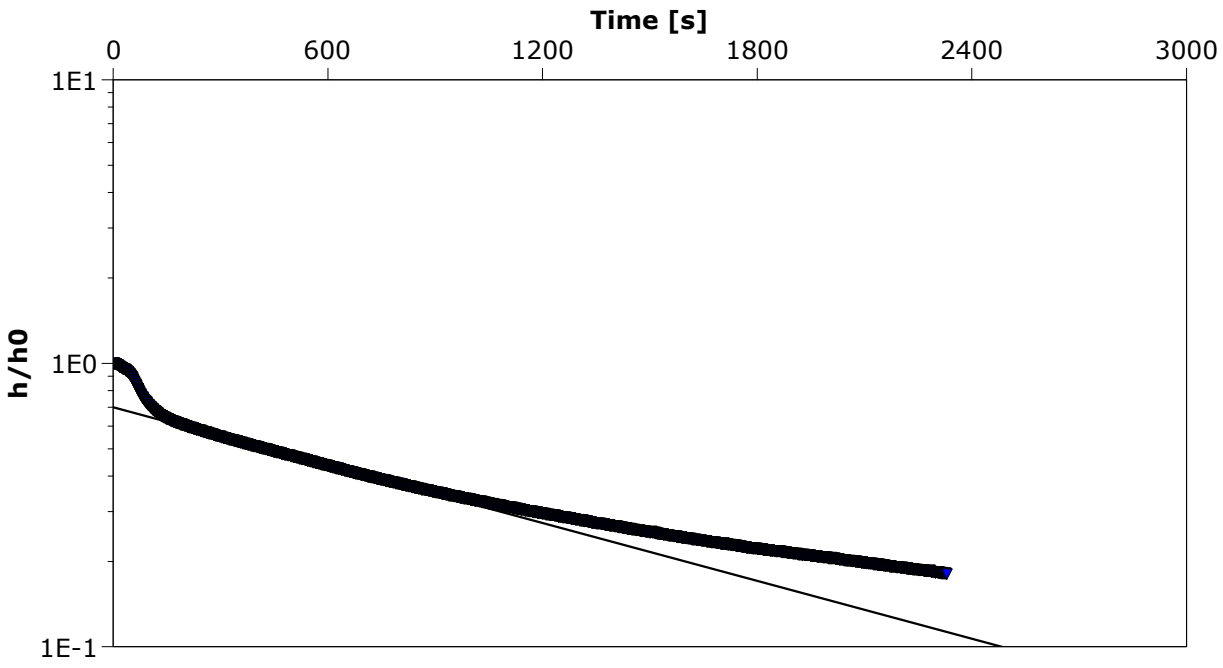
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz08-D	Test Well: Pz08-D
Test conducted by: AW		Test date: 6/06/2008
Analysis performed by: AW	Pz08-D Hvorslev	Date: 1/07/2008
Aquifer Thickness: 6.00 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz08-D	3.40×10^{-2}	

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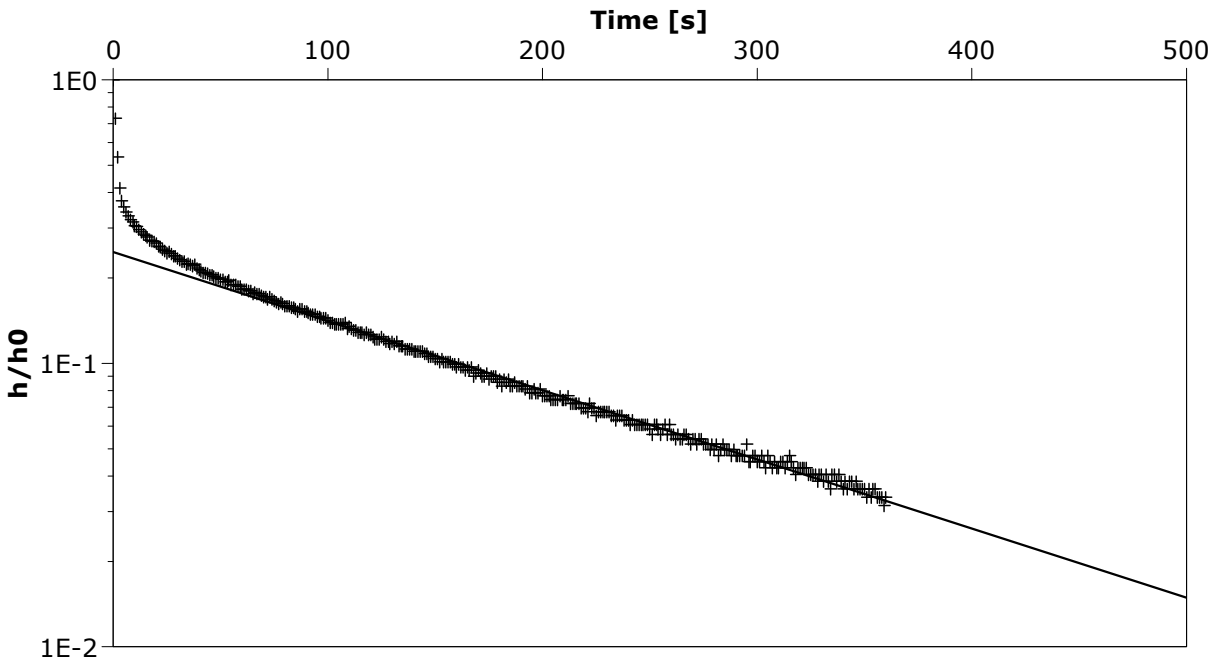
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz08-Sb	Test Well: Pz08-S
Test conducted by: AW		Test date: 9/09/2008
Analysis performed by: SD	Pz08-S Bouwer & Rice	Date: 9/10/2008
Aquifer Thickness: 2.40 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz08-S	8.78×10^{-2}	

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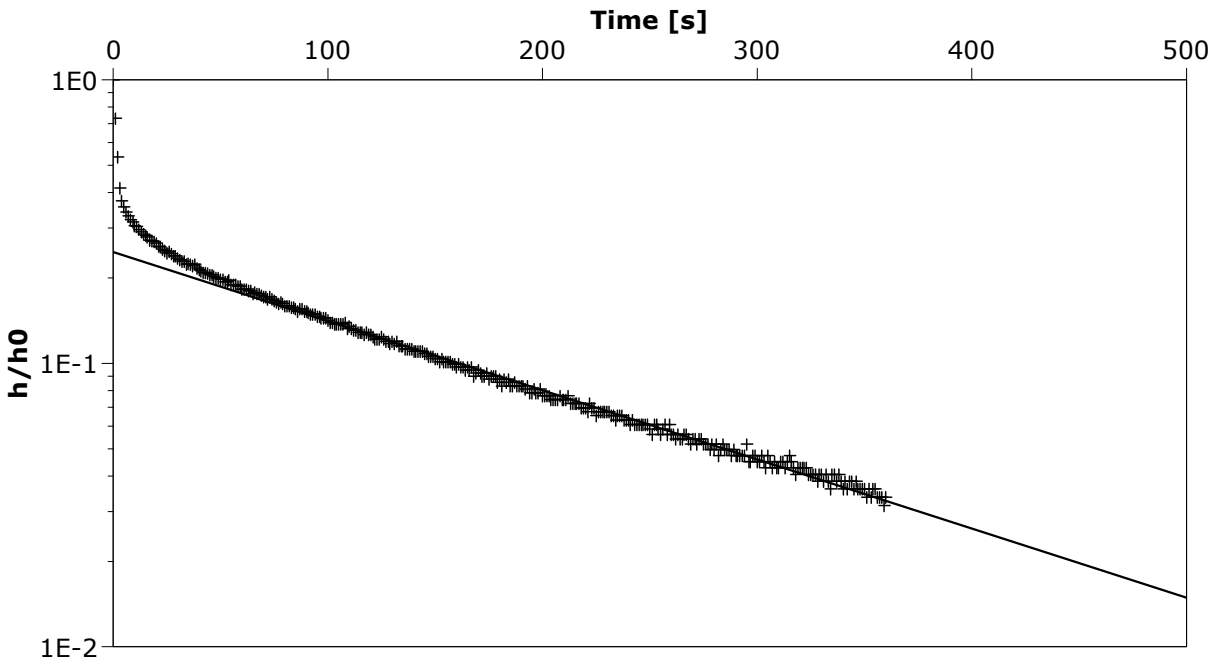
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz08-Sb	Test Well: Pz08-S
Test conducted by: AW		Test date: 9/09/2008
Analysis performed by: SD	Pz08-S Hvorslev	Date: 9/10/2008
Aquifer Thickness: 2.40 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz08-S	1.22×10^{-1}	

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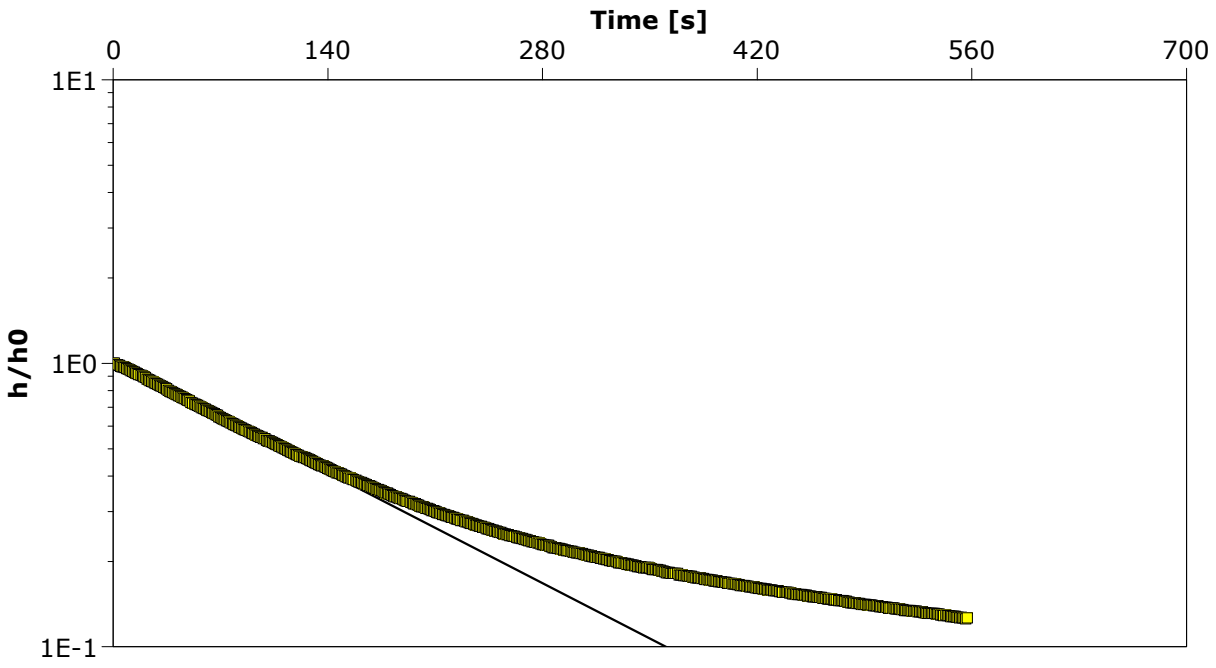
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz09	Test Well: Pz09
Test conducted by: AW		Test date: 6/06/2008
Analysis performed by: AW	Pz09 Bouwer & Rice	Date: 1/07/2008
Aquifer Thickness: 6.00 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz09	1.25×10^{-1}	

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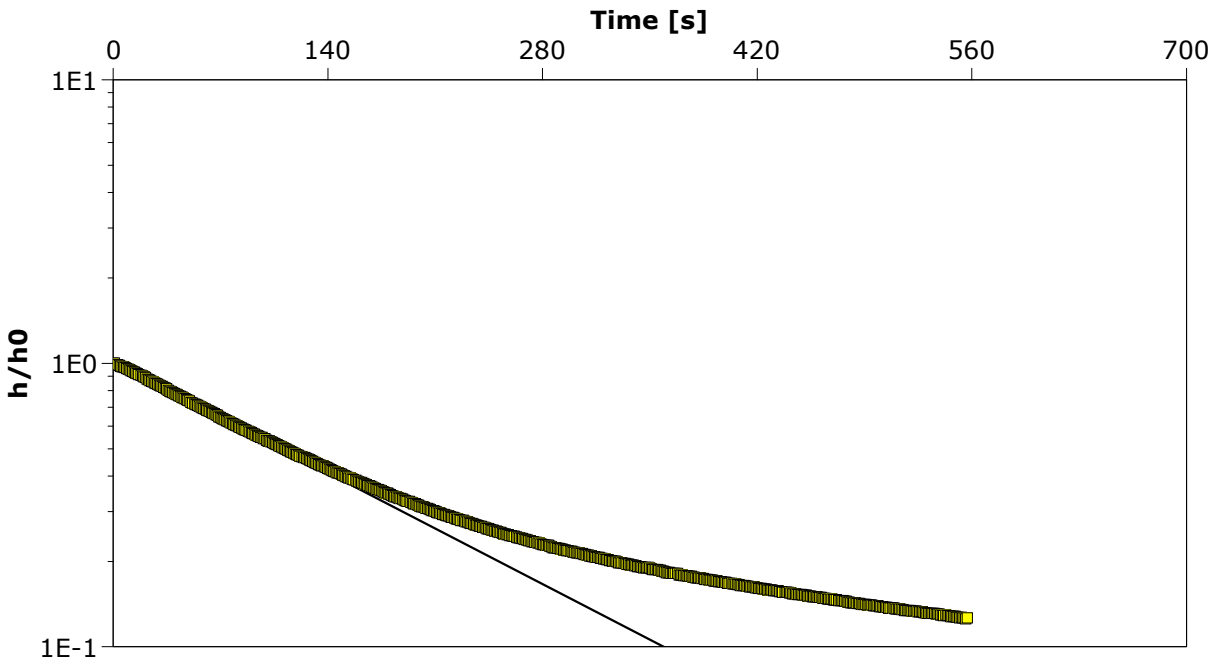
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz09	Test Well: Pz09
Test conducted by: AW		Test date: 6/06/2008
Analysis performed by: AW	Pz09 Hvorslev	Date: 1/07/2008
Aquifer Thickness: 6.00 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz09	1.60×10^{-1}	

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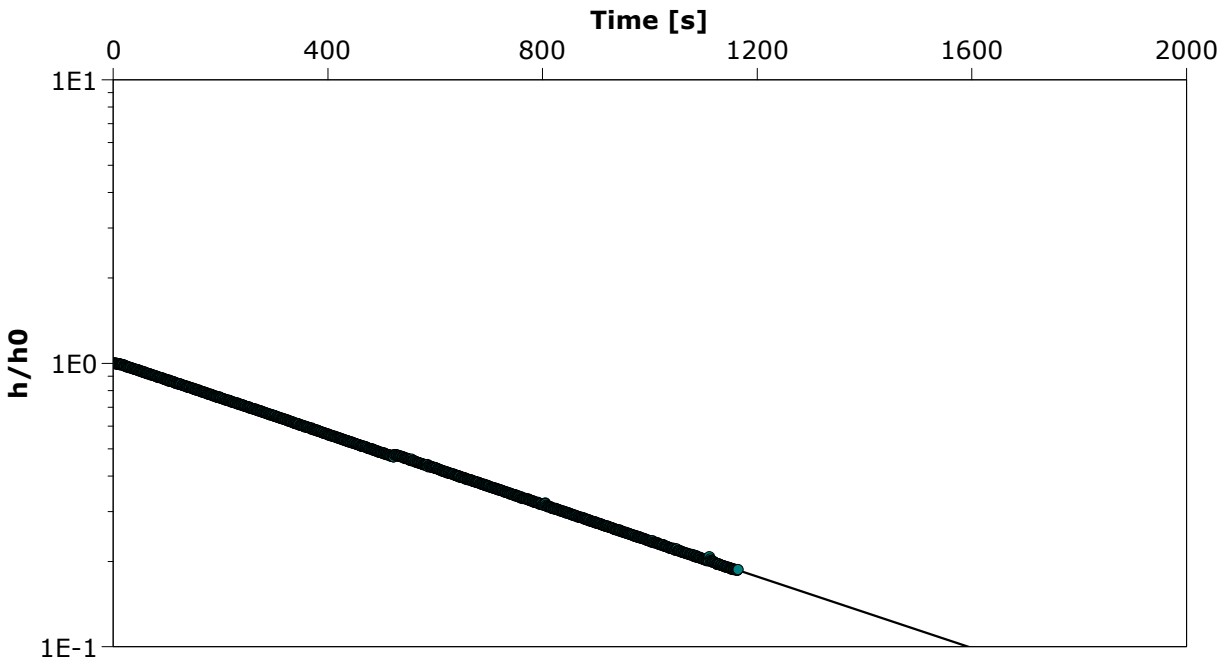
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz10	Test Well: Pz10
Test conducted by: AW		Test date: 6/06/2008
Analysis performed by: AW	Pz10 Bouwer & Rice	Date: 1/07/2008
Aquifer Thickness: 4.00 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz10	2.82×10^{-2}	

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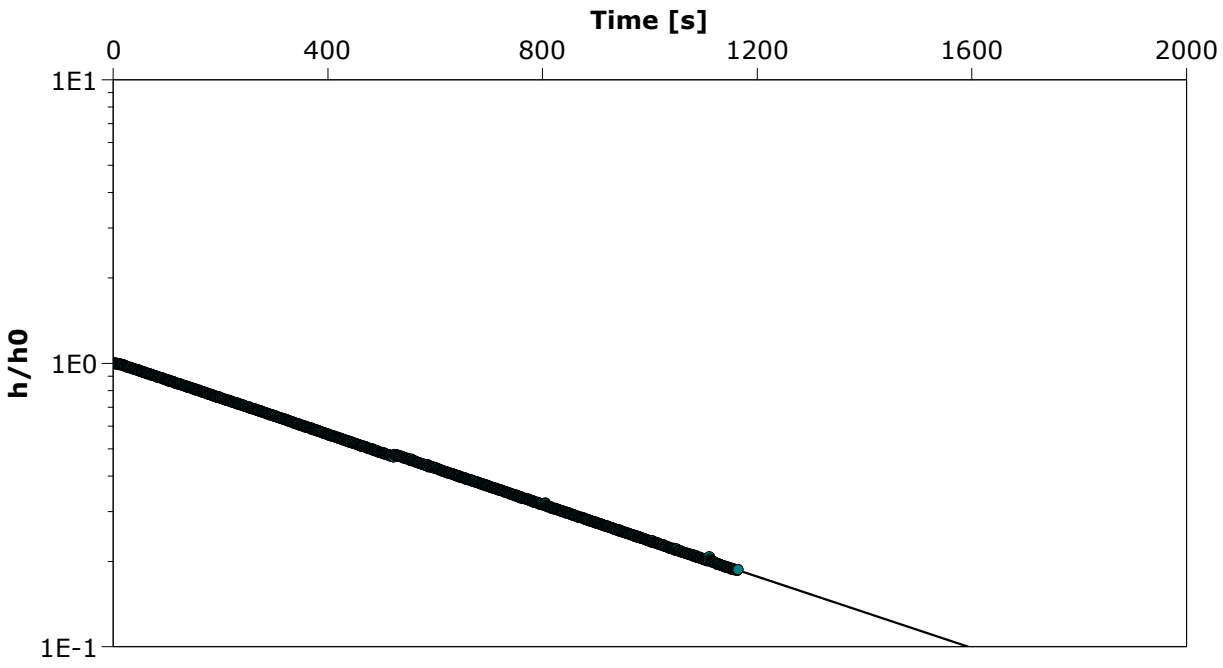
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz10	Test Well: Pz10
Test conducted by: AW		Test date: 6/06/2008
Analysis performed by: AW	Pz10 Hvorslev	Date: 1/07/2008
Aquifer Thickness: 4.00 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz10	3.60×10^{-2}	

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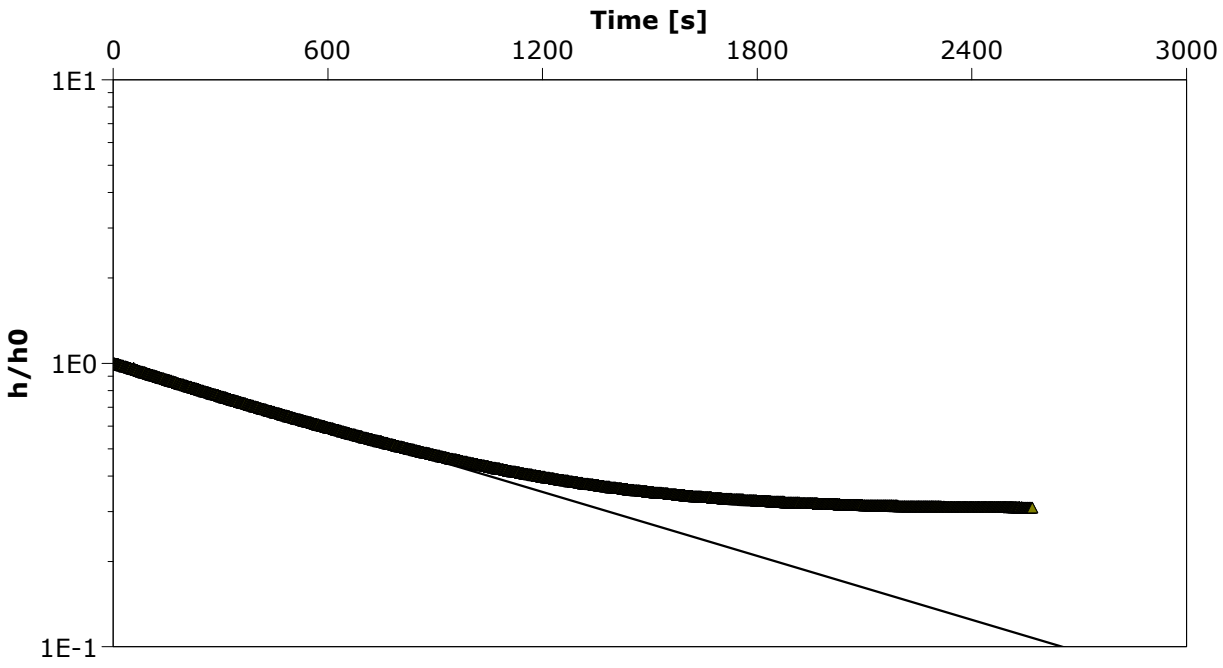
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz11-D	Test Well: Pz11-D
Test conducted by: AW		Test date: 6/06/2008
Analysis performed by: AW	Pz11-D Bouwer & Rice	Date: 1/07/2008
Aquifer Thickness: 3.00 m		



Calculation after Bouwer && Rice

Observation well	K [m/d]	
Pz11-D	2.90×10^{-2}	

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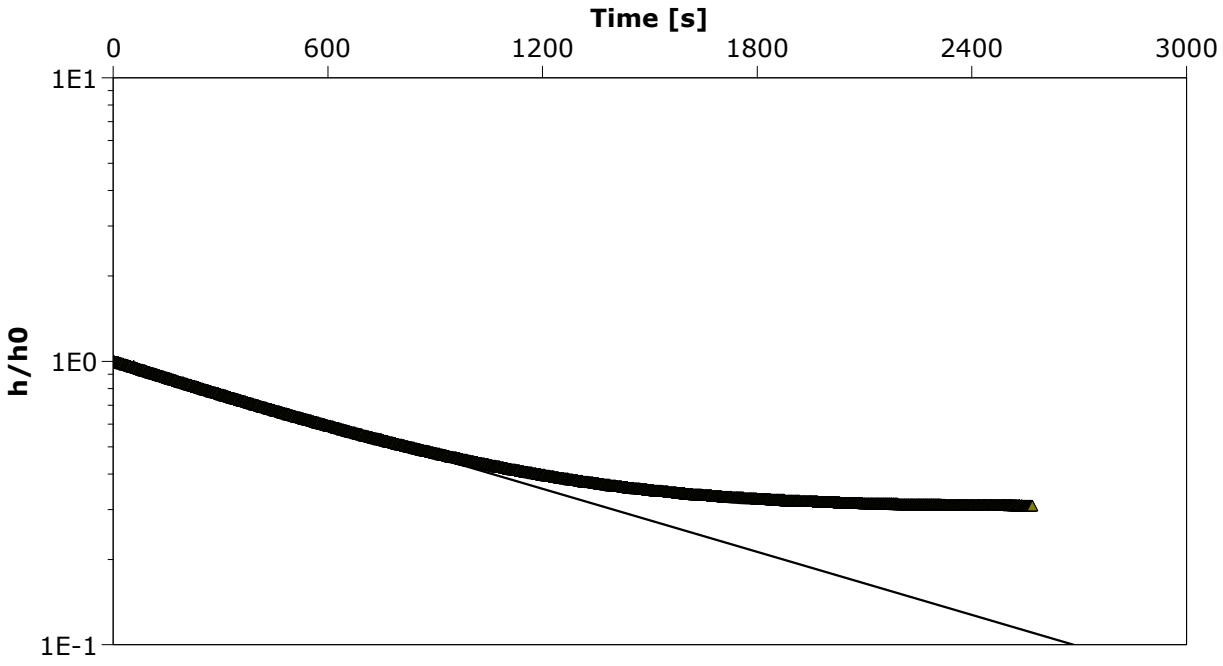
Slug Test Analysis Report

Project: Caval Ridge EIS

Number: 42626162

Client: BMA Coal

Location: Moranbah QLD	Slug Test: Pz11-D	Test Well: Pz11-D
Test conducted by: AW		Test date: 6/06/2008
Analysis performed by: AW	Pz11-D Hvorslev	Date: 1/07/2008
Aquifer Thickness: 3.00 m		



Calculation after Hvorslev

Observation well	K [m/d]	
Pz11-D	3.70×10^{-2}	

Groundwater Monitoring Well Purge Sheets

Appendix E

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ04

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: PZ04 3/06/08 Done by: AW + BS

Development Method
Time Started
Time Stopped
Comments

SWL (start) 67.62 (ToC)
SWL (end)

Volume Removed
Discharge Rate

Bore Depth (start) 96m (ToC)
Bore Depth (end)
NAPL Present
(If yes thickness)

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

05/06/08
67.54 (ToC)

Purging Date: 0 Done by: AW/BS

Purge Method
Time Started
Time Stopped
Comments

Purge Depth
SWL (start)
SWL (end)

Bore Volume
Volume Removed

Bore Depth (start)
Bore Depth (end)
NAPL Present
(If yes thickness)

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Sampling Date: Done by: AW/BS

Sampling Method
Time Started
Time Stopped
Comments

Sampling Depth
SWL (start)
SWL (end)

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: ~~PZ~~ 06-D

QL01-10am

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 05/06/08 Done by: AW/BS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 29.935 (ToC) Bore Volume _____ Bore Depth (start) 34.08 (ToC)
Time Stopped _____ SWL (end) 31.24 (ToC) Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: ~~P205~~ P206-D

~~0671384mE~~
~~7515822mN~~

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: 02/06/08 Done by: AWilson

Development Method
Time Started — SWL (start) — Volume Removed — Bore Depth (start)
Time Stopped — SWL (end) — Discharge Rate — Bore Depth (end)
Comments — NAPL Present
(If yes thickness)

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: ~~02/06/08~~ Done by: AW/BS

Purge Method ~~P205~~ Purge Depth ~~P205~~
Time Started — SWL (start) ~~37.62 EC~~ — Bore Volume — Bore Depth (start) ≈120m (tape m. only 100m)
Time Stopped — SWL (end) — Volume Removed — Bore Depth (end)
Comments — NAPL Present
(If yes thickness)

Field Analyses
Purging 05/06/08

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
9.15am	pumping	1424	6.89	~~-0.7~~	-306		1.82	light grey - turbid - sulphur
9.26am	"	1468	6.98	7.8	-300		0.67	" " - "
9.41am	"	1517	~~7.34~~	4.7	-314		1.05	light grey - slightly turbid/clear - sulphur
9.58am	"	2263	7.06	~~6.5~~	~~-294~~		0.70	" " - cloudy/clearer - sulphur
10.17am	"	1691	6.81	22.5 | 5.7	301		0.42	light grey - cloudy/turbid.

P206-d

Sampling Date: 1 probe out of sample Done by: AW/BS

Sampling Method — Sampling Depth
Time Started — SWL (start)
Time Stopped — SWL (end)
Comments

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ06-S

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 05/06/08 Done by: AW/BS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 26.232 (ToC) Bore Volume _____ Bore Depth (start) 29.055 (ToC) 26.25(ToC)
Time Stopped _____ SWL (end) 26.25 (ToC) Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Purging 05/06/08

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
9.36am	6L	Ranging cond.	7.68	3.3	-192	-	7.71	grey & turbid -
9:50	13L	Ranging	7.74	25.5	-143	-	6.48	grey brown, turbid
10:09	18L	11.5	7.73	27.9/17.9	-161	-	7.73	grey brown, turbid.

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P207-D

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 05/06/08 Done by: AW/BS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 14.146 (ToC) Bore Volume _____ Bore Depth (start) 44.57 (ToC)
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
15:19	pumping	—	~~6.84~~	~~25~~	-196	—	~~BLANK~~ 1.24	dark grey, turbid
15:32	"	—	7.04	—	-228	—	0.58	" " "
15:41	"	—	6.96	—	-211	—	0.59	lighter grey - less turbid, sulphur
15:47	"	—	6.84	—	-197	—	2.02	" " " "

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: ~~P207-S~~ P207-S

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 05/06/08 Done by: AW/BS

Purge Method _____ Purge Depth
Time Started _____ SWL (start) 13.487m TOC Bore Volume _____ Bore Depth (start) 15.37m TOC
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
15:22	4L	—	6.59	~~25~~.0	23	—	2.38	dark grey-very turbid
15:25	8L	—	6.20	~~25~~.0	96	—	2.08	" " - " "
15:28	12L	—	6.22	~~25~~.0	136	—	1.97	" " - " "
15:37	16L	—	6.35	—	-6	—	2.09	" " - " "

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ08-D

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: _____ Done by: AW/BS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 27.046m TOC Bore Volume _____ Bore Depth (start) 64.1m TOC
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging 06/06/08

Pump was set up 07/06/08

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
6:38	pumping	—	6.84	—	-262	—	1.37	grey, sulphur, cloudy
6:49	"	—	6.61	—	-271	—	1.12	" " clearish
7:02	"	—	7.20	—	-277	—	0.62	sulphur clear
7:16	"	—	6:43	—	-256	—	0.91	" "

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ08-S

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 6/6/08 Done by: AW/BS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 14.05 m Bore Volume _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Purging 06/06/08

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
6:54	34	—	6.45	—	-91	—	3.64	pale reddish brown, turbid
7:06	62	—	6.52	—	-78	—	5.30	"
7:14	90	—	6.49	—	-92	—	7.16	

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P2610

613691 mE
7548096 mN

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 06/06/08 Done by: AW/BS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 41.56 Bore Volume _____ Bore Depth (start) ~86.6.
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
11:28	Purging	~~1878~~	7.29	~~26.6~~	-178	—	1.96	Light brown clear to slightly Rusty
11:33	1	1728	7.36	24.5	-199	—	1.86	clear yellowish.
11:35	11	1699	7.36	23.4	-196	—	1.45	" "
11:41	"	1770	7.30	24.7	-210	—	1.05	" "
11:44	"	1718	7.40	23.9	-200	—	1.91	" "

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ09

LD QC04 for PZ09 & QC04 filter from PZ10 was used.

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 06/06/08 Done by: AW/BS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 19.678 (ToC) Bore Volume _____ Bore Depth (start) ≈ 78.7 (ToC)
Time Stopped _____ SWL (end) 20.87 (ToC) Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
13:03	pump	1622	7.49	27.6	-170	—	1.48	light brown cloudy
13:10	pump	1664	7.51	26.2	-209	—	0.34	light brown, clear to slightly turbid
13:15	"	1661	7.62	26.4	-214	—	0.19	light brown, clear to slightly turbid
13:20	"	1683	7.70	26.6	-216	—	0.18	" " " "
13:25	"	1689	7.67	26.6	-214	—	0.12	" " " "

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ-1R-S

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: _____ Done by: AW/BS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) dry! Bore Volume _____ Bore Depth (start) 8.94(TOC)
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ11-D

filter used @ PZ10&9
0614329mE
7548821mN

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 06/06/08 Done by: AW/BS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 11.782 (ToC) Bore Volume _____ Bore Depth (start) 59.1 (ToC)
Time Stopped _____ SWL (end) 24.27m ToC Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC ~~(uS/cm)~~ mS	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
15:52	Pump	4.48	7.07	26.6	+31	=	2.44	clear Slightly tr/bi.A
15:35	"	3.49	7.24	26.8	-49	=	0.80	" "
15:39	"	3.54	7.52	25.8	-84	=	0.39	" "
15:44	"	3.33	7.52	25.7	-98	=	0.26	" "

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P203-S

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: _____ Done by: AW/BS

Purge Method _____
Time Started _____ Purge Depth
Time Stopped _____ SWL (start) 25.492m TOC Bore Volume 3.75L Bore Depth (start) 27.23m TOC
Comments _____ SWL (end) 25.55 m Volume Removed _____ Bore Depth (end) _____
_____ NAPL Present
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
14:53	3.75L	14.06	7.04	25.5	-13	—	2.15	light brown, turbid
15:01	7.5L	14.07	6.83	25.4	-21	—	2.71	" "
15:09	11.25L	13.64	6.80	25.3	*120	—	3.01	" "
15:16	14L	13.52	6.78	25.3	130	—	3.31	" "

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: Pz03-D

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 7/6/08 Done by: AW/BS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 31.757m TOC Bore Volume _____ Bore Depth (start) ≈ 43.1m TOC
Time Stopped _____ SWL (end) 31.79 m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

MS

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
14:33	pump	18.72	6.75	26.2	-135	—	1.72	light grey brown, turbid, sulphur
14:36	"	19.35	7.14	25.9	-172	—	0.42	" " " no sulphur
14:39	"	19.71	7.15	25.9	-168	—	0.27	" " "
14:42	"	20.02	6.91	25.8	-166	—	0.21	" " "
14:45	"	19.97	7.10	25.8	-165	—	0.19	" " "

Sampling Date: _____ Done by: AW/BS

QC07 = Pz03-D

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ02

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: _____ Done by: AW/BS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 25.653 (TOC) Bore Volume _____ Bore Depth (start) 35.13 (TOC
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
(If yes thickness) _____

Field Analyses
Purging

MS bat?

Time	Vol Removed (L)	EC ? (uS/cm)	pH	T ? (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
16:55	pump	2.58	7.58	24.2	-173	—	1.59	light grey, clear to slightly turbid
16:58	"	ranging	7.56	24.2	-175	—	0.40	" " " "
17:01	"	"	7.82	24.2	-149	—	0.27	" " " "
17:04	"	"	7.54	24.1	-122	—	0.51	" " " "
17:06	"	"	7.94	24.1	-111	—	0.68	" " " "

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

25.73 25.30
~~25~~ 23.67

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ04

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 8/6/08 Done by: AW/BS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 67.58m TOC Bore Volume _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) 67.59m TOC Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
7:21	.75L	1497	7.00	24.2	-202	—	3.26	clear, sulphur odour, milky, light grey
7:27	2L	1529	6.74	25.7	-195	—	2.21	" " "

grab sample

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ01

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 8/6/08 Done by: AW/BS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 8.438m TOC Bore Volume _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) 86.6m TOC Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
9:14	pump	8.49	7.00	25.1	-252	—	1.76	clear to dark
9:19	"	4.75	7.21	25.8	-222	—	1.49	" " "
9:24	"	4.20	7.16	25.9	-229	—	0.84	" " "
9:31	"	4.26	7.18	25.1	-226	—	0.86	" " "
9:34	"	3.55	7.29	25.9	-229	—	0.86	"as above"

mS

bubbles on probes + container particulates, sulphur

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: B25

filter used @ PZ01 + dup @ PZ01.

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 7/6/08 ~~8/6/08~~ Done by: AW/BS

8/6/08 37.69 m TOC

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 37.60 m TOC Bore Volume _____ Bore Depth (start) _____ 36.355
Time Stopped _____ 8/6/08 SWL (end) 43.70 TOC Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses 8/6/08
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
11:15	pump	ranging	7.13	25.1	-142	—	5.88	light grey slightly clear
11:20	pump	1823	7.29	25.3	-181	—	0.96	" " "
11:25	pump	1751	7.51	25.3	-185	—	0.57	'as above'
11:30	pump	1737	7.46	24.4	-176	—	0.42	'as above'
11:35	pump							

07/06/08 - could not get pump or bailer down well.

Sampling Date: _____ Done by: AW/BS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: Pz04

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 11/9/08 Done by: AW/DG

Purge Method Bailer Grab Sample Purge Depth _____
Time Started _____ SWL (start) 67.535 Bore Volume _____ Bore Depth (start) 94.51
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
7:29	1	1107	5.09	24.1	-209		1.24	Dark grey, clear to slightly turbid, dark particles

Sampling Date: _____ Done by: AW/DG

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P201

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 10/9/08 Done by: AW/DG

Purge Method AP2 Pump Purge Depth _____
Time Started 18:13 SWL (start) 8.395 m Bore Volume _____ Bore Depth (start) 8.86 m
Time Stopped 18:44 SWL (end) 12.66 m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
18:16	1	5790	5.74	27.0	-301		1.06	Clear, Sulphur odour
18:27	20	7360	5.51	27.6	-324		0.08	" "
18:36	30	7340	5.54	27.9	-325		0.05	" "
18:44	40	7330	5.53	27.9	-322		0.05	" "

Sampling Date: _____ Done by: AW/DG

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P203-D

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 10/9/08 Done by: AW/DG

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 31.73 m Bore Volume _____ Bore Depth (start) 42.26 m
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
1636	1	591	4.02	26.9	-288		1.43	clear. Sulfur odour.
16:53	22	21410	5.42	26.4	-204		0.46	" "
17:02	32	21480	5.62	26.5	-201		0.22	" "
17:10	40	21450	5.58	26.5	-197		0.16	" "

Sampling Date: _____ Done by: AW/DG

Sampling Method _____ Sampling Depth _____
Time Started 17:11 SWL (start) _____
Time Stopped 17:18 SWL (end) 31.91 m
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P203-S

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 10/9/08 Done by: AW/DG

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 23.525m Bore Volume [redacted] 3L Bore Depth (start) 27.02m
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
16:50	4	11260	5.33	25.9	-129		2.54	Light brown/grey, turbid, Hc odour
17:00	8	12470	5.46	25.7	-100		2.65	" " "

Sampling Date: _____ Done by: AW/DG

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P202

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 10/9/08 Done by: AW/DG

Purge Method AP2 Pump Purge Depth ≈ 34 m (pump in screen)
Time Started 15:11 SWL (start) 25.643m Bore Volume _____ Bore Depth (start) 33.11 m
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Screen broken

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)	
15:13	1	1682	4.36	25.9	-267		0.71	Clear Sulfur	odour
15:24	20	1494	4.55	25.6	-194		0.66	cloudy -	
15:31	26	1529	4.26	25.6	-198		0.23	" HC	odour
15:37	32	1540	4.19	25.6	-221		0.14	" HC	odour

Sampling Date: _____ Done by: AW/DG

Sampling Method _____ Sampling Depth _____
Time Started 15:37 SWL (start) _____
Time Stopped 15:40 SWL (end) 32.115m
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P206-D

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: Done by:

Development Method
Time Started SWL (start) Volume Removed Bore Depth (start)
Time Stopped SWL (end) Discharge Rate Bore Depth (end)
Comments NAPL Present
(If yes thickness)

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: Done by: AW/DG

Purge Method Purge Depth
Time Started SWL (start) 29.965m Bore Volume Bore Depth (start) 83.5m
Time Stopped SWL (end) Volume Removed Bore Depth (end)
Comments NAPL Present
(If yes thickness)

Field Analyses
Purging

Probes caps still on

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
09:59	2	1089	~~4.64~~ 4.60	25.8	~~199~~ 196		1.22	Clear, salt/iron odour.
~~10:10~~ 10:10	20	1434	~~4.46~~ 4.46	26.1	~~96~~ 96		0.37	" " "
10:25	40	1947	~~4.78~~ 4.78	26.4	~~85~~ 85		0.85	" " "
11:12	90	2005	4.43	26.8	-198		0.26	" " "
11:28	100	1993	4.37	26.6	-194		0.39	light grey, cloudy, turbid
~~11:41~~	~~115~~	~~1981~~	~~4.34~~	~~26.9~~	~~-192~~		0.28	" " "

Sampling Date: Done by: AW/DG

Sampling Method AP2 pump Sampling Depth 85 m
Time Started SWL (start)
Time Stopped SWL (end)
Comments

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ06-S

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 10/9/08 Done by: AW/DG

Purge Method Bale Purge Depth _____
Time Started _____ SWL (start) 26.255 m Bore Volume 5.2 L Bore Depth (start) 28.85 m
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
11:17	5.8	1563	4.42	25.3	-202		1.71	Dark grey, turbid
11:26	11.6	1798	4.41	25.3	~~-204~~ 204		1.99	
12:02	17.4	1639	4.35	26.1	-128		2.81	" "

Sampling Date: _____ Done by: AW/DG

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P208-D

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: _____ Done by: AW/DG

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 25.615m Bore Volume _____ Bore Depth (start) 64.360
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
17:16	2	1084	4.87	27.8	3		0.98	clear, no odour.
17.40	40	5690	4.93	28.3	-330		0.13	clear - slight sulfur odour.
18:01	63	12400	5.06	28.6	-229		0.12	clear. V strong sulfur odour
18:13	70	12490	5.06	28.6	-213		0.14	11 11
18:20	80	12510	5.03	28.8	-206		0.12	" "

Sampling Date: _____ Done by: AW/DG

Sampling Method AQ2 Pump Sampling Depth 39.5 top of pump approx.
Time Started 18.25 SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

Date	Litres	Disposal method
		devmt
		purging

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ08-S

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: _____ Done by: AW/DG

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 13.11 m Bore Volume 4.5 L Bore Depth (start) 15.51 m
Time Stopped _____ SWL (end) [redacted] m 13.205 Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
1730	5	1817	4.79	26.7	-16		3.24	Brown/murky — no odour.
1736	4.5 [redacted]	1839	4.72	27.1	-158		3.72	" " oily odour
17:45	5.5 dry	1861	5.01	25.9	-131		3.94	" " oily odour

Sampling Date: _____ Done by: AW/DG

Sampling Method Bailer Sampling Depth 13.205.
Time Started 17.50 SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: RB 073

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: _____ Done by: AW/DG

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 14.22 Bore Volume _____ Bore Depth (start) 44-54
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
14.54	1	1026	6.00	26.9	-208		0.71	clear, non turbid, slight Sulfur odour.
15.10	40	3410	5.19	20.6	-273		0.24	" "
15:23	60	3820	5.04	26.7	-260		0.18	" "
15:33	80	3870	4.87	26.8	-247		0.12	" "
15 44	100	3890	4.81	26.8.	-244		0.22	" "

Sampling Date: _____ Done by: AW/DG

Sampling Method _____ Sampling Depth _____
Time Started 15:45 SWL (start) _____
Time Stopped 15:49 SWL (end) 16.32 m
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: Pz 07s

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: _____ Done by: AW/DG

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 13.670 Bore Volume 1.7 L. Bore Depth (start) 15.385
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
15:10	2.7	346	5.15	26.0	-151		1.36	Dark grey brown some turbidity, no odour.
15:15	5.9	345	4.87	25.7	-152		1.32	" " "
15:20	7.5	359	4.76	25.6	-149		0.9	" " "

Sampling Date: _____ Done by: AW/DG

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P205

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 9/9/08 Done by: AW/DG

Purge Method AP2 Pump Purge Depth _____
Time Started 10:57 SWL (start) 37.57m Bore Volume _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
11:01	1	1109	7.14	26.4	-247		1.01	Clear, black and sparkling particles, strong
12:00	40	1064	7.17	27.0	-268		0.63	" " sulfur odour
12:36	60	1078	7.16	26.7	-268		0.47	" "
13:08	80	1075	7.18	27.1	-268		0.05	" "

Sampling Date: _____ Done by: AW/DG

Sampling Method _____ Sampling Depth _____
Time Started 13:09 SWL (start) _____
Time Stopped 13:12 SWL (end) 68.29?
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

10/9/08 SWL 38.2m

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P209

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 8/9/08 Done by: AW/DG

Purge Method Air Pump Purge Depth _____
Time Started 16:36 SWL (start) 19.443 m Bore Volume _____ Bore Depth (start) ≈ 77.3 m
Time Stopped 17:39 SWL (end) 23.050 m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
16:40	2	1013	7.60	27.5	-308		0.62	Clear, Strong Sulfur odour
17:02	40	7640	7.28	27.2	-280		0.49	" " "
17:27	80	12,420	7.39	27.8	-229		0.24	" " "
17:32	90	12,480	7.26	27.8	-228		0.27	" " "
17:38	100	12,510	7.15	27.8	-234		0.16	" " "

Sampling Date: _____ Done by: AW/DG

Sampling Method _____ Sampling Depth _____
Time Started 17:39 SWL (start) 23.050 m
Time Stopped 17:42 SWL (end) 23.050 m
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: Pz 11 - D

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 8/9/08 Done by: AW/DG

Purge Method AP2 Pump Purge Depth _____
Time Started 14:22 SWL (start) 11.997m Bore Volume _____ Bore Depth (start) 58.135m
Time Stopped _____ SWL (end) 28.60m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
14:24	0.5	3120	7.28	27.2	-298		0.71	Clear, Sulfur odour
14:34	20	3760	7.35	27.0	-307		0.17	clear, " "
14:43	40	3200	7.54	27.1	-314		0.06	" " no odour.
15:14	80	7040	7.56	27.3	-309		0.08	Clear, Sulfur odour, bubbles on probes
15:31	100	8650 ~~8620~~	7.62	27.5	-261		0.01	" " " "
							0.00	" " " "

Sampling Date: _____ Done by: AW/DG

Sampling Method _____ Sampling Depth _____
Time Started 15:31 SWL (start) 28.60 m
Time Stopped 15:35 SWL (end) 28.640 m
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: Pz11-5

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 8/9/08 Done by: AW/DG

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) Dry Bore Volume _____ Bore Depth (start) 8.940m
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Sampling Date: _____ Done by: AW/DG

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: Pz 10

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 8/4/08 Done by: AW/DG

Purge Method AP2 pump. Purge Depth _____
Time Started 11:42 SWL (start) 41.858. Bore Volume 40L Bore Depth (start) 86.6.
Time Stopped 13:03 SWL (end) 43.41 Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
12:00	10	986	7.45	29.0	-246		0.52	Clear, black particles, sulfur odour
12:19	20	1013	7.44	28.7	-249		0.29	" "
12:32	30	8.030	7.22	28.9	-238		0.30	" " bubbles on probes
12:47	40	9190	7.23	28.8	-232		0.27	" " "
13:03	50	9040	7.24	28.7	-233		0.24	" " "

Sampling Date: _____ Done by: AW/DG

Sampling Method AP2 Sampling Depth _____
Time Started 13:03 SWL (start) 43.41
Time Stopped 13:09 SWL (end) 43.42
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ06 - D

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 27/2/09 Done by: AW/SS

Purge Method AP2 Pump Purge Depth
Time Started 16:40 SWL (start) 29.997m Bore Volume _____ Bore Depth (start) 84.9m
Time Stopped _____ SWL (end) 30.51 m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
17:16:39→50	30 35	1900	6.67	27.0	-182		0.55	CLEAR SLIGHT TURBID - SULPHUR ODOUR. S.STEVENS
17:33	60	1871	6.84	26.8	-149		0.27	CLEAR SLIGHTLY TURBID - SULPHUR ODOUR S.STEVENS
17:56	90	1842	6.94	26.3	-140		0.45	" " " " "
18:22:14	123	1813	6.89	25.9	-113		0.30	CLEAR LESS TURBID " "

Sampling Date: 27-02-09 Done by: AW/SS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ06-S

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 27/2/09 Done by: AW/SS

Purge Method Bailer Purge Depth _____
Time Started _____ SWL (start) 26.214 m Bore Volume 6.1 L Bore Depth (start) ≈ 29.40m
Time Stopped _____ SWL (end) 26.28 m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
17:47	6.1	1703	7.61	25.3	-84		2.55	Light grey, light brown, slight HC odour
18:08	12.2	1790	7.60	25.2	-51		4.03	" " "
18:19	18.3	1688	7.67	25.1	-33		4.39	" "

Sampling Date: _____ Done by: AW/SS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P208-D

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 28/2/09 Done by: AW/SS

Purge Method AP2 pump Purge Depth _____
Time Started 8:35 SWL (start) 25.288m Bore Volume _____ Bore Depth (start) ~ 64.20m
Time Stopped _____ SWL (end) 31.40 m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	~~uS~~ mS EC (~~uS~~/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
9:00 am	30	10.93	6.72	27.7	-21		1.21ppm	TURBID, AIR BUBBLES PRESENT, V. SLIGHT SULPHUR ODOUR
9:25 am	60	10.63	6.75	28.5	-52		0.65	LESS TURBID → AIR BUBBLES, SLIGHT SULPHUR ODOUR
9:49 am	90	11.18	6.78	28.4	-30		0.38	TURBID → CLEAR → LESS AIR BUBBLES, SLIGHT SULPHUR ODOUR
10:00 am	105	11:28	6.76	28.6	-44		0.62	CLEAR/S.TURBID → " AIR BUBBLES, SLIGHT SULPHUR ODOUR, SLIGHT ORGANIC ODOUR
10:15	120	11:38	6.83	29.6	-69		0.21	CLEAR S.TURBID → LESS AIR BUBBLES, SLIGHT SULPHUR ODOUR

Sampling Date: 28-02-09 Done by: AW/SS

Sampling Method AP2 PUMP Sampling Depth _____
Time Started 10.17 am SWL (start) _____
Time Stopped 10.21 am SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ08-S

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 28/2/09 Done by: AW/SS

Purge Method Bailer Purge Depth
Time Started 9:02 SWL (start) 13.270 m Bore Volume 4.5L Bore Depth (start) 15.532 m
Time Stopped 9:45 SWL (end) 13.33 m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
9:17	4.5	2191	6.97	27.0	-9		2.93	Orange-brown, highly turbid, organic odour
9:33	9	2177	7.03	27.2	13		3.59	11 11 11
9:45	~~13.5~~ 13.5	2129	6.99	27.3	48		3.06	11 11 11

Sampling Date: _____ Done by: AW/SS

Sampling Method _____ Sampling Depth _____
Time Started 9:50 SWL (start) _____
Time Stopped 10:03 SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: Pz07-D

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 28/2/09 Done by: AW/SS

Purge Method AP2 Pump Purge Depth _____
Time Started 12:10 SWL (start) 14.270 m Bore Volume _____ Bore Depth (start) 44.55 m
Time Stopped 13:24 SWL (end) 14.412 m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	~~EC~~ EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
12.34	30 L	4.04	7.08	30.4	-105		0.76	CLEAR, SLIGHT ORGANIC ODOR
12.49	60 L	3.81	7.15	28.8	-127		0.64	CLEAR, SLIGHT SULPHUR ODOR
13.04	90 L	3.96	7.15	28.8	-140		0.48	CLEAR, SLIGHT SULPHUR ODOR.
13.24	105 L	3.96	7.15	28.8	-143		0.15	CLEAR, SLIGHT SULPHUR ODOR

Sampling Date: _____ Done by: AW/SS

Sampling Method ~~13~~ AP2 Pump Sampling Depth _____
Time Started 13:25 SWL (start) _____
Time Stopped 13:33 SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ07-S

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 28/2/09 Done by: AW/SS

Purge Method Bailer Purge Depth _____
Time Started 13:02 SWL (start) 13.674m Bore Volume 3.5L Bore Depth (start) 15.368m
Time Stopped 13:23 SWL (end) 13.680m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
13:11	3.5	422	6.67	26.3	-79		0.78	Dark grey, highly turbid, roots, organic odour
13:17	7	436	6.53	26.5	-86		0.34	" " " "
13:23	10.5	443	6.51	26.5	-77		0.61	" " " "

Sampling Date: _____ Done by: AW/SS

Sampling Method Bailer Sampling Depth _____
Time Started 14:00 SWL (start) _____
Time Stopped 14:06 SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P205

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 28/2/0~~8~~9 Done by: AW/SS

Purge Method AP2 Pump Purge Depth
Time Started 16:32 SWL (start) 37.688m Bore Volume _____ Bore Depth (start) >100 m
Time Stopped _____ SWL (end) 59.375m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
17:03	30	1461 us	7.52	29.2	-187	0.45	~~0.93~~	CLEAR SLIGHTLY TURBID, ABUNDANT SUSPENDED ORGANIC SLUDGE, EXOSKELETON
17:35	60	2364 us	7.47	27.1	-215		0.60	CLEAR, NO INSECT MATTER, BUBBLES IN FLOW CELL, INSECTS
18:14	90	7100 us	7.33	26.4	-212		0.26	" " " "
18:19	93	11260 us	7.21	25.9	-221		0.37	CLEAR, NO MATTER, SULPHR OR ORGANIC SLIM, SULPHR
18:25	95	13200 us	7.19	26.0	-232		0.01	" " " " NO BUBBLES ODOUR

SULPHR ODOUR.

Sampling Date: 28/02/09 Done by: AW/SS

AFTER SAMPLING. ←

18:33	97	13630 us	7.21	25.7	-222	0.06	

Sampling Method AP2 Pump Sampling Depth _____
Time Started 18:28 SWL (start) _____
Time Stopped 18:31 SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P209

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 2/3/09 Done by: AW/SS

Purge Method AP2 Pump Purge Depth
Time Started 12:50 SWL (start) 19.872m Bore Volume _____ Bore Depth (start) 278.10m
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
13:21	30	9590	7.26	31.7	-144		0.38	Clear, bubbles on probes, slight sulfur odour
13:49	60	9666	7.25	31.5	-138		0.55	CLEAR, NO BUBBLES, SLIGHT SULPHUR ODOUR
14:18	90	9770	7.23	31.2	-135		0.46	CLEAR, NO BUBBLES, SLIGHT SULPHUR ODOUR.
14:46	120	9810	7.24	31.2	-137		0.36	CLEAR, NO BUBBLES, SLIGHT SULPHUR ODOUR.
14:52	124	9790	7.26	31.3	-141		0.13	" " " " " "

Sampling Date: 02/03/09 Done by: AW/SS

P209 = QC01

Sampling Method AP2 Pump Sampling Depth _____
Time Started 14:53 SWL (start) _____
Time Stopped 15:04 SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P211-5

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 2/3/09 Done by: AW/SS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) Dry Bore Volume _____ Bore Depth (start) 8.94 m
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Sampling Date: _____ Done by: AW/SS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: Pz 11-D

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 2/3/09 Done by: AW/SS

Purge Method AP1 pump Purge Depth _____
Time Started 16:36 SWL (start) 12.201 m Bore Volume _____ Bore Depth (start) ~ 58.2 m
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
16:55	30	7180	7.38	28.9	-168		0.94	MEDIUM GREY, EXTREMELY TURBID, HIGH SULPHUR ODOUR
17:14	60	7190	7.42	28.7	-161		0.31	MEDIUM GREY, " " " " " " "
17:34	90	7230	7.46	28.0	-143		0.64	LIGHT " MEDIUM → SLIGHT TURBIDITY,
17:54	120	7220	7.47	27.6	-141		0.28	VERY LIGHT GREY, V. SLIGHT TURBIDITY, SLIGHT SULPHUR.

Sampling Date: 02-03-09 Done by: AW/SS

Sampling Method AP2 PUMP Sampling Depth _____
Time Started 17:57 SWL (start) _____
Time Stopped 18:02 SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P201

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 3/3/09 Done by: AW/SS

Purge Method AP2 Pump Purge Depth _____
Time Started 8:40 SWL (start) 8.207m Bore Volume _____ Bore Depth (start) ~ 86.50 m
Time Stopped _____ SWL (end) 9.94 m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
9:24	30L	12490	6.85	30.1	-100		1.20	CLEAR, SMALL AIR BUBBLES
10:13	75L	15260	6.85	28.9	-124		0.43	VERY CLEAR, SMALL BLACK
10:41	105L	15690	6.87	29.1	-96		0.60	VERY CLEAR, " "
11:16	135L	15610	6.87	29.5	-89		0.64	" " " "

ON SIDE OF FLOW CELL
LOW SULPHUR SMELL
PARTICLES, SULPHUR ODOUR
" SIGNIFICANT
" " "
" " "

Sampling Date: 03-03-09 Done by: AW/SS

Sampling Method AP2 pump Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: Pz03–D

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 3/3/09 Done by: AW/SS

Purge Method AP2 Pump Purge Depth _____
Time Started 12:40 SWL (start) 31.758 m Bore Volume _____ Bore Depth (start) ~ 42.70 m
Time Stopped 14.09 SWL (end) 31.750 m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
13:06	32	14930	6.73	BWV 28.6	-108		0.30	CLEAR, SLIGHT TURBIDITY, MODERATE SULPHUR ODOR
13:28	64	15950	6.81	28.2	-93		0.24	CLEAR, V. LOW TURBIDITY, MODERATE SULPHUR ODOR
13:49	96	15890	6.78	28.4	-97		0.22	" " " " " "
14:09	128	16570	6.72	28.4	-82		1.31	CLEAR, MODERATE SULPHR ODOR "

Sampling Date: 03-03-09 Done by: AW/SS P2-03-D = QC 04.

Sampling Method AP2 Pump Sampling Depth _____
Time Started 14.10 SWL (start) _____
Time Stopped 14.24 SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P203-S

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 3/3/09 Done by: AW/SS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 25.575 m Bore Volume 3.1 L Bore Depth (start) ≈ 27.10 m
Time Stopped _____ SWL (end) 25.570 m Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
13:03	3.1	9460	6.98	30.0	-16		2.04	light brown-grey turbid
13:26	6.2	11040	6.92	26.8	-8		2.23	" " "
13:39	9.3	10930	6.96	27.3	14		2.88	" " "

Sampling Date: _____ Done by: AW/SS

Sampling Method _____ Sampling Depth _____
Time Started _____ SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ02

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
(If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 3/3/09 Done by: AW/SS

Purge Method AP2 Pump Purge Depth _____
Time Started 15:44 SWL (start) 25.693m Bore Volume _____ Bore Depth (start) 35.110m
Time Stopped 16:50 SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments Pumped dry - allowed to recover NAPL Present _____
(If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
16:05	30	1509	7.54	27.5	157		0.43	Clear - Slightly turbid, HC odour
16:25	60	1497	7.84	27.3	-165		0.35	" " " "
Bailer → 17:44	Recovered	2180	7.87	27.5	-166		2.42	" " " "

Sampling Date: 03-03-09 Done by: AW/SS

Sampling Method ~~AP2 Pump~~ Bailer Sampling Depth _____
Time Started 17:45 SWL (start) _____
Time Stopped _____ SWL (end) _____
Comments _____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ04

Project No 42626162 Project Name **BMA Caval Ridge Groundwater**

Development Date: _____ Done by: _____

Development Method _____
Time Started _____ SWL (start) _____ Volume Removed _____ Bore Depth (start) _____
Time Stopped _____ SWL (end) _____ Discharge Rate _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Development

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)

Purging Date: 3/3/09 Done by: AW/SS

Purge Method _____ Purge Depth _____
Time Started _____ SWL (start) 67.486m Bore Volume _____ Bore Depth (start) ≈ 95.40m
Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
Comments _____ NAPL Present _____
_____ (If yes thickness) _____

Field Analyses
Purging

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
18.49	1L	1111	6.66	27.9	-151		0.62	CLEAR, SULPHUR ODOUR - STRONG.

Sampling Date: 03-03-09 Done by: AW/SS

Sampling Method BAILER - GRAB Sampling Depth _____
Time Started 18.30 SWL (start) _____
Time Stopped 18.50 SWL (end) _____
Comments _____
_____
_____

Groundwater Disposal Record

	Date	Litres	Disposal method
devmt			
purging			

Checked By:.....

Groundwater Analytical Laboratory Documentation

Appendix F

CHAIN OF CUSTODY FORM

THIS COLUMN FOR LAB USE ONLY

Job Code:

Due Date:

FROM:
URS (AUSTRALIA)
Level 14, 240 Queen Street
BRISBANE QLD 4000
PO Box 302, BBN QLD 4001
Ph: 07 3243 2111 **Fax: 07 3243 2199**

DATE:

TO:
ALS
32 Shand St
Stafford QLD 4053

Project No: 42626162
Project Manager: Stephen Denner
Agreement No:
Sampler(s): AW/BS
Signature(s):
Checked:

Environmental Division
Brisbane
Work Order
EB0807578
Telephone : +61-7-3243 7222

Custody seal Intact? (YES) NO
Sample cold? YES (NO)

Released for URS by: AW
Date: 8/6/08 Time: 13:00

Container Size, Type, Preservative and Analysis

Container Identification

Size								
Type*								
Preservative Code								
Analytes	NT1	NT2	NT3	W3	pH and EC			

Lab Identification	Date	Time	Matrix	Sample Number		Total no	Tick required analytes						
13	5/6/08	AM	Water	PZ06-D	P	2	✓	✓	✓	✓	✓		
14	5/6/08	AM		PZ06-S	P	2	✓	✓	✓	✓	✓		
15	5/6/08	PM		PZ07-D	P	2	✓	✓	✓	✓	✓		
16	5/6/08	PM		PZ07-S	P	2	✓	✓	✓	✓	✓		
17	6/6/08	AM		PZ08-D	P	2	✓	✓	✓	✓	✓		
18	6/6/08	AM		PZ08-S	P	2	✓	✓	✓	✓	✓		
19	6/6/08	AM		PZ10	P	2	✓	✓	✓	✓	✓		
20	6/6/08	PM		PZ09	P	2	✓	✓	✓	✓	✓		
21	6/6/08	PM		PZ11-D	P	2	✓	✓	✓	✓	✓		
22	7/6/08	PM		PZ03-D	P	2	✓	✓	✓	✓	✓		
23	7/6/08	PM		PZ03-S	P	2	✓	✓	✓	✓	✓		
24	7/6/08	PM	✓	PZ02	P	2	✓	✓	✓	✓	✓		
					TOTAL								

Remarks:

* Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinsed Jar; S = Solvent Washed Acid Rinsed Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric

Courier Job No: 052788 98

Specify Turnaround Time:

NOTE: SAMPLES MAY CONTAIN DANGEROUS AND HAZARDOUS SUBSTANCES

CHAIN OF CUSTODY FORM

Sheet 2 of 2

THIS COLUMN FOR LAB USE ONLY	FROM:	DATE:	TO:	Container Size, Type, Preservative and Analysis
	URS (AUSTRALIA) Level 14, 240 Queen Street BRISBANE QLD 4000 PO Box 302, BBN QLD 4001		ALS 32 Shand St Stafford QLD 4053	Container Identification
Job Code:				Size
				Type*
				Preservative Code
	Ph: 07 3243 2111	Fax: 07 3243 2199		
Due Date:	Project No: 42626162 Project Manager: Stephen Denner Agreement No:	Sampler(s): AW/BS Signature(s): Checked:		Analytes: NT1, NT2, NT3, N3, pH and EC
Custody seal Intact? YES / NO Sample cold? YES / NO	Released for URS by: AW Date: 8/6/08 Time: 13:00	Received for Laboratory by: Date: Time:		

Lab Identification	Date	Time	Matrix	Sample Number	Comments	Total no	Tick required analytes
1	8/6/08	AM	Water	PZ04	F	2	✓ ✓ ✓ ✓ ✓
2	8/6/08	AM		PZ01	F	2	✓ ✓ ✓ ✓ ✓
3	8/6/08	AM		PZ05	F	2	✓ ✓ ✓ ✓ ✓
4	5/6/08	AM		QC01	F	2	✓ ✓ ✓ ✓ ✓
5	5/6/08	PM		QC02	F	1	✓ ✓
6	5/6/08	PM		QC03	F	1	✓ ✓
7	6/6/08	AM		QC04	F	2	✓ ✓ ✓ ✓ ✓
8	6/6/08	PM		QC05	F	1	✓ ✓
9	6/6/08	PM		QC06	F	1	✓ ✓
10	7/6/08	AM		QC07	F	2	✓ ✓ ✓ ✓ ✓
11	7/6/08	AM	✓	QC08	F	1	✓ ✓
12	8/6/08	AM		QC10	F	2	✓ ✓ ✓ ✓ ✓
					TOTAL		

Remarks:

* Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinsed Jar; S = Solvent Washed Acid Rinsed Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric

Courier Job No: 05278898

Specify Turnaround Time:

NOTE: SAMPLES MAY CONTAIN DANGEROUS AND HAZARDOUS SUBSTANCES

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **EB0807578**

Client	: **URS AUSTRALIA PTY LTD (QLD)**	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2008URSQLD0041 (EN/001/08)
Site	: ----		
Sampler	: AW/BS	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 10-JUN-2008	Issue Date	: 11-JUN-2008 11:51
Client Requested Due Date	: 17-JUN-2008	Scheduled Reporting Date	: **17-JUN-2008**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 17.5 C, 16.1 C
No. of coolers/boxes	: 2 MEDIUM	No. of samples received	: 24
Sercurity Seal	: Intact.	No. of samples analysed	: 24

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Breaches in recommended extraction / analysis holding times may occur.**
- **pH holding time is six hours after sampling.**
- **The recommended holding time for Nitrite, Nitrate +/or reactive phosphorus analysis is 48 hours from the time of sampling.**
- **Please be advised that we are unable to perform pH & EC for samples QC02, QC03, QC05, QC06 & QC08. These analysis needs an unpreserved container which were not received.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

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 neccessary 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.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EA005: pH pH	WATER - EA010P Conductivity (PC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 (EB/PCT) Major Anions (Cl, SO4, Alkalinity)	WATER - NT-03 (EB) Anions: Minor - Nitrite as N, Nitrate as N, Fluoride, Reactive Phosphorous	WATER - W-03 13 Metals (NEPM Suite)	WATER - W-03T 13 Metals (Total) (NEPM)
EB0807578-001	08-JUN-2008 11:00	PZ04	✓	✓	✓	✓	✓	✓	
EB0807578-002	08-JUN-2008 11:00	PZ01	✓	✓	✓	✓	✓	✓	
EB0807578-003	08-JUN-2008 11:00	PZ05	✓	✓	✓	✓	✓	✓	
EB0807578-004	05-JUN-2008 11:00	QC01	✓	✓	✓	✓	✓	✓	
EB0807578-005	05-JUN-2008 15:00	QC02							✓
EB0807578-006	05-JUN-2008 15:00	QC03							✓
EB0807578-007	06-JUN-2008 11:00	QC04	✓	✓	✓	✓	✓	✓	
EB0807578-008	06-JUN-2008 15:00	QC05							✓
EB0807578-009	06-JUN-2008 15:00	QC06							✓
EB0807578-010	07-JUN-2008 11:00	QC07	✓	✓	✓	✓	✓	✓	
EB0807578-011	07-JUN-2008 11:00	QC08						✓	
EB0807578-012	08-JUN-2008 11:00	QC10	✓	✓	✓	✓	✓	✓	
EB0807578-013	05-JUN-2008 11:00	PZ06-D	✓	✓	✓	✓	✓	✓	
EB0807578-014	05-JUN-2008 11:00	PZ06-S	✓	✓	✓	✓	✓	✓	
EB0807578-015	05-JUN-2008 15:00	PZ07-D	✓	✓	✓	✓	✓	✓	
EB0807578-016	05-JUN-2008 15:00	PZ07-S	✓	✓	✓	✓	✓	✓	
EB0807578-017	06-JUN-2008 11:00	PZ08-D	✓	✓	✓	✓	✓	✓	
EB0807578-018	06-JUN-2008 11:00	PZ08-S	✓	✓	✓	✓	✓	✓	
EB0807578-019	06-JUN-2008 11:00	PZ10	✓	✓	✓	✓	✓	✓	
EB0807578-020	06-JUN-2008 15:00	PZ09	✓	✓	✓	✓	✓	✓	
EB0807578-021	06-JUN-2008 15:00	PZ11-D	✓	✓	✓	✓	✓	✓	
EB0807578-022	07-JUN-2008 15:00	PZ03-D	✓	✓	✓	✓	✓	✓	
EB0807578-023	07-JUN-2008 15:00	PZ03-S	✓	✓	✓	✓	✓	✓	
EB0807578-024	07-JUN-2008 15:00	PZ02	✓	✓	✓	✓	✓	✓	

Requested Deliverables

ALL RESULTS BRISBANE

- *AU Certificate of Analysis - NATA	Email	brisbane@urscorp.com
- A4 - AU Sample Receipt Notification - Environmental	Email	brisbane@urscorp.com
- AU Interpretive QC Report (Anon QCI Not Rep)	Email	brisbane@urscorp.com
- AU QC Report (Anon QC Not Rep) - NATA	Email	brisbane@urscorp.com
- Default - Chain of Custody	Email	brisbane@urscorp.com
- EDI Format - MRED	Email	brisbane@urscorp.com

MR STEPHEN DENNER

- *AU Certificate of Analysis - NATA	Email	stephen_denner@urscorp.com
- A4 - AU Sample Receipt Notification - Environmental	Email	stephen_denner@urscorp.com
- AU Interpretive QC Report (Anon QCI Not Rep)	Email	stephen_denner@urscorp.com
- AU QC Report (Anon QC Not Rep) - NATA	Email	stephen_denner@urscorp.com
- Default - Chain of Custody	Email	stephen_denner@urscorp.com
- EDI Format - MRED	Email	stephen_denner@urscorp.com

MS LUCIA PIRES

- A4 - AU Tax Invoice	Email	lucia_pires@urscorp.com

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB0807578**	Page	: 1 of 12
Client	: **URS AUSTRALIA PTY LTD (QLD)**	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 10-JUN-2008
Sampler	: AW/BS	Issue Date	: 17-JUN-2008
Site	: ----		
		No. of samples received	: 24
Quote number	: EN/001/08	No. of samples analysed	: 24

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics
Phillip Kennedy	2IC Environmental Laboratory	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 preformed, results are reported on a dry weight basis.

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

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

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

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

- **LCS recovery for EG020F (Filtered Metals) analyses fall outside Dynamic Control Limits. They are however within ALS Static Control Limits and hence deemed acceptable.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ04	PZ01	PZ05	QC01	QC02
				Client sampling date / time: 08-JUN-2008 11:00	08-JUN-2008 11:00	08-JUN-2008 11:00	05-JUN-2008 11:00	05-JUN-2008 15:00
				EB0807578-001	EB0807578-002	EB0807578-003	EB0807578-004	EB0807578-005
EA005: pH								
pH Value	----	0.01	pH Unit	**7.00**	**7.12**	**7.35**	**7.05**	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1120**	**3480**	**1070**	**1840**	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**314**	**357**	**316**	**466**	----
Total Alkalinity as CaCO3	----	1	mg/L	**314**	**357**	**316**	**466**	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**19**	**95**	**16**	**105**	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**135**	**874**	**157**	**254**	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**29**	**111**	**80**	**36**	----
Magnesium	7439-95-4	1	mg/L	**11**	**95**	**35**	**42**	----
Sodium	7440-23-5	1	mg/L	**187**	**440**	**94**	**300**	----
Potassium	7440-09-7	1	mg/L	<1	**3**	**1**	**4**	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	**0.005**	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Barium	7440-39-3	0.001	mg/L	**0.025**	**0.069**	**0.062**	**0.090**	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	**0.0001**	<0.0001	**0.0003**	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L	**0.061**	**0.150**	**0.195**	**0.062**	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.034**	**0.019**	**0.004**	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	**0.016**	----
EG020T: Total Metals by ICP-MS								
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	----	----	----	----	<0.001
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	----	**0.0003**
Chromium	7440-47-3	0.001	mg/L	----	----	----	----	<0.001
Cobalt	7440-48-4	0.001	mg/L	----	----	----	----	<0.001

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ04	PZ01	PZ05	QC01	QC02
				Client sampling date / time: 08-JUN-2008 11:00	08-JUN-2008 11:00	08-JUN-2008 11:00	05-JUN-2008 11:00	05-JUN-2008 15:00
				EB0807578-001	EB0807578-002	EB0807578-003	EB0807578-004	EB0807578-005
EG020T: Total Metals by ICP-MS - Continued								
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	----	----	----	----	<0.001
Nickel	7440-02-0	0.001	mg/L	----	----	----	----	<0.001
Vanadium	7440-62-2	0.01	mg/L	----	----	----	----	<0.01
Zinc	7440-66-6	0.005	mg/L	----	----	----	----	**0.013**
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	----	----	----	<0.0001
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.2**	**0.2**	**0.2**	**0.4**	----
EK057: Nitrite as N								
Nitrite as N	----	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	----
EK058: Nitrate as N								
^ Nitrate as N	14797-55-8	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	----
EK059: Nitrite plus Nitrate as N (NOx)								
Nitrite + Nitrate as N	----	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	----
EK071: Reactive Phosphorus as P (Dissolved)								
Reactive Phosphorus - Filtered	----	0.010	mg/L	**0.023**	<0.010	**0.010**	<0.010	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: QC03	QC04	QC05	QC06	QC07
				Client sampling date / time: 05-JUN-2008 15:00	06-JUN-2008 11:00	06-JUN-2008 15:00	06-JUN-2008 15:00	07-JUN-2008 11:00
				EB0807578-006	EB0807578-007	EB0807578-008	EB0807578-009	EB0807578-010
EA005: pH								
pH Value	----	0.01	pH Unit	----	**7.62**	----	----	**6.77**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	**981**	----	----	**18900**
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	----	**178**	----	----	**659**
Total Alkalinity as CaCO3	----	1	mg/L	----	**178**	----	----	**659**
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	----	**67**	----	----	**998**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	----	**166**	----	----	**6750**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	**44**	----	----	**324**
Magnesium	7439-95-4	1	mg/L	----	**25**	----	----	**710**
Sodium	7440-23-5	1	mg/L	----	**124**	----	----	**3250**
Potassium	7440-09-7	1	mg/L	----	**4**	----	----	**28**
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	----	<0.001	----	----	**0.003**
Beryllium	7440-41-7	0.001	mg/L	----	<0.001	----	----	**0.001**
Barium	7440-39-3	0.001	mg/L	----	**0.024**	----	----	**0.044**
Cadmium	7440-43-9	0.0001	mg/L	----	<0.0001	----	----	<0.0001
Chromium	7440-47-3	0.001	mg/L	----	<0.001	----	----	**0.002**
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	----	**0.062**	----	----	**0.173**
Nickel	7440-02-0	0.001	mg/L	----	**0.003**	----	----	**0.019**
Vanadium	7440-62-2	0.01	mg/L	----	<0.01	----	----	<0.01
Zinc	7440-66-6	0.005	mg/L	----	<0.005	----	----	<0.005
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	<0.001	<0.001	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	<0.001	<0.001	----
Barium	7440-39-3	0.001	mg/L	<0.001	----	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	**0.0008**	----	<0.0001	**0.0002**	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	<0.001	<0.001	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	<0.001	<0.001	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: QC03	QC04	QC05	QC06	QC07
				Client sampling date / time: 05-JUN-2008 15:00	06-JUN-2008 11:00	06-JUN-2008 15:00	06-JUN-2008 15:00	07-JUN-2008 11:00
				EB0807578-006	EB0807578-007	EB0807578-008	EB0807578-009	EB0807578-010
EG020T: Total Metals by ICP-MS - Continued								
Copper	7440-50-8	0.001	mg/L	**0.001**	----	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L	<0.001	----	<0.001	<0.001	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	<0.001	<0.001	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	<0.005	<0.005	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	<0.0001	----	----	<0.0001
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	<0.0001	<0.0001	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	----	**0.1**	----	----	**0.3**
EK057: Nitrite as N								
Nitrite as N	----	0.010	mg/L	----	<0.010	----	----	<0.010
EK058: Nitrate as N								
^ Nitrate as N	14797-55-8	0.010	mg/L	----	<0.010	----	----	<0.010
EK059: Nitrite plus Nitrate as N (NOx)								
Nitrite + Nitrate as N	----	0.010	mg/L	----	<0.010	----	----	<0.010
EK071: Reactive Phosphorus as P (Dissolved)								
Reactive Phosphorus - Filtered	----	0.010	mg/L	----	<0.010	----	----	<0.010

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: QC08	QC10	PZ06-D	PZ06-S	PZ07-D
				Client sampling date / time: 07-JUN-2008 11:00	08-JUN-2008 11:00	05-JUN-2008 11:00	05-JUN-2008 11:00	05-JUN-2008 15:00
				EB0807578-011	EB0807578-012	EB0807578-013	EB0807578-014	EB0807578-015
EA005: pH								
pH Value	----	0.01	pH Unit	----	**7.16**	**7.04**	**7.72**	**7.17**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	**3280**	**1840**	**1950**	**3480**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	**350**	**474**	**494**	**489**
Total Alkalinity as CaCO3	----	1	mg/L	----	**350**	**474**	**494**	**489**
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	----	**92**	**105**	**58**	**150**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	----	**883**	**256**	**336**	**814**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	**110**	**36**	**51**	**75**
Magnesium	7439-95-4	1	mg/L	----	**94**	**41**	**90**	**74**
Sodium	7440-23-5	1	mg/L	----	**431**	**298**	**245**	**563**
Potassium	7440-09-7	1	mg/L	----	**3**	**4**	**4**	**6**
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	**0.005**	**0.004**	**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	<0.001	**0.054**	**0.090**	**0.089**	**0.046**
Cadmium	7440-43-9	0.0001	mg/L	**0.0008**	<0.0001	**0.0002**	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
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	<0.001	**0.095**	**0.061**	**0.279**	**0.009**
Nickel	7440-02-0	0.001	mg/L	<0.001	**0.023**	**0.004**	**0.011**	**0.002**
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	<0.005	<0.005	**0.006**	**0.008**	<0.005
EG035F: Dissolved 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	----	**0.2**	**0.4**	**0.2**	**0.2**
EK057: Nitrite as N								
Nitrite as N	----	0.010	mg/L	----	<0.010	<0.010	<0.010	<0.010
EK058: Nitrate as N								

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: QC08	QC10	PZ06-D	PZ06-S	PZ07-D
				Client sampling date / time: 07-JUN-2008 11:00	08-JUN-2008 11:00	05-JUN-2008 11:00	05-JUN-2008 11:00	05-JUN-2008 15:00
				EB0807578-011	EB0807578-012	EB0807578-013	EB0807578-014	EB0807578-015
EK058: Nitrate as N - Continued								
^ Nitrate as N	14797-55-8	0.010	mg/L	----	<0.010	<0.010	<0.010	<0.010
EK059: Nitrite plus Nitrate as N (NOx)								
Nitrite + Nitrate as N	----	0.010	mg/L	----	<0.010	<0.010	<0.010	<0.010
EK071: Reactive Phosphorus as P (Dissolved)								
Reactive Phosphorus - Filtered	----	0.010	mg/L	----	<0.010	<0.010	<0.010	<0.010

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ07-S Client sampling date / time: 05-JUN-2008 15:00 EB0807578-016	Client sample ID: PZ08-D Client sampling date / time: 06-JUN-2008 11:00 EB0807578-017	Client sample ID: PZ08-S Client sampling date / time: 06-JUN-2008 11:00 EB0807578-018	Client sample ID: PZ10 Client sampling date / time: 06-JUN-2008 11:00 EB0807578-019	Client sample ID: PZ09 Client sampling date / time: 06-JUN-2008 15:00 EB0807578-020
EA005: pH								
pH Value	----	0.01	pH Unit	**6.98**	**6.75**	**6.98**	**7.54**	**7.67**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**321**	**10600**	**2660**	**975**	**979**
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	**130**	**401**	**272**	**176**	**171**
Total Alkalinity as CaCO3	----	1	mg/L	**130**	**401**	**272**	**176**	**171**
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**6**	**1090**	**84**	**71**	**70**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**26**	**3420**	**695**	**169**	**163**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**27**	**327**	**105**	**45**	**43**
Magnesium	7439-95-4	1	mg/L	**17**	**327**	**82**	**25**	**25**
Sodium	7440-23-5	1	mg/L	**15**	**1700**	**288**	**122**	**123**
Potassium	7440-09-7	1	mg/L	**6**	**35**	**23**	**4**	**4**
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	**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	**0.082**	**0.038**	**0.272**	**0.032**	**0.031**
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	<0.001	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	**0.006**	<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	<0.001	**0.119**	**0.673**	**0.073**	**0.075**
Nickel	7440-02-0	0.001	mg/L	<0.001	**0.008**	**0.005**	**0.005**	**0.004**
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	<0.005	<0.005	<0.005	<0.005	**0.014**
EG035F: Dissolved 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	**0.3**	**0.2**	**0.3**	**0.2**	**0.2**
EK057: Nitrite as N								
Nitrite as N	----	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
EK058: Nitrate as N								

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ07-S Client sampling date / time: 05-JUN-2008 15:00 EB0807578-016	Client sample ID: PZ08-D Client sampling date / time: 06-JUN-2008 11:00 EB0807578-017	Client sample ID: PZ08-S Client sampling date / time: 06-JUN-2008 11:00 EB0807578-018	Client sample ID: PZ10 Client sampling date / time: 06-JUN-2008 11:00 EB0807578-019	Client sample ID: PZ09 Client sampling date / time: 06-JUN-2008 15:00 EB0807578-020
EK058: Nitrate as N - Continued								
^ Nitrate as N	14797-55-8	0.010	mg/L	**0.076**	<0.010	<0.010	<0.010	<0.010
EK059: Nitrite plus Nitrate as N (NOx)								
Nitrite + Nitrate as N	----	0.010	mg/L	**0.076**	<0.010	<0.010	<0.010	<0.010
EK071: Reactive Phosphorus as P (Dissolved)								
Reactive Phosphorus - Filtered	----	0.010	mg/L	<0.010	<0.010	**0.011**	<0.010	<0.010

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ11-D	PZ03-D	PZ03-S	PZ02	----
				Client sampling date / time: 06-JUN-2008 15:00	07-JUN-2008 15:00	07-JUN-2008 15:00	07-JUN-2008 15:00	----
				EB0807578-021	EB0807578-022	EB0807578-023	EB0807578-024	----
EA005: pH								
pH Value	----	0.01	pH Unit	**7.50**	**6.82**	**6.98**	**7.64**	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**3570**	**18500**	**13300**	**1520**	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**156**	**667**	**866**	**633**	----
Total Alkalinity as CaCO3	----	1	mg/L	**156**	**667**	**866**	**633**	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**161**	**1000**	**468**	**94**	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**978**	**7200**	**4810**	**114**	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**121**	**324**	**203**	**40**	----
Magnesium	7439-95-4	1	mg/L	**60**	**708**	**571**	**52**	----
Sodium	7440-23-5	1	mg/L	**507**	**3310**	**2100**	**243**	----
Potassium	7440-09-7	1	mg/L	**7**	**28**	**14**	**4**	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	**0.015**	**0.004**	<0.001	**0.001**	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	**0.001**	<0.001	<0.001	----
Barium	7440-39-3	0.001	mg/L	**0.075**	**0.044**	**0.186**	**0.055**	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	**0.0001**	----
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.002**	**0.003**	<0.001	----
Cobalt	7440-48-4	0.001	mg/L	**0.002**	**0.001**	**0.029**	**0.002**	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	**0.001**	<0.001	----
Lead	7439-92-1	0.001	mg/L	**0.001**	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L	**0.059**	**0.301**	**1.49**	**0.399**	----
Nickel	7440-02-0	0.001	mg/L	**0.014**	**0.020**	**0.031**	**0.019**	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L	**0.092**	<0.005	**0.006**	**0.013**	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.1**	**0.3**	**0.6**	**1.4**	----
EK057: Nitrite as N								
Nitrite as N	----	0.010	mg/L	<0.010	<0.010	**0.078**	<0.010	----
EK058: Nitrate as N								

Analytical Results

Sub-Matrix: WATER				Client sample ID	PZ11-D	PZ03-D	PZ03-S	PZ02	----
				Client sampling date / time	06-JUN-2008 15:00	07-JUN-2008 15:00	07-JUN-2008 15:00	07-JUN-2008 15:00	----
Compound	CAS Number	LOR	Unit		EB0807578-021	EB0807578-022	EB0807578-023	EB0807578-024	----
EK058: Nitrate as N - Continued									
^ Nitrate as N	14797-55-8	0.010	mg/L		<0.010	<0.010	**0.241**	<0.010	----
EK059: Nitrite plus Nitrate as N (NOx)									
Nitrite + Nitrate as N	----	0.010	mg/L		<0.010	<0.010	**0.319**	<0.010	----
EK071: Reactive Phosphorus as P (Dissolved)									
Reactive Phosphorus - Filtered	----	0.010	mg/L		<0.010	<0.010	**0.010**	<0.010	----

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **EB0807578**	Page	: 1 of 11
Client	: **URS AUSTRALIA PTY LTD (QLD)**	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 10-JUN-2008
Sampler	: AW/BS	Issue Date	: 17-JUN-2008
Order number	: ----		
		No. of samples received	: 24
Quote number	: EN/001/08	No. of samples analysed	: 24

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

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics
Phillip Kennedy	2IC Environmental Laboratory	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 preformed, results are reported on a dry weight basis.

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = Chemistry Abstract Services number
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 677701)									
EB0807578-001	PZ04	EA005: pH Value	----	0.01	pH Unit	7.00	6.99	0.1	0% - 20%
EB0807578-016	PZ07-S	EA005: pH Value	----	0.01	pH Unit	6.98	6.98	0.0	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 680379)									
EB0807578-001	PZ04	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1120	1120	0.0	0% - 20%
EB0807578-015	PZ07-D	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	3480	3490	0.3	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 680378)									
EB0807578-001	PZ04	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	314	317	0.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	314	317	0.9	0% - 20%
EB0807578-015	PZ07-D	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	489	479	2.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	489	479	2.1	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 677877)									
EB0807578-001	PZ04	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	19	19	0.0	0% - 50%
EB0807578-015	PZ07-D	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	150	152	1.0	0% - 20%
ED045P: Chloride by PC Titrator (QC Lot: 680380)									
EB0807578-001	PZ04	ED045-P: Chloride	16887-00-6	1	mg/L	135	136	0.7	0% - 20%
EB0807578-015	PZ07-D	ED045-P: Chloride	16887-00-6	1	mg/L	814	819	0.6	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 677878)									
EB0807578-001	PZ04	ED093F: Calcium	7440-70-2	1	mg/L	29	30	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	11	11	0.0	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	187	189	1.1	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EB0807578-015	PZ07-D	ED093F: Calcium	7440-70-2	1	mg/L	75	76	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	74	76	2.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	563	562	0.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 677936)									
EB0807575-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Barium	7440-39-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 677936) - continued									
EB0807575-001	Anonymous	EG020A-F: Cobalt	7440-48-4	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Copper	7440-50-8	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Lead	7439-92-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0807575-010	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Barium	7440-39-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Copper	7440-50-8	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Lead	7439-92-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EG020F: Dissolved Metals by ICP-MS (QC Lot: 677937)									
EB0807578-019	PZ10	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	0.032	0.032	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	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	0.073	0.073	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.005	0.004	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB0807598-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Barium	7440-39-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Copper	7440-50-8	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Lead	7439-92-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 677937) - continued									
EB0807598-004	Anonymous	EG020A-F: Manganese	7439-96-5	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EG020F: Dissolved Metals by ICP-MS (QC Lot: 678388)									
EB0807578-002	PZ01	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	0.069	0.068	1.6	0% - 20%
		EG020A-F: Chromium	7440-47-3	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	0.150	0.151	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.034	0.034	0.0	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 677853)									
EB0807578-004	QC01	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.086	0.086	0.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.059	0.059	0.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.007	0.005	36.8	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB0807586-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Barium	7440-39-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Copper	7440-50-8	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Lead	7439-92-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 677853) - continued									
EB0807586-001	Anonymous	EG020A-T: Zinc	7440-66-6	0.005	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EG035F: Dissolved Mercury by FIMS (QC Lot: 682288)									
EB0807509-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0807575-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EG035F: Dissolved Mercury by FIMS (QC Lot: 682289)									
EB0807578-003	PZ05	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB0807578-017	PZ08-D	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 681681)									
EB0807559-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0807578-009	QC06	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 680381)									
EB0807578-001	PZ04	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.0	No Limit
EB0807578-015	PZ07-D	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.0	No Limit
EK057: Nitrite as N (QC Lot: 677867)									
EB0807578-001	PZ04	EK057: Nitrite as N	----	0.010	mg/L	<0.010	<0.010	0.0	No Limit
EB0807578-015	PZ07-D	EK057: Nitrite as N	----	0.010	mg/L	<0.010	<0.010	0.0	No Limit
EK059: Nitrite plus Nitrate as N (NOx) (QC Lot: 677865)									
EB0807575-001	Anonymous	EK059: Nitrite + Nitrate as N	----	0.010	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0807575-010	Anonymous	EK059: Nitrite + Nitrate as N	----	0.010	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EK059: Nitrite plus Nitrate as N (NOx) (QC Lot: 677868)									
EB0807578-001	PZ04	EK059: Nitrite + Nitrate as N	----	0.010	mg/L	<0.010	<0.010	0.0	No Limit
EB0807578-015	PZ07-D	EK059: Nitrite + Nitrate as N	----	0.010	mg/L	<0.010	<0.010	0.0	No Limit
EK071: Reactive Phosphorus as P (Dissolved) (QC Lot: 677866)									
EB0807578-001	PZ04	EK071F: Reactive Phosphorus - Filtered	----	0.010	mg/L	0.023	0.024	0.0	No Limit
EB0807578-015	PZ07-D	EK071F: Reactive Phosphorus - Filtered	----	0.010	mg/L	<0.010	<0.010	0.0	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005: pH (QCLot: 677701)								
EA005: pH Value	----	0.01	pH Unit	----	7.00 pH Unit	100	98.3	118
EA010P: Conductivity by PC Titrator (QCLot: 680379)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	100	90.3	108
ED037P: Alkalinity by PC Titrator (QCLot: 680378)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	99.9	77.5	112
ED040F: Dissolved Major Anions (QCLot: 677877)								
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1	----	----	----	----
ED045P: Chloride by PC Titrator (QCLot: 680380)								
ED045-P: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	99.8	88.4	110
ED093F: Dissolved Major Cations (QCLot: 677878)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 677936)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	106	70	130
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	109	70	130
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	97.2	70	130
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	104	70	130
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.100 mg/L	102	70	130
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	101	70	130
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	105	70	130
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.100 mg/L	103	70	130
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	99.6	70	130
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.100 mg/L	99.0	70	130
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	108	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 677937)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	102	70	130
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	107	70	130
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	99.5	70	130
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	106	70	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 677937) - continued								
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.100 mg/L	101	70	130
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	101	70	130
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	106	70	130
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.100 mg/L	103	70	130
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	100	70	130
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.100 mg/L	97.4	70	130
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	128	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 678388)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	122	70	130
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	105	70	130
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	102	70	130
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	105	70	130
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.100 mg/L	104	70	130
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	103	70	130
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	101	70	130
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.100 mg/L	103	70	130
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	104	70	130
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.100 mg/L	98.2	70	130
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	130	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 683147)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	# 129	79.6	115
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	126	80.8	130
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	103	86.6	113
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	101	84.4	128
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.100 mg/L	101	86.6	117
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	103	85	117
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	# 125	85.4	117
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.100 mg/L	103	84.1	122
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	102	86.3	118
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.100 mg/L	100	76.9	117
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	128	84.2	130
EG020T: Total Metals by ICP-MS (QCLot: 677853)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	93.0	70	130
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	110	70	130
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	97.8	70	130
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	104	70	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 677853) - continued								
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.100 mg/L	99.2	70	130
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	97.8	70	130
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	102	70	130
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.100 mg/L	100	70	130
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	100	70	130
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.100 mg/L	88.6	70	130
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	120	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 682288)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.010 mg/L	100	85.3	117
EG035F: Dissolved Mercury by FIMS (QCLot: 682289)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.010 mg/L	106	85.3	117
EG035T: Total Recoverable Mercury by FIMS (QCLot: 681681)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0100 mg/L	102	84.2	118
EK040P: Fluoride by PC Titrator (QCLot: 680381)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	10 mg/L	99.1	72.9	113
EK057: Nitrite as N (QCLot: 677867)								
EK057: Nitrite as N	----	0.01	mg/L	----	0.5 mg/L	108	95.4	119
		0.010	mg/L	<0.010	----	----	----	----
EK059: Nitrite plus Nitrate as N (NOx) (QCLot: 677865)								
EK059: Nitrite + Nitrate as N	----	0.01	mg/L	----	0.5 mg/L	98.3	85.5	118
		0.010	mg/L	<0.010	----	----	----	----
EK059: Nitrite plus Nitrate as N (NOx) (QCLot: 677868)								
EK059: Nitrite + Nitrate as N	----	0.01	mg/L	----	0.5 mg/L	95.6	85.5	118
		0.010	mg/L	<0.010	----	----	----	----
EK071: Reactive Phosphorus as P (Dissolved) (QCLot: 677866)								
EK071F: Reactive Phosphorus - Filtered	----	0.01	mg/L	----	1 mg/L	100	88.5	116
		0.010	mg/L	<0.010	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045P: Chloride by PC Titrator (QCLot: 680380)							
EB0807578-001	PZ04	ED045-P: Chloride	16887-00-6	80 mg/L	97.5	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 677936)							
EB0807575-002	Anonymous	EG020A-F: Arsenic	7440-38-2	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Beryllium	7440-41-7	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Barium	7440-39-3	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Cadmium	7440-43-9	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Chromium	7440-47-3	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Cobalt	7440-48-4	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Copper	7440-50-8	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Lead	7439-92-1	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Manganese	7439-96-5	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Nickel	7440-02-0	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Vanadium	7440-62-2	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Zinc	7440-66-6	Anonymous	Anonymous	Anonymous	Anonymous
EG020F: Dissolved Metals by ICP-MS (QCLot: 677937)							
EB0807578-020	PZ09	EG020A-F: Arsenic	7440-38-2	0.100 mg/L	105	70	130
		EG020A-F: Beryllium	7440-41-7	0.100 mg/L	116	70	130
		EG020A-F: Barium	7440-39-3	0.100 mg/L	103	70	130
		EG020A-F: Cadmium	7440-43-9	0.100 mg/L	101	70	130
		EG020A-F: Chromium	7440-47-3	0.100 mg/L	95.8	70	130
		EG020A-F: Cobalt	7440-48-4	0.100 mg/L	103	70	130
		EG020A-F: Copper	7440-50-8	0.100 mg/L	102	70	130
		EG020A-F: Lead	7439-92-1	0.100 mg/L	94.9	70	130
		EG020A-F: Manganese	7439-96-5	0.100 mg/L	113	70	130
		EG020A-F: Nickel	7440-02-0	0.100 mg/L	101	70	130
		EG020A-F: Vanadium	7440-62-2	0.100 mg/L	102	70	130
		EG020A-F: Zinc	7440-66-6	0.100 mg/L	115	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 678388)							
EB0807578-004	QC01	EG020A-F: Arsenic	7440-38-2	0.100 mg/L	102	70	130
		EG020A-F: Beryllium	7440-41-7	0.100 mg/L	107	70	130
		EG020A-F: Barium	7440-39-3	0.100 mg/L	99.9	70	130
		EG020A-F: Cadmium	7440-43-9	0.100 mg/L	104	70	130
		EG020A-F: Chromium	7440-47-3	0.100 mg/L	104	70	130
		EG020A-F: Cobalt	7440-48-4	0.100 mg/L	104	70	130
		EG020A-F: Copper	7440-50-8	0.100 mg/L	104	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Spike Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 678388) - continued							
EB0807578-004	QC01	EG020A-F: Lead	7439-92-1	0.100 mg/L	102	70	130
		EG020A-F: Manganese	7439-96-5	0.100 mg/L	102	70	130
		EG020A-F: Nickel	7440-02-0	0.100 mg/L	102	70	130
		EG020A-F: Vanadium	7440-62-2	0.100 mg/L	106	70	130
		EG020A-F: Zinc	7440-66-6	0.100 mg/L	113	70	130
EG020T: Total Metals by ICP-MS (QCLot: 677853)							
EB0807578-005	QC02	EG020A-T: Arsenic	7440-38-2	1.000 mg/L	118	70	130
		EG020A-T: Beryllium	7440-41-7	0.100 mg/L	122	70	130
		EG020A-T: Barium	7440-39-3	1.000 mg/L	118	70	130
		EG020A-T: Cadmium	7440-43-9	0.500 mg/L	120	70	130
		EG020A-T: Chromium	7440-47-3	1.000 mg/L	128	70	130
		EG020A-T: Cobalt	7440-48-4	1.000 mg/L	128	70	130
		EG020A-T: Copper	7440-50-8	1.000 mg/L	124	70	130
		EG020A-T: Lead	7439-92-1	1.000 mg/L	128	70	130
		EG020A-T: Manganese	7439-96-5	1.000 mg/L	125	70	130
		EG020A-T: Nickel	7440-02-0	1.000 mg/L	122	70	130
		EG020A-T: Vanadium	7440-62-2	1.000 mg/L	122	70	130
		EG020A-T: Zinc	7440-66-6	1.000 mg/L	123	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 682288)							
EB0807509-001	Anonymous	EG035F: Mercury	7439-97-6	Anonymous	Anonymous	Anonymous	Anonymous
EG035F: Dissolved Mercury by FIMS (QCLot: 682289)							
EB0807578-003	PZ05	EG035F: Mercury	7439-97-6	0.01 mg/L	95.0	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 681681)							
EB0807559-001	Anonymous	EG035T: Mercury	7439-97-6	Anonymous	Anonymous	Anonymous	Anonymous
EK040P: Fluoride by PC Titrator (QCLot: 680381)							
EB0807578-001	PZ04	EK040P: Fluoride	16984-48-8	4.9 mg/L	85.0	70	130
EK057: Nitrite as N (QCLot: 677867)							
EB0807578-001	PZ04	EK057: Nitrite as N	----	0.4 mg/L	105	70	130
EK059: Nitrite plus Nitrate as N (NOx) (QCLot: 677865)							
EB0807570-001	Anonymous	EK059: Nitrite + Nitrate as N	----	Anonymous	Anonymous	Anonymous	Anonymous
EK059: Nitrite plus Nitrate as N (NOx) (QCLot: 677868)							
EB0807578-014	PZ06-S	EK059: Nitrite + Nitrate as N	----	0.4 mg/L	102	70	130
EK071: Reactive Phosphorus as P (Dissolved) (QCLot: 677866)							
EB0807570-001	Anonymous	EK071F: Reactive Phosphorus - Filtered	----	Anonymous	Anonymous	Anonymous	Anonymous

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB0807578**	Page	: 1 of 14
Client	: URS AUSTRALIA PTY LTD (QLD)	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 10-JUN-2008
Sampler	: AW/BS	Issue Date	: 17-JUN-2008
Order number	: ----		
		No. of samples received	: 24
Quote number	: EN/001/08	No. of samples analysed	: 24

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
EA005: pH							
Clear Plastic Bottle - Natural							
QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	**05-JUN-2008**	**----**	----	----	**10-JUN-2008**	05-JUN-2008	×
Clear Plastic Bottle - Natural							
QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	**06-JUN-2008**	**----**	----	----	**10-JUN-2008**	06-JUN-2008	×
Clear Plastic Bottle - Natural							
QC07, PZ03-D, PZ03-S, PZ02	**07-JUN-2008**	**----**	----	----	**10-JUN-2008**	07-JUN-2008	×
Clear Plastic Bottle - Natural							
PZ04, PZ01, PZ05, QC10	**08-JUN-2008**	**----**	----	----	**10-JUN-2008**	08-JUN-2008	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural							
QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	**05-JUN-2008**	**---**	---	----	**13-JUN-2008**	03-JUL-2008	✓
Clear Plastic Bottle - Natural							
QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	**06-JUN-2008**	**---**	---	----	**13-JUN-2008**	04-JUL-2008	✓
Clear Plastic Bottle - Natural							
QC07, PZ03-D, PZ03-S, PZ02	**07-JUN-2008**	**---**	---	----	**13-JUN-2008**	05-JUL-2008	✓
Clear Plastic Bottle - Natural							
PZ04, PZ01, PZ05, QC10	**08-JUN-2008**	**---**	---	----	**13-JUN-2008**	06-JUL-2008	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	**05-JUN-2008**	---	---	----	**13-JUN-2008**	19-JUN-2008	✓
Clear Plastic Bottle - Natural							
QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	**06-JUN-2008**	---	---	----	**13-JUN-2008**	20-JUN-2008	✓
Clear Plastic Bottle - Natural							
QC07, PZ03-D, PZ03-S, PZ02	**07-JUN-2008**	---	---	----	**13-JUN-2008**	21-JUN-2008	✓
Clear Plastic Bottle - Natural							
PZ04, PZ01, PZ05, QC10	**08-JUN-2008**	---	---	----	**13-JUN-2008**	22-JUN-2008	✓
ED040F: Dissolved Major Anions							
Clear Plastic Bottle - Natural							
QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	**05-JUN-2008**	---	---	----	**11-JUN-2008**	03-JUL-2008	✓
Clear Plastic Bottle - Natural							
QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	**06-JUN-2008**	---	---	----	**11-JUN-2008**	04-JUL-2008	✓
Clear Plastic Bottle - Natural							
QC07, PZ03-D, PZ03-S, PZ02	**07-JUN-2008**	---	---	----	**11-JUN-2008**	05-JUL-2008	✓
Clear Plastic Bottle - Natural							
PZ04, PZ01, PZ05, QC10	**08-JUN-2008**	---	---	----	**11-JUN-2008**	06-JUL-2008	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045P: Chloride by PC Titrator							
Clear Plastic Bottle - Natural QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	**05-JUN-2008**	**---**	---	----	**13-JUN-2008**	03-JUL-2008	✓
Clear Plastic Bottle - Natural QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	**06-JUN-2008**	**---**	---	----	**13-JUN-2008**	04-JUL-2008	✓
Clear Plastic Bottle - Natural QC07, PZ03-D, PZ03-S, PZ02	**07-JUN-2008**	**---**	---	----	**13-JUN-2008**	05-JUL-2008	✓
Clear Plastic Bottle - Natural PZ04, PZ01, PZ05, QC10	**08-JUN-2008**	**---**	---	----	**13-JUN-2008**	06-JUL-2008	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	**05-JUN-2008**	**---**	---	----	**11-JUN-2008**	03-JUL-2008	✓
Clear Plastic Bottle - Natural QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	**06-JUN-2008**	**---**	---	----	**11-JUN-2008**	04-JUL-2008	✓
Clear Plastic Bottle - Natural QC07, PZ03-D, PZ03-S, PZ02	**07-JUN-2008**	**---**	---	----	**11-JUN-2008**	05-JUL-2008	✓
Clear Plastic Bottle - Natural PZ04, PZ01, PZ05, QC10	**08-JUN-2008**	**---**	---	----	**11-JUN-2008**	06-JUL-2008	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified PZ07-D, PZ07-S	**05-JUN-2008**	**---**	---	----	**11-JUN-2008**	02-DEC-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified QC01, PZ06-D, PZ06-S	**05-JUN-2008**	**---**	---	----	**13-JUN-2008**	02-DEC-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	**06-JUN-2008**	**---**	---	----	**11-JUN-2008**	03-DEC-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified QC07, PZ03-D, PZ03-S	**07-JUN-2008**	**---**	---	----	**11-JUN-2008**	04-DEC-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified QC08, PZ02	**07-JUN-2008**	**---**	---	----	**13-JUN-2008**	04-DEC-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified PZ04, PZ05, QC10	**08-JUN-2008**	**---**	---	----	**11-JUN-2008**	05-DEC-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified PZ01	**08-JUN-2008**	**---**	---	----	**13-JUN-2008**	05-DEC-2008	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified QC02, QC03	**05-JUN-2008**	**11-JUN-2008**	02-DEC-2008	✓	**11-JUN-2008**	02-DEC-2008	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified QC05, QC06	**06-JUN-2008**	**11-JUN-2008**	03-DEC-2008	✓	**11-JUN-2008**	03-DEC-2008	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	**05-JUN-2008**	**----**	----	----	**16-JUN-2008**	03-JUL-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	**06-JUN-2008**	**----**	----	----	**16-JUN-2008**	04-JUL-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified QC07, QC08, PZ03-D, PZ03-S, PZ02	**07-JUN-2008**	**----**	----	----	**16-JUN-2008**	05-JUL-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified PZ04, PZ01, PZ05, QC10	**08-JUN-2008**	**----**	----	----	**16-JUN-2008**	06-JUL-2008	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified							
QC02, QC03	**05-JUN-2008**	**----**	----	----	**16-JUN-2008**	03-JUL-2008	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified							
QC05, QC06	**06-JUN-2008**	**----**	----	----	**16-JUN-2008**	04-JUL-2008	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural							
QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	**05-JUN-2008**	**---**	---	----	**13-JUN-2008**	03-JUL-2008	✓
Clear Plastic Bottle - Natural							
QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	**06-JUN-2008**	**---**	---	----	**13-JUN-2008**	04-JUL-2008	✓
Clear Plastic Bottle - Natural							
QC07, PZ03-D, PZ03-S, PZ02	**07-JUN-2008**	**---**	---	----	**13-JUN-2008**	05-JUL-2008	✓
Clear Plastic Bottle - Natural							
PZ04, PZ01, PZ05, QC10	**08-JUN-2008**	**---**	---	----	**13-JUN-2008**	06-JUL-2008	✓
EK057: Nitrite as N							
Clear Plastic Bottle - Natural							
QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	**05-JUN-2008**	**---**	---	----	**11-JUN-2008**	07-JUN-2008	×
Clear Plastic Bottle - Natural							
QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	**06-JUN-2008**	**---**	---	----	**11-JUN-2008**	08-JUN-2008	×
Clear Plastic Bottle - Natural							
QC07, PZ03-D, PZ03-S, PZ02	**07-JUN-2008**	**---**	---	----	**11-JUN-2008**	09-JUN-2008	×
Clear Plastic Bottle - Natural							
PZ04, PZ01, PZ05, QC10	**08-JUN-2008**	**---**	---	----	**11-JUN-2008**	10-JUN-2008	×

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059: Nitrite plus Nitrate as N (NOx)							
Clear Plastic Bottle - Natural QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	**05-JUN-2008**	**---**	---	----	**11-JUN-2008**	07-JUN-2008	×
Clear Plastic Bottle - Natural QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	**06-JUN-2008**	**---**	---	----	**11-JUN-2008**	08-JUN-2008	×
Clear Plastic Bottle - Natural QC07, PZ03-D, PZ03-S, PZ02	**07-JUN-2008**	**---**	---	----	**11-JUN-2008**	09-JUN-2008	×
Clear Plastic Bottle - Natural PZ04, PZ01, PZ05, QC10	**08-JUN-2008**	**---**	---	----	**11-JUN-2008**	10-JUN-2008	×
EK071: Reactive Phosphorus as P (Dissolved)							
Clear Plastic Bottle - Natural QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	**05-JUN-2008**	**---**	---	----	**11-JUN-2008**	07-JUN-2008	×
Clear Plastic Bottle - Natural QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	**06-JUN-2008**	**---**	---	----	**11-JUN-2008**	08-JUN-2008	×
Clear Plastic Bottle - Natural QC07, PZ03-D, PZ03-S, PZ02	**07-JUN-2008**	**---**	---	----	**11-JUN-2008**	09-JUN-2008	×
Clear Plastic Bottle - Natural PZ04, PZ01, PZ05, QC10	**08-JUN-2008**	**---**	---	----	**11-JUN-2008**	10-JUN-2008	×

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	4	40	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	5	37	**13.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	2	19	**10.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)	EK059	4	34	**11.8**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N	EK057	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH	EA005	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus - Filtered	EK071F	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	3	25	**12.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	2	40	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	42	**9.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)	EK059	2	34	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N	EK057	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH	EA005	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus - Filtered	EK071F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	25	**8.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chloride by PC Titrator	ED045-P	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	2	40	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	42	**9.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	19	**5.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Nitrite and Nitrate as N (NOx)	EK059	2	34	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N	EK057	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus - Filtered	EK071F	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	25	**8.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by PC Titrator	ED045-P	1	19	**5.3**	**5.0**	✓	ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	2	40	**5.0**	**5.0**	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	37	**8.1**	**5.0**	✓	ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	19	**5.3**	**5.0**	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx)	EK059	2	34	**5.9**	**5.0**	✓	ALS QCS3 requirement
Nitrite as N	EK057	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Reactive Phosphorus - Filtered	EK071F	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	25	**8.0**	**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	EA005	WATER	APHA 21st ed. 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 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 both manual measurement and automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Major Anions - Filtered	ED040F	WATER	APHA 21st ed., 3120 Sulfur and/or Silcon content is determined by ICP/AES and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Chloride by PC Titrator	ED045-P	WATER	APHA 21st ed., 4500 Cl - B. Automated Silver Nitrate titration.
Major Cations - Filtered	ED093F	WATER	APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Mercury by FIMS	EG035T	WATER	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. 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)
Nitrite as N	EK057	WATER	APHA 21st ed., 4500 NO3- I. Nitrite is determined by direct colourimetry by FIA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Analytical Methods	Method	Matrix	Method Descriptions
Nitrate as N	EK058	WATER	APHA 21st ed., 4500 NO3--I Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by FIA. 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)	EK059	WATER	APHA 21st ed., 4500 NO3- I. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by FIA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus - Filtered	EK071F	WATER	APHA 21st ed., 4500 P-E Water samples are filtered through a 0.45um filter prior to analysis. Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is achieved by FIA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA 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	765975-002	----	**Arsenic**	7440-38-2	129 %	79.6-115%	**Recovery greater than upper control limit**
EG020F: Dissolved Metals by ICP-MS	765975-002	----	**Lead**	7439-92-1	125 %	85.4-117%	**Recovery greater than upper control limit**

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

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
EA005: pH							
Clear Plastic Bottle - Natural							
QC01, PZ06-S, PZ07-S	PZ06-D, PZ07-D,	----	----	----	10-JUN-2008	05-JUN-2008	**5**
Clear Plastic Bottle - Natural							
QC04, PZ08-S, PZ09,	PZ08-D, PZ10, PZ11-D	----	----	----	10-JUN-2008	06-JUN-2008	**4**
Clear Plastic Bottle - Natural							
QC07, PZ03-S,	PZ03-D, PZ02	----	----	----	10-JUN-2008	07-JUN-2008	**3**
Clear Plastic Bottle - Natural							
PZ04, PZ05,	PZ01, QC10	----	----	----	10-JUN-2008	08-JUN-2008	**2**

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
EK057: Nitrite as N						
Clear Plastic Bottle - Natural QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	----	----	----	11-JUN-2008	07-JUN-2008	**4**
Clear Plastic Bottle - Natural QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	----	----	----	11-JUN-2008	08-JUN-2008	**3**
Clear Plastic Bottle - Natural QC07, PZ03-D, PZ03-S, PZ02	----	----	----	11-JUN-2008	09-JUN-2008	**2**
Clear Plastic Bottle - Natural PZ04, PZ01, PZ05, QC10	----	----	----	11-JUN-2008	10-JUN-2008	**1**
EK059: Nitrite plus Nitrate as N (NOx)						
Clear Plastic Bottle - Natural QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	----	----	----	11-JUN-2008	07-JUN-2008	**4**
Clear Plastic Bottle - Natural QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	----	----	----	11-JUN-2008	08-JUN-2008	**3**
Clear Plastic Bottle - Natural QC07, PZ03-D, PZ03-S, PZ02	----	----	----	11-JUN-2008	09-JUN-2008	**2**
Clear Plastic Bottle - Natural PZ04, PZ01, PZ05, QC10	----	----	----	11-JUN-2008	10-JUN-2008	**1**
EK071: Reactive Phosphorus as P (Dissolved)						
Clear Plastic Bottle - Natural QC01, PZ06-D, PZ06-S, PZ07-D, PZ07-S	----	----	----	11-JUN-2008	07-JUN-2008	**4**
Clear Plastic Bottle - Natural QC04, PZ08-D, PZ08-S, PZ10, PZ09, PZ11-D	----	----	----	11-JUN-2008	08-JUN-2008	**3**
Clear Plastic Bottle - Natural QC07, PZ03-D, PZ03-S, PZ02	----	----	----	11-JUN-2008	09-JUN-2008	**2**

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
EK071: Reactive Phosphorus as P (Dissolved) - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural						
PZ04, PZ01, PZ05, QC10	----	----	----	11-JUN-2008	10-JUN-2008	**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 DOCUMENTATION

Australian Laboratory Services Pty Ltd

CLIENT: BMA	SAMPLER: Andrew Wilson / Dale Gould
ADDRESS / OFFICE:	MOBILE: 0448 853 004 / 0437 338 439
PROJECT MANAGER (PM): Stephen Denner	PHONE 3243 2146 / 3243 2128
PROJECT ID: 42626162	EMAIL REPORT TO: stephen_denner@urscorp.cc (underscore between stephen and denner)
SITE: Caval Ridge P.O. NO.:	EMAIL INVOICE TO: (if different to report)
RESULTS REQUIRED (Date): QUOTE NO.:	**ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles	NT1	NT2	NT8	W3	Al, A, B, Fe, Ga, Li (Dissolved)	Mo, Se, Sr, Th, Ti, U (Dissolved)	Al, A, B, Fe, Ga, Li (Total)	Mo, Se, Sr, Th, Ti, U (Total)	
1	Pz 10	Water	8/9	AM	P, SP	3	✓	✓	✓	✓	✓	✓			All green plastics
2	Pz 11-D		8/9	PM			✓	✓	✓	✓	✓	✓			frozen as soon
3	Pz 09		8/9	PM			✓	✓	✓	✓	✓	✓			as practicable
4	Pz 05		9/9	PM			✓	✓	✓	✓	✓	✓			
5	Pz 07-S		9/9	PM			✓	✓	✓	✓	✓	✓			
6	Pz 07-D		9/9	PM			✓	✓	✓	✓	✓	✓			
7	Pz 08-S		9/9	PM			✓	✓	✓	✓	✓	✓			
8	Pz 08-D		9/9	PM			✓	✓	✓	✓	✓	✓			
9	Pz 06-S		10/9	AM			✓	✓	✓	✓	✓	✓			
10	Pz 06-D		10/9	AM			✓	✓	✓	✓	✓	✓			
11	Pz 03-S		10/9	PM			✓	✓	✓	✓	✓	✓			
12	Pz 03-D	✓	10/9	PM	✓	✓	✓	✓	✓	✓	✓	✓			

Notes: e.g. Highly contaminated samples
e.g. "High PAHs expected".
Extra volume for QC or trace LORs etc.

Environmental Division
Brisbane
Work Order
EB0812573

Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: Andrew Wilson	Date: 11/9/08	Name: T. Creagh	Date: 12/9/08	Con' Note No:
Of: URS	Time:	Of: ALS Brisbane	Time: 0748	
Name:	Date:	Name:	Date:	Transport Co:
Of:	Time:	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY DOCUMENTATION

Australian Laboratory Services Pty Ltd

CLIENT: BMA	SAMPLER: Andrew Wilson / Dale Gould
ADDRESS / OFFICE:	MOBILE: 0448 853 004 / 0437 338 439
PROJECT MANAGER (PM): Stephen Denner	PHONE 3243 2146 / 3243 2128
PROJECT ID: 42626162	EMAIL REPORT TO: stephen_denner@urscorp.cc (underscore between stephen and denner)
SITE: Caval Ridge P.O. NO.:	EMAIL INVOICE TO: (if different to report)
RESULTS REQUIRED (Date): QUOTE NO.:	**ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

Notes: e.g. Highly contaminated samples
e.g. "High PAHs expected".
Extra volume for QC or trace LORs etc.

	SAMPLE INFORMATION (note: S = Soil, W=Water)				CONTAINER INFORMATION		NT1	NT2	NT8	W3	Al, A, B, Fe, Ga, Li (Dissolved)	Mo, Se, Sr, Th, Ti, U (Dissolved)	Al, A, B, Fe, Ga, Li (Total)	Mo, Se, Sr, Th, Ti, U (Total)						
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles														
13	Pz02	Water	10/9	PM	P, SP	3	✓	✓	✓	✓	✓	✓								Green plastics frozen as soon as practicable (except Pz04)
14	Pz01		10/9	PM	P, SP	3	✓	✓	✓	✓	✓	✓								
15	Pz04		11/9	AM	P, SP	3	✓	✓	✓	✓	✓	✓								
16	QC01		8/9	PM	P	1							✓	✓						
17	QC02		9/9	AM	P	1							✓	✓						
18	QC03		10/9	PM	P	1							✓	✓						
19	QC04	↓	10/9	PM	P, SP	3	✓	✓	✓	✓	✓	✓								
	Extra samples																			
~~20~~	~~Conductivity Std.~~																			
21	PH Buffer 4.00																			
~~22~~	~~PH Buffer 6.00~~																			

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: Andrew Wilson	Date: 11/9/08	Name: T. Creagh	Date: 12/9/08	Con' Note No:
Of: URS	Time:	Of: ALS Brisbane	Time: 0748	
Name:	Date:	Name:	Date:	Transport Co:
Of:	Time:	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

AUSTRALIAN LABORATORY SERVICES P/L

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB0812573**		
Client	: **URS AUSTRALIA PTY LTD (QLD)**	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2008URSQLD0041 (EN/001/08)
Site	: Caval Ridge		
Sampler	: A. Wilson, D. Gould	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 12-SEP-2008	Issue Date	: 17-SEP-2008 11:00
Client Requested Due Date	: 23-SEP-2008	Scheduled Reporting Date	: **23-SEP-2008**

Delivery Details

Mode of Delivery	: Client Drop off	Temperature	: 9.6 C
No. of coolers/boxes	: 1 LARGE	No. of samples received	: 19
Sercurity Seal	: Intact.	No. of samples analysed	: 19

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- **As per phone confirmation Antimony have been added to all samples. 17/9/8**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

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 neccessary 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.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EG020A-F Dissolved Metals by ICPMS - Suite A	WATER - EG020A-T Total Metals by ICPMS - Suite A	WATER - EG020B-F Dissolved Metals by ICPMS - Suite B	WATER - EG020B-T Total Metals by ICPMS - Suite B	WATER - EG020D-F Dissolved Metals by ICPMS - Suite D	WATER - EG020D-T Total Metals by ICPMS - Suite D	WATER - EN055 Ionic Balance	WATER - NT-01 Major Cations (Ca, Mg, Na, K)
EB0812573-001	08-SEP-2008 15:00	PZ10	✓		✓		✓		✓	✓
EB0812573-002	08-SEP-2008 15:00	PZ11-D	✓		✓		✓		✓	✓
EB0812573-003	08-SEP-2008 15:00	PZ09	✓		✓		✓		✓	✓
EB0812573-004	09-SEP-2008 15:00	PZ05	✓		✓		✓		✓	✓
EB0812573-005	09-SEP-2008 15:00	PZ07-S	✓		✓		✓		✓	✓
EB0812573-006	09-SEP-2008 15:00	PZ07-D	✓		✓		✓		✓	✓
EB0812573-007	09-SEP-2008 15:00	PZ08-S	✓		✓		✓		✓	✓
EB0812573-008	09-SEP-2008 15:00	PZ08-D	✓		✓		✓		✓	✓
EB0812573-009	10-SEP-2008 15:00	PZ06-S	✓		✓		✓		✓	✓
EB0812573-010	10-SEP-2008 15:00	PZ06-D	✓		✓		✓		✓	✓
EB0812573-011	10-SEP-2008 15:00	PZ03-S	✓		✓		✓		✓	✓
EB0812573-012	10-SEP-2008 15:00	PZ03-D	✓		✓		✓		✓	✓
EB0812573-013	10-SEP-2008 15:00	PZ02	✓		✓		✓		✓	✓
EB0812573-014	10-SEP-2008 15:00	PZ01	✓		✓		✓		✓	✓
EB0812573-015	11-SEP-2008 15:00	PZ04	✓		✓		✓		✓	✓
EB0812573-016	08-SEP-2008 15:00	QC01		✓		✓		✓		
EB0812573-017	09-SEP-2008 15:00	QC02		✓		✓		✓		
EB0812573-018	10-SEP-2008 15:00	QC03		✓		✓		✓		
EB0812573-019	10-SEP-2008 15:00	QC04	✓		✓		✓		✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - NT-02 (EB/PCT) Major Anions (Cl, SO4, Alkalinity)	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P	WATER - W-03 13 Metals (NEPM Suite)
EB0812573-001	08-SEP-2008 15:00	PZ10	✓	✓	✓
EB0812573-002	08-SEP-2008 15:00	PZ11-D	✓	✓	✓
EB0812573-003	08-SEP-2008 15:00	PZ09	✓	✓	✓
EB0812573-004	09-SEP-2008 15:00	PZ05	✓	✓	✓
EB0812573-005	09-SEP-2008 15:00	PZ07-S	✓	✓	✓

			WATER - NT-02 (EB/PCT) Major Anions (Cl, SO4, Alkalinity)	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P	WATER - W-03 13 Metals (NEPM Suite)
EB0812573-006	09-SEP-2008 15:00	PZ07-D	✓	✓	✓
EB0812573-007	09-SEP-2008 15:00	PZ08-S	✓	✓	✓
EB0812573-008	09-SEP-2008 15:00	PZ08-D	✓	✓	✓
EB0812573-009	10-SEP-2008 15:00	PZ06-S	✓	✓	✓
EB0812573-010	10-SEP-2008 15:00	PZ06-D	✓	✓	✓
EB0812573-011	10-SEP-2008 15:00	PZ03-S	✓	✓	✓
EB0812573-012	10-SEP-2008 15:00	PZ03-D	✓	✓	✓
EB0812573-013	10-SEP-2008 15:00	PZ02	✓	✓	✓
EB0812573-014	10-SEP-2008 15:00	PZ01	✓	✓	✓
EB0812573-015	11-SEP-2008 15:00	PZ04	✓	✓	✓
EB0812573-019	10-SEP-2008 15:00	QC04	✓	✓	✓

Requested Deliverables

MR STEPHEN DENNER

- *AU Certificate of Analysis - NATA	Email	stephen_denner@urscorp.com
- A4 - AU Sample Receipt Notification - Environmental	Email	stephen_denner@urscorp.com
- AU Interpretive QC Report (Anon QCI Not Rep)	Email	stephen_denner@urscorp.com
- AU QC Report (Anon QC Not Rep) - NATA	Email	stephen_denner@urscorp.com
- Default - Chain of Custody	Email	stephen_denner@urscorp.com
- EDI Format - MRED	Email	stephen_denner@urscorp.com

RESULTS ADDRESS

- *AU Certificate of Analysis - NATA	Email	brisbane@urscorp.com
- A4 - AU Sample Receipt Notification - Environmental	Email	brisbane@urscorp.com
- AU Interpretive QC Report (Anon QCI Not Rep)	Email	brisbane@urscorp.com
- AU QC Report (Anon QC Not Rep) - NATA	Email	brisbane@urscorp.com
- Default - Chain of Custody	Email	brisbane@urscorp.com
- EDI Format - MRED	Email	brisbane@urscorp.com

THE ACCOUNTS BRISBANE

- A4 - AU Tax Invoice	Email	brisbane_accounts@urscorp.com

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB0812573**	Page	: 1 of 10
Client	: **URS AUSTRALIA PTY LTD (QLD)**	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 12-SEP-2008
Sampler	: A. Wilson, D. Gould	Issue Date	: 23-SEP-2008
Site	: Caval Ridge		
		No. of samples received	: 19
Quote number	: EN/001/08	No. of samples analysed	: 19

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics
Stephen Hislop	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

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

- **LCS recovery for EG020T (Total Metals) & EG020F (Filtered Metals) fall outside Dynamic Control Limits. They are however within ALS Static Control Limits and hence deemed acceptable.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ10	PZ11-D	PZ09	PZ05	PZ07-S
				Client sampling date / time: 08-SEP-2008 15:00	08-SEP-2008 15:00	08-SEP-2008 15:00	09-SEP-2008 15:00	09-SEP-2008 15:00
				EB0812573-001	EB0812573-002	EB0812573-003	EB0812573-004	EB0812573-005
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**139**	**79**	**111**	**289**	**127**
Total Alkalinity as CaCO3	----	1	mg/L	**139**	**79**	**111**	**289**	**127**
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**626**	**247**	**817**	**3**	**6**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**1210**	**2770**	**3800**	**148**	**34**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**140**	**275**	**460**	**64**	**29**
Magnesium	7439-95-4	1	mg/L	**124**	**128**	**295**	**35**	**16**
Sodium	7440-23-5	1	mg/L	**771**	**1280**	**1600**	**103**	**14**
Potassium	7440-09-7	1	mg/L	**11**	**9**	**17**	**1**	**6**
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	**0.01**	<0.01	**0.02**	**0.04**
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**	**0.003**	<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	**0.036**	**0.081**	**0.061**	**0.079**	**0.138**
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	**0.004**	**0.002**	**0.002**	**0.004**	<0.001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	**0.002**	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	**0.002**	**0.001**	**0.002**	<0.001	<0.001
Gallium	7440-55-3	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**
Lithium	7439-93-2	0.001	mg/L	**0.326**	**0.715**	**0.413**	**0.004**	**0.025**
Manganese	7439-96-5	0.001	mg/L	**0.197**	**0.032**	**0.335**	**0.238**	**0.151**
Molybdenum	7439-98-7	0.001	mg/L	**0.003**	**0.002**	**0.001**	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	**0.009**	**0.006**	**0.012**	**0.010**	<0.001
Selenium	7782-49-2	0.010	mg/L	**0.019**	**0.019**	**0.028**	<0.010	<0.010
Strontium	7440-24-6	0.001	mg/L	**11.4**	**47.3**	**39.2**	**0.702**	**0.233**
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
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	<0.005	**0.006**	<0.005	<0.005	**0.006**
Boron	7440-42-8	0.05	mg/L	**0.50**	**0.15**	**0.13**	**0.06**	**0.09**
Iron	7439-89-6	0.05	mg/L	**1.58**	**1.76**	**3.31**	**0.43**	**0.23**

Analytical Results

Sub-Matrix: WATER				Client sample ID	PZ10	PZ11-D	PZ09	PZ05	PZ07-S
				Client sampling date / time	08-SEP-2008 15:00	08-SEP-2008 15:00	08-SEP-2008 15:00	09-SEP-2008 15:00	09-SEP-2008 15:00
Compound	CAS Number	LOR	Unit		EB0812573-001	EB0812573-002	EB0812573-003	EB0812573-004	EB0812573-005
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**1.02**	**2.39**	**2.77**	**0.02**	**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		<0.01	<0.01	<0.01	<0.01	<0.01
EK059G: NOX as N by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.8**	**2.5**	**3.1**	**1.8**	**25.4**
EK062: Total Nitrogen as N									
^ Total Nitrogen as N	----	0.1	mg/L		**1.8**	**2.5**	**3.1**	**1.8**	**25.4**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**1.78**	**3.13**	**0.36**	**0.43**	**3.24**
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		**50.0**	**84.9**	**126**	**10.0**	**3.63**
^ Total Cations	----	0.01	meq/L		**51.0**	**80.4**	**117**	**10.6**	**3.54**
^ Ionic Balance	----	0.01	%		**0.94**	**2.72**	**3.76**	**2.82**	**1.28**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ07-D Client sampling date / time: 09-SEP-2008 15:00 EB0812573-006	PZ08-S 09-SEP-2008 15:00 EB0812573-007	PZ08-D 09-SEP-2008 15:00 EB0812573-008	PZ06-S 10-SEP-2008 15:00 EB0812573-009	PZ06-D 10-SEP-2008 15:00 EB0812573-010
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**503**	**317**	**407**	**462**	**484**
Total Alkalinity as CaCO3	----	1	mg/L	**503**	**317**	**407**	**462**	**484**
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**151**	**88**	**1250**	**30**	**75**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**936**	**335**	**3650**	**296**	**365**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**79**	**52**	**346**	**30**	**36**
Magnesium	7439-95-4	1	mg/L	**83**	**46**	**337**	**73**	**43**
Sodium	7440-23-5	1	mg/L	**646**	**242**	**1880**	**220**	**347**
Potassium	7440-09-7	1	mg/L	**7**	**18**	**42**	**4**	**4**
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	<0.001	<0.001	**0.002**	<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	**0.065**	**0.174**	**0.032**	**0.067**	**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	**0.007**	**0.004**	**0.011**	**0.012**	**0.012**
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	**0.003**	<0.001	<0.001
Gallium	7440-55-3	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
Lithium	7439-93-2	0.001	mg/L	**0.066**	**0.149**	**0.530**	**0.014**	**0.029**
Manganese	7439-96-5	0.001	mg/L	**0.031**	**0.009**	**0.218**	**0.186**	**0.084**
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	**0.014**	**0.004**
Nickel	7440-02-0	0.001	mg/L	**0.006**	**0.002**	**0.010**	**0.010**	**0.006**
Selenium	7782-49-2	0.010	mg/L	<0.010	<0.010	**0.025**	<0.010	<0.010
Strontium	7440-24-6	0.001	mg/L	**4.88**	**0.568**	**6.94**	**1.22**	**0.989**
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
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	<0.005	<0.005	<0.005	<0.005	<0.005
Boron	7440-42-8	0.05	mg/L	**0.35**	**0.46**	**0.73**	**0.24**	**0.30**
Iron	7439-89-6	0.05	mg/L	**0.70**	**0.11**	**0.84**	**0.13**	**0.40**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ07-D Client sampling date / time: 09-SEP-2008 15:00 EB0812573-006	Client sample ID: PZ08-S Client sampling date / time: 09-SEP-2008 15:00 EB0812573-007	Client sample ID: PZ08-D Client sampling date / time: 09-SEP-2008 15:00 EB0812573-008	Client sample ID: PZ06-S Client sampling date / time: 10-SEP-2008 15:00 EB0812573-009	Client sample ID: PZ06-D Client sampling date / time: 10-SEP-2008 15:00 EB0812573-010
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.71**	**0.05**	**1.53**	**0.50**	**0.42**
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	**0.08**	<0.01	**0.01**	<0.01
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	**0.08**	<0.01	**0.01**	<0.01
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**2.4**	**6.4**	**1.6**	**0.7**	**0.8**
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	**2.4**	**6.5**	**1.6**	**0.7**	**0.8**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.45**	**3.72**	**0.22**	**2.03**	**0.51**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**39.6**	**17.6**	**137**	**18.2**	**21.5**
^ Total Cations	----	0.01	meq/L	**39.0**	**17.4**	**128**	**17.2**	**20.6**
^ Ionic Balance	----	0.01	%	**0.72**	**0.81**	**3.50**	**2.93**	**2.34**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ03-S Client sampling date / time: 10-SEP-2008 15:00 EB0812573-011	PZ03-D 10-SEP-2008 15:00 EB0812573-012	PZ02 10-SEP-2008 15:00 EB0812573-013	PZ01 10-SEP-2008 15:00 EB0812573-014	PZ04 11-SEP-2008 15:00 EB0812573-015
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	**21**	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**824**	**599**	**531**	**458**	**345**
Total Alkalinity as CaCO3	----	1	mg/L	**824**	**599**	**531**	**479**	**345**
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**411**	**1030**	**168**	**422**	**15**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**4450**	**6310**	**131**	**2270**	**142**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**184**	**284**	**29**	**177**	**33**
Magnesium	7439-95-4	1	mg/L	**476**	**628**	**33**	**204**	**12**
Sodium	7440-23-5	1	mg/L	**2200**	**3110**	**319**	**1210**	**209**
Potassium	7440-09-7	1	mg/L	**13**	**28**	**8**	**7**	**1**
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	<0.001	**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	**0.184**	**0.042**	**0.069**	**0.077**	**0.049**
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	**0.014**	**0.013**	**0.007**	**0.013**	**0.008**
Cobalt	7440-48-4	0.001	mg/L	**0.037**	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	**0.002**	**0.003**	<0.001	**0.001**	<0.001
Gallium	7440-55-3	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
Lithium	7439-93-2	0.001	mg/L	**0.211**	**0.419**	**0.073**	**0.203**	**0.002**
Manganese	7439-96-5	0.001	mg/L	**2.73**	**0.466**	**0.399**	**0.162**	**0.134**
Molybdenum	7439-98-7	0.001	mg/L	**0.004**	**0.001**	**0.024**	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	**0.041**	**0.012**	**0.012**	**0.008**	**0.002**
Selenium	7782-49-2	0.010	mg/L	**0.024**	**0.038**	<0.010	**0.011**	<0.010
Strontium	7440-24-6	0.001	mg/L	**5.88**	**7.55**	**0.558**	**10.1**	**0.233**
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L	<0.01	**0.02**	<0.01	<0.01	<0.01
Uranium	7440-61-1	0.001	mg/L	**0.010**	<0.001	**0.003**	**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	**0.012**	**0.010**	**0.011**	<0.005	<0.005
Boron	7440-42-8	0.05	mg/L	**1.14**	**3.17**	**0.28**	**0.50**	**0.07**
Iron	7439-89-6	0.05	mg/L	**1.38**	**4.08**	**0.20**	**0.44**	**1.04**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ03-S Client sampling date / time: 10-SEP-2008 15:00 EB0812573-011	Client sample ID: PZ03-D Client sampling date / time: 10-SEP-2008 15:00 EB0812573-012	Client sample ID: PZ02 Client sampling date / time: 10-SEP-2008 15:00 EB0812573-013	Client sample ID: PZ01 Client sampling date / time: 10-SEP-2008 15:00 EB0812573-014	Client sample ID: PZ04 Client sampling date / time: 11-SEP-2008 15:00 EB0812573-015
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	**0.0001**	<0.0001	<0.0001	<0.0001
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.17**	**1.36**	**0.24**	**0.82**	**1.08**
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	**0.39**	<0.01	<0.01	<0.01	**0.02**
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.39**	<0.01	<0.01	<0.01	**0.02**
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.6**	**1.6**	**0.3**	**1.4**	**2.1**
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	**1.0**	**1.6**	**0.3**	**1.4**	**2.1**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**1.65**	**1.86**	**10.0**	**0.81**	**0.52**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**150**	**211**	**17.8**	**82.3**	**11.2**
^ Total Cations	----	0.01	meq/L	**144**	**202**	**18.2**	**78.5**	**11.7**
^ Ionic Balance	----	0.01	%	**2.04**	**2.30**	**1.16**	**2.36**	**2.25**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: QC01	QC02	QC03	QC04	----
				Client sampling date / time: 08-SEP-2008 15:00	09-SEP-2008 15:00	10-SEP-2008 15:00	10-SEP-2008 15:00	----
				EB0812573-016	EB0812573-017	EB0812573-018	EB0812573-019	----
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	----	----	----	**666**	----
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	**666**	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	----	----	----	**1020**	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	----	----	----	**7290**	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	----	----	**323**	----
Magnesium	7439-95-4	1	mg/L	----	----	----	**701**	----
Sodium	7440-23-5	1	mg/L	----	----	----	**3380**	----
Potassium	7440-09-7	1	mg/L	----	----	----	**32**	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	----	----	----	<0.01	----
Antimony	7440-36-0	0.001	mg/L	----	----	----	<0.001	----
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	----	----	----	**0.041**	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	----	----	----	**0.019**	----
Cobalt	7440-48-4	0.001	mg/L	----	----	----	<0.001	----
Copper	7440-50-8	0.001	mg/L	----	----	----	**0.003**	----
Gallium	7440-55-3	0.001	mg/L	----	----	----	<0.001	----
Lead	7439-92-1	0.001	mg/L	----	----	----	<0.001	----
Lithium	7439-93-2	0.001	mg/L	----	----	----	**0.441**	----
Manganese	7439-96-5	0.001	mg/L	----	----	----	**0.461**	----
Molybdenum	7439-98-7	0.001	mg/L	----	----	----	**0.001**	----
Nickel	7440-02-0	0.001	mg/L	----	----	----	**0.012**	----
Selenium	7782-49-2	0.010	mg/L	----	----	----	**0.042**	----
Strontium	7440-24-6	0.001	mg/L	----	----	----	**7.75**	----
Thorium	7440-29-1	0.001	mg/L	----	----	----	<0.001	----
Titanium	7440-32-6	0.01	mg/L	----	----	----	<0.01	----
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	----	----	----	**0.008**	----
Boron	7440-42-8	0.05	mg/L	----	----	----	**3.09**	----
Iron	7439-89-6	0.05	mg/L	----	----	----	**0.90**	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: QC01	QC02	QC03	QC04	----
				Client sampling date / time: 08-SEP-2008 15:00	09-SEP-2008 15:00	10-SEP-2008 15:00	10-SEP-2008 15:00	----
				EB0812573-016	EB0812573-017	EB0812573-018	EB0812573-019	----
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Lithium	7439-93-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.010	mg/L	<0.010	<0.010	<0.010	----	----
Strontium	7440-24-6	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	<0.01	----	----
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	----	----	<0.0001	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	----	----	**1.60**	----
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: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	<0.01	----
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	**1.9**	----
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	----	**1.9**	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	----	**0.86**	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	----	----	----	**240**	----
^ Total Cations	----	0.01	meq/L	----	----	----	**222**	----
^ Ionic Balance	----	0.01	%	----	----	----	**4.08**	----

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **EB0812573**	Page	: 1 of 12
Client	: **URS AUSTRALIA PTY LTD (QLD)**	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Caval Ridge		
C-O-C number	: ----	Date Samples Received	: 12-SEP-2008
Sampler	: A. Wilson, D. Gould	Issue Date	: 23-SEP-2008
Order number	: ----		
		No. of samples received	: 19
Quote number	: EN/001/08	No. of samples analysed	: 19

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

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Inorganics
Stephen Hislop	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = Chemistry Abstract Services number
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 760714)									
EB0812573-001	PZ10	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	139	140	0.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	139	140	0.7	0% - 20%
EB0812635-007	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ED037P: Alkalinity by PC Titrator (QC Lot: 762170)									
EB0812573-004	PZ05	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	289	290	0.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	289	290	0.3	0% - 20%
EB0812573-013	PZ02	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	531	533	0.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	531	533	0.4	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 759990)									
EB0812491-001	Anonymous	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0812561-006	Anonymous	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ED040F: Dissolved Major Anions (QC Lot: 759992)									
EB0812573-007	PZ08-S	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	88	91	2.8	0% - 20%
EB0812573-019	QC04	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	1020	1040	1.1	0% - 20%
ED045P: Chloride by PC Titrator (QC Lot: 760715)									
EB0812573-001	PZ10	ED045-P: Chloride	16887-00-6	1	mg/L	1210	1200	0.8	0% - 20%
EB0812635-007	Anonymous	ED045-P: Chloride	16887-00-6	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ED045P: Chloride by PC Titrator (QC Lot: 762171)									
EB0812573-004	PZ05	ED045-P: Chloride	16887-00-6	1	mg/L	148	146	1.4	0% - 20%
EB0812573-013	PZ02	ED045-P: Chloride	16887-00-6	1	mg/L	131	128	2.3	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 759991)									
EB0812491-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Magnesium	7439-95-4	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Sodium	7440-23-5	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Potassium	7440-09-7	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0812561-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 759991) - continued									
EB0812561-006	Anonymous	ED093F: Magnesium	7439-95-4	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Sodium	7440-23-5	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Potassium	7440-09-7	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ED093F: Dissolved Major Cations (QC Lot: 759993)									
EB0812573-007	PZ08-S	ED093F: Calcium	7440-70-2	1	mg/L	52	53	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	46	46	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	242	246	1.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	18	18	0.0	0% - 50%
EB0812573-019	QC04	ED093F: Calcium	7440-70-2	1	mg/L	323	323	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	701	695	0.9	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	3380	3420	1.1	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	32	32	0.0	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 759443)									
EB0812491-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Barium	7440-39-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Copper	7440-50-8	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Lead	7439-92-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Lithium	7439-93-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Selenium	7782-49-2	0.010	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Boron	7440-42-8	0.05	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Iron	7439-89-6	0.05	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0812573-008	PZ08-D	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	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	0.032	0.032	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	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	0.003	0.003	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 759443) - continued									
EB0812573-008	PZ08-D	EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Lithium	7439-93-2	0.001	mg/L	0.530	0.511	3.6	0% - 20%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.218	0.221	1.5	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	0.010	0.011	11.1	0% - 50%
		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: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-F: Selenium	7782-49-2	0.010	mg/L	0.025	0.022	12.7	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.73	0.72	0.0	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.84	0.92	8.7	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 759444)									
EB0812491-001	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-F: Thorium	7440-29-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-F: Titanium	7440-32-6	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0812573-008	PZ08-D	EG020B-F: Strontium	7440-24-6	0.001	mg/L	6.94	7.06	1.6	0% - 20%
		EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 759445)									
EB0812491-001	Anonymous	EG020D-F: Gallium	7440-55-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0812573-008	PZ08-D	EG020D-F: Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 760171)									
EB0812504-001	Anonymous	EG020A-T: Antimony	7440-36-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Lithium	7439-93-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Molybdenum	7439-98-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Selenium	7782-49-2	0.010	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Boron	7440-42-8	0.05	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Iron	7439-89-6	0.05	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0812573-016	QC01	EG020A-T: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lithium	7439-93-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-T: Selenium	7782-49-2	0.010	mg/L	<0.010	<0.010	0.0	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 760172)									
EB0812504-001	Anonymous	EG020B-T: Strontium	7440-24-6	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metals by ICP-MS (QC Lot: 760172) - continued									
EB0812504-001	Anonymous	EG020B-T: Thorium	7440-29-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-T: Uranium	7440-61-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-T: Titanium	7440-32-6	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0812573-016	QC01	EG020B-T: Strontium	7440-24-6	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-T: Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-T: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-T: Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 760173)									
EB0812504-001	Anonymous	EG020D-T: Gallium	7440-55-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0812573-016	QC01	EG020D-T: Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 763478)									
EB0812573-001	PZ10	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0001	0.0	No Limit
EB0812573-011	PZ03-S	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 761696)									
EB0812521-005	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0812558-004	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 761697)									
EB0812573-006	PZ07-D	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.71	0.74	4.6	0% - 20%
EB0812573-019	QC04	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.60	1.49	6.7	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 759920)									
EB0812521-017	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0812567-003	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 759923)									
EB0812558-001	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0812573-009	PZ06-S	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: NOX as N by Discrete Analyser (QC Lot: 761134)									
EB0812573-001	PZ10	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB0812573-011	PZ03-S	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.39	0.40	0.0	0% - 20%
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 759513)									
EB0812400-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0812573-003	PZ09	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.1	3.0	3.6	0% - 20%
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 759515)									
EB0812573-013	PZ02	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.3	0.2	0.0	No Limit
EB0812612-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 759514)									
EB0812400-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0812573-003	PZ09	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.36	0.33	10.7	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 759516)									
EB0812573-013	PZ02	EK067G: Total Phosphorus as P	----	0.01	mg/L	10.0	10.5	5.2	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 (%)*
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 759516) - continued									
EB0812612-004	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 760714)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	500 mg/L	98.0	77.5	112
ED037P: Alkalinity by PC Titrator (QCLot: 762170)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	500 mg/L	97.8	77.5	112
ED040F: Dissolved Major Anions (QCLot: 759990)								
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1	----	----	----	----
ED040F: Dissolved Major Anions (QCLot: 759992)								
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1	----	----	----	----
ED045P: Chloride by PC Titrator (QCLot: 760715)								
ED045-P: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	101	88.4	110
ED045P: Chloride by PC Titrator (QCLot: 762171)								
ED045-P: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	100	88.4	110
ED093F: Dissolved Major Cations (QCLot: 759991)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
ED093F: Dissolved Major Cations (QCLot: 759993)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 759443)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.500 mg/L	105	76.1	130
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	0.100 mg/L	94.4	87.7	114
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	# 74.6	79.6	115
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	99.4	80.8	130
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	99.3	86.6	113
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	99.5	84.4	128
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.100 mg/L	96.1	86.6	117
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	95.6	85	117
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	92.4	85.4	117
EG020A-F: Lithium	7439-93-2	0.001	mg/L	<0.001	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 759443) - continued								
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.100 mg/L	94.3	84.1	122
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.100 mg/L	91.4	89.6	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	92.3	86.3	118
EG020A-F: Selenium	7782-49-2	0.01	mg/L	----	0.100 mg/L	98.8	84.4	122
		0.010	mg/L	<0.010	----	----	----	----
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.100 mg/L	89.5	76.9	117
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	110	84.2	130
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.50 mg/L	104	70	130
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.50 mg/L	105	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 759444)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.500 mg/L	93.3	84.1	116
EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	0.100 mg/L	103	84.2	118
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 759445)								
EG020D-F: Gallium	7440-55-3	0.001	mg/L	<0.001	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 760171)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.500 mg/L	85.8	74	130
EG020A-T: Antimony	7440-36-0	0.001	mg/L	<0.001	0.100 mg/L	85.1	84.6	112
EG020A-T: Lithium	7439-93-2	0.001	mg/L	<0.001	----	----	----	----
EG020A-T: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.100 mg/L	# 84.2	85.2	111
EG020A-T: Selenium	7782-49-2	0.01	mg/L	----	0.100 mg/L	91.0	78.9	113
		0.010	mg/L	<0.010	----	----	----	----
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.500 mg/L	94.6	70	130
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.500 mg/L	94.4	70	130
EG020T: Total Metals by ICP-MS (QCLot: 760172)								
EG020B-T: Strontium	7440-24-6	0.001	mg/L	<0.001	0.500 mg/L	85.3	81.2	115
EG020B-T: Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
EG020B-T: Titanium	7440-32-6	0.01	mg/L	<0.01	0.100 mg/L	88.6	77.9	118
EG020B-T: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 760173)								
EG020D-T: Gallium	7440-55-3	0.001	mg/L	<0.001	----	----	----	----
EG035F: Dissolved Mercury by FIMS (QCLot: 763478)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.010 mg/L	106	85.3	117
EK055G: Ammonia as N by Discrete Analyser (QCLot: 761696)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	84.1	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 761697)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	82.4	70	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK057G: Nitrite as N by Discrete Analyser (QCLot: 759920)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 759923)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	102	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 761134)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 759513)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10.0 mg/L	122	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 759515)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10.0 mg/L	79.4	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 759514)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.2 mg/L	102	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 759516)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.2 mg/L	119	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045P: Chloride by PC Titrator (QCLot: 760715)							
EB0812573-002	PZ11-D	ED045-P: Chloride	16887-00-6	400 mg/L	# Not Determined	70	130
ED045P: Chloride by PC Titrator (QCLot: 762171)							
EB0812573-005	PZ07-S	ED045-P: Chloride	16887-00-6	40 mg/L	97.5	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 759443)							
EB0812517-009	Anonymous	EG020A-F: Aluminium	7429-90-5	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Antimony	7440-36-0	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Arsenic	7440-38-2	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Beryllium	7440-41-7	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Barium	7440-39-3	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Cadmium	7440-43-9	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Chromium	7440-47-3	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Cobalt	7440-48-4	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Copper	7440-50-8	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Lead	7439-92-1	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Manganese	7439-96-5	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Molybdenum	7439-98-7	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Nickel	7440-02-0	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Selenium	7782-49-2	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Vanadium	7440-62-2	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Zinc	7440-66-6	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Boron	7440-42-8	Anonymous	Anonymous	Anonymous	Anonymous
EG035F: Dissolved Mercury by FIMS (QCLot: 763478)							
EB0812573-001	PZ10	EG035F: Mercury	7439-97-6	0.01 mg/L	93.7	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 761696)							
EB0812521-006	Anonymous	EK055G: Ammonia as N	7664-41-7	Anonymous	Anonymous	Anonymous	Anonymous
EK055G: Ammonia as N by Discrete Analyser (QCLot: 761697)							
EB0812573-007	PZ08-S	EK055G: Ammonia as N	7664-41-7	0.8 mg/L	84.1	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 759920)							
EB0812557-001	Anonymous	EK057G: Nitrite as N	----	Anonymous	Anonymous	Anonymous	Anonymous
EK057G: Nitrite as N by Discrete Analyser (QCLot: 759923)							
EB0812558-002	Anonymous	EK057G: Nitrite as N	----	Anonymous	Anonymous	Anonymous	Anonymous
EK059G: NOX as N by Discrete Analyser (QCLot: 761134)							
EB0812573-002	PZ11-D	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	84.8	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 759513)							
EB0812400-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	Anonymous	Anonymous	Anonymous	Anonymous
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 759515)							
EB0812573-014	PZ01	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	81.2	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 759514)							
EB0812400-002	Anonymous	EK067G: Total Phosphorus as P	----	Anonymous	Anonymous	Anonymous	Anonymous
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 759516)							
EB0812573-014	PZ01	EK067G: Total Phosphorus as P	----	2 mg/L	100	70	130

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB0812573**	Page	: 1 of 13
Client	: URS AUSTRALIA PTY LTD (QLD)	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Caval Ridge		
C-O-C number	: ----	Date Samples Received	: 12-SEP-2008
Sampler	: A. Wilson, D. Gould	Issue Date	: 23-SEP-2008
Order number	: ----		
		No. of samples received	: 19
Quote number	: EN/001/08	No. of samples analysed	: 19

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

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

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

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

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural PZ10, PZ11-D, PZ09	**08-SEP-2008**	**---**	---	----	**18-SEP-2008**	22-SEP-2008	✓
Clear Plastic Bottle - Natural PZ05, PZ07-S, PZ07-D, PZ08-S, PZ08-D	**09-SEP-2008**	**---**	---	----	**19-SEP-2008**	23-SEP-2008	✓
Clear Plastic Bottle - Natural PZ06-S, PZ06-D, PZ03-S, PZ03-D, PZ02, PZ01, QC04	**10-SEP-2008**	**---**	---	----	**19-SEP-2008**	24-SEP-2008	✓
Clear Plastic Bottle - Natural PZ04	**11-SEP-2008**	**---**	---	----	**19-SEP-2008**	25-SEP-2008	✓
ED040F: Dissolved Major Anions							
Clear Plastic Bottle - Natural PZ10, PZ11-D, PZ09	**08-SEP-2008**	**---**	---	----	**17-SEP-2008**	06-OCT-2008	✓
Clear Plastic Bottle - Natural PZ05, PZ07-S, PZ07-D, PZ08-S, PZ08-D	**09-SEP-2008**	**---**	---	----	**17-SEP-2008**	07-OCT-2008	✓
Clear Plastic Bottle - Natural PZ06-S, PZ06-D, PZ03-S, PZ03-D, PZ02, PZ01, QC04	**10-SEP-2008**	**---**	---	----	**17-SEP-2008**	08-OCT-2008	✓
Clear Plastic Bottle - Natural PZ04	**11-SEP-2008**	**---**	---	----	**17-SEP-2008**	09-OCT-2008	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045P: Chloride by PC Titrator							
Clear Plastic Bottle - Natural PZ10, PZ11-D, PZ09	**08-SEP-2008**	---	---	----	**18-SEP-2008**	06-OCT-2008	✓
Clear Plastic Bottle - Natural PZ05, PZ07-S, PZ07-D, PZ08-S, PZ08-D	**09-SEP-2008**	---	---	----	**19-SEP-2008**	07-OCT-2008	✓
Clear Plastic Bottle - Natural PZ06-S, PZ06-D, PZ03-S, PZ03-D, PZ02, PZ01, QC04	**10-SEP-2008**	---	---	----	**19-SEP-2008**	08-OCT-2008	✓
Clear Plastic Bottle - Natural PZ04	**11-SEP-2008**	---	---	----	**19-SEP-2008**	09-OCT-2008	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural PZ10, PZ11-D, PZ09	**08-SEP-2008**	---	---	----	**17-SEP-2008**	06-OCT-2008	✓
Clear Plastic Bottle - Natural PZ05, PZ07-S, PZ07-D, PZ08-S, PZ08-D	**09-SEP-2008**	---	---	----	**17-SEP-2008**	07-OCT-2008	✓
Clear Plastic Bottle - Natural PZ06-S, PZ06-D, PZ03-S, PZ03-D, PZ02, PZ01, QC04	**10-SEP-2008**	---	---	----	**17-SEP-2008**	08-OCT-2008	✓
Clear Plastic Bottle - Natural PZ04	**11-SEP-2008**	---	---	----	**17-SEP-2008**	09-OCT-2008	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified PZ10, PZ11-D, PZ09	**08-SEP-2008**	**---**	---	----	**17-SEP-2008**	07-MAR-2009	✓
Clear Plastic Bottle - Filtered; Lab-acidified PZ05, PZ07-S, PZ07-D, PZ08-S	**09-SEP-2008**	**---**	---	----	**17-SEP-2008**	08-MAR-2009	✓
Clear Plastic Bottle - Filtered; Lab-acidified PZ03-S, PZ03-D, PZ02, QC04	**10-SEP-2008**	**---**	---	----	**17-SEP-2008**	09-MAR-2009	✓
Clear Plastic Bottle - Filtered; Lab-acidified PZ04	**11-SEP-2008**	**---**	---	----	**17-SEP-2008**	10-MAR-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered PZ08-D	**09-SEP-2008**	**---**	---	----	**17-SEP-2008**	08-MAR-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered PZ06-S, PZ06-D, PZ01	**10-SEP-2008**	**---**	---	----	**17-SEP-2008**	09-MAR-2009	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified QC01	**08-SEP-2008**	**18-SEP-2008**	07-MAR-2009	✓	**18-SEP-2008**	07-MAR-2009	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified QC02	**09-SEP-2008**	**18-SEP-2008**	08-MAR-2009	✓	**18-SEP-2008**	08-MAR-2009	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified QC03	**10-SEP-2008**	**18-SEP-2008**	09-MAR-2009	✓	**18-SEP-2008**	09-MAR-2009	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified PZ10, PZ11-D, PZ09	**08-SEP-2008**	**----**	----	----	**22-SEP-2008**	06-OCT-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified PZ05, PZ07-S, PZ07-D, PZ08-S	**09-SEP-2008**	**----**	----	----	**22-SEP-2008**	07-OCT-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified PZ03-S, PZ03-D, PZ02, QC04	**10-SEP-2008**	**----**	----	----	**22-SEP-2008**	08-OCT-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified PZ04	**11-SEP-2008**	**----**	----	----	**22-SEP-2008**	09-OCT-2008	✓
Clear Plastic Bottle - Nitric Acid; Filtered PZ08-D	**09-SEP-2008**	**----**	----	----	**22-SEP-2008**	07-OCT-2008	✓
Clear Plastic Bottle - Nitric Acid; Filtered PZ06-S, PZ06-D, PZ01	**10-SEP-2008**	**----**	----	----	**22-SEP-2008**	08-OCT-2008	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulphuric Acid PZ10, PZ11-D, PZ09	**08-SEP-2008**	**----**	----	----	**18-SEP-2008**	06-OCT-2008	✓
Clear Plastic Bottle - Sulphuric Acid PZ05, PZ07-S, PZ07-D, PZ08-S, PZ08-D	**09-SEP-2008**	**----**	----	----	**18-SEP-2008**	07-OCT-2008	✓
Clear Plastic Bottle - Sulphuric Acid PZ06-S, PZ06-D, PZ03-S, PZ03-D, PZ02, PZ01, QC04	**10-SEP-2008**	**----**	----	----	**18-SEP-2008**	08-OCT-2008	✓
Clear Plastic Bottle - Sulphuric Acid PZ04	**11-SEP-2008**	**----**	----	----	**18-SEP-2008**	09-OCT-2008	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural PZ10, PZ11-D, PZ09	**08-SEP-2008**	**----**	----	----	**17-SEP-2008**	10-SEP-2008	×
Clear Plastic Bottle - Natural PZ05, PZ07-S, PZ07-D, PZ08-S, PZ08-D	**09-SEP-2008**	**----**	----	----	**17-SEP-2008**	11-SEP-2008	×
Clear Plastic Bottle - Natural PZ06-S, PZ06-D, PZ03-S, PZ03-D, PZ02, PZ01, QC04	**10-SEP-2008**	**----**	----	----	**17-SEP-2008**	12-SEP-2008	×
Clear Plastic Bottle - Natural PZ04	**11-SEP-2008**	**----**	----	----	**17-SEP-2008**	13-SEP-2008	×

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: NOX as N by Discrete Analyser							
Clear Plastic Bottle - Sulphuric Acid PZ10, PZ11-D, PZ09	**08-SEP-2008**	**----**	----	----	**18-SEP-2008**	06-OCT-2008	✓
Clear Plastic Bottle - Sulphuric Acid PZ05, PZ07-S, PZ07-D, PZ08-S, PZ08-D	**09-SEP-2008**	**----**	----	----	**18-SEP-2008**	07-OCT-2008	✓
Clear Plastic Bottle - Sulphuric Acid PZ06-S, PZ06-D, PZ03-S, PZ03-D, PZ02, PZ01, QC04	**10-SEP-2008**	**----**	----	----	**18-SEP-2008**	08-OCT-2008	✓
Clear Plastic Bottle - Sulphuric Acid PZ04	**11-SEP-2008**	**----**	----	----	**18-SEP-2008**	09-OCT-2008	✓
EK061: Total Kjeldahl Nitrogen (TKN)							
Clear Plastic Bottle - Sulphuric Acid PZ10, PZ11-D, PZ09	**08-SEP-2008**	**17-SEP-2008**	06-OCT-2008	✓	**17-SEP-2008**	06-OCT-2008	✓
Clear Plastic Bottle - Sulphuric Acid PZ05, PZ07-S, PZ07-D, PZ08-S, PZ08-D	**09-SEP-2008**	**17-SEP-2008**	07-OCT-2008	✓	**17-SEP-2008**	07-OCT-2008	✓
Clear Plastic Bottle - Sulphuric Acid PZ06-S, PZ06-D, PZ03-S, PZ03-D, PZ02, PZ01, QC04	**10-SEP-2008**	**17-SEP-2008**	08-OCT-2008	✓	**17-SEP-2008**	08-OCT-2008	✓
Clear Plastic Bottle - Sulphuric Acid PZ04	**11-SEP-2008**	**17-SEP-2008**	09-OCT-2008	✓	**17-SEP-2008**	09-OCT-2008	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulphuric Acid PZ10, PZ11-D, PZ09	**08-SEP-2008**	**17-SEP-2008**	06-OCT-2008	✓	**17-SEP-2008**	06-OCT-2008	✓
Clear Plastic Bottle - Sulphuric Acid PZ05, PZ07-S, PZ07-D, PZ08-S, PZ08-D	**09-SEP-2008**	**17-SEP-2008**	07-OCT-2008	✓	**17-SEP-2008**	07-OCT-2008	✓
Clear Plastic Bottle - Sulphuric Acid PZ06-S, PZ06-D, PZ03-S, PZ03-D, PZ02, PZ01, QC04	**10-SEP-2008**	**17-SEP-2008**	08-OCT-2008	✓	**17-SEP-2008**	08-OCT-2008	✓
Clear Plastic Bottle - Sulphuric Acid PZ04	**11-SEP-2008**	**17-SEP-2008**	09-OCT-2008	✓	**17-SEP-2008**	09-OCT-2008	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	4	40	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	4	40	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	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
Dissolved Metals by ICP-MS - Suite D	EG020D-F	2	18	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	4	40	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	4	38	**10.5**	**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	4	40	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	26	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite B	EG020B-T	2	13	**15.4**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite D	EG020D-T	2	12	**16.7**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	4	31	**12.9**	**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	2	40	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	2	40	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	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
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	40	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	26	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite B	EG020B-T	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	31	**6.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	40	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	2	40	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Dissolved Metals by ICP-MS - Suite D	EG020D-F	1	18	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	2	40	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	38	**5.3**	**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	2	40	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	26	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite B	EG020B-T	1	13	**7.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite D	EG020D-T	1	12	**8.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	31	**6.5**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	40	**5.0**	**5.0**	✓	ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	2	40	**5.0**	**5.0**	✓	ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	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	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	40	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	26	**7.7**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	13	**7.7**	**5.0**	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	31	**6.5**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by both manual measurement and automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Major Anions - Filtered	ED040F	WATER	APHA 21st ed., 3120 Sulfur and/or Silcon content is determined by ICP/AES and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Chloride by PC Titrator	ED045-P	WATER	APHA 21st ed., 4500 Cl - B. Automated Silver Nitrate titration.
Major Cations - Filtered	ED093F	WATER	APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite B	EG020B-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite D	EG020D-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite D	EG020D-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. 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 NO3- 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 Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg-D25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500 N org / NO3. 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)
Ionic Balance by PCT and ICPAES	EN055	WATER	APHA 21st Ed. 1030F. 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)
Digestion for Total Recoverable Metals	EN25	WATER	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA 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	857555-002	----	**Arsenic**	7440-38-2	74.6 %	79.6-115%	**Recovery less than lower control limit**
EG020T: Total Metals by ICP-MS	858449-002	----	**Molybdenum**	7439-98-7	84.2 %	85.2-111%	**Recovery less than lower control limit**
Matrix Spike (MS) Recoveries							
ED045P: Chloride by PC Titrator	EB0812573-002	PZ11-D	**Chloride**	16887-00-6	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: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EK057G: Nitrite as N by Discrete Analyser						
Clear Plastic Bottle - Natural PZ10, PZ11-D, PZ09	----	----	----	17-SEP-2008	10-SEP-2008	**7**
Clear Plastic Bottle - Natural PZ05, PZ07-S, PZ07-D, PZ08-S, PZ08-D	----	----	----	17-SEP-2008	11-SEP-2008	**6**
Clear Plastic Bottle - Natural PZ06-S, PZ06-D, PZ03-S, PZ03-D, PZ02, PZ01, QC04	----	----	----	17-SEP-2008	12-SEP-2008	**5**
Clear Plastic Bottle - Natural PZ04	----	----	----	17-SEP-2008	13-SEP-2008	**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.**

URSQLD per previous EB0917573. 17/3 CE Andrew.Wilson@urscorp.com

CHAIN OF CUSTODY DOCUMENTATION

CLIENT: BMA

ADDRESS / OFFICE:

PROJECT MANAGER (PM): Stephen Denner

PROJECT ID: 42626162

SITE: Caval Ridge P.O. NO.:

RESULTS REQUIRED (Date): QUOTE NO.:

SAMPLER: Andrew Wilson / Shane Stevens

MOBILE: 0448 853 004 / 0427 753 236

PHONE 3243 2146 / 3243 2209

EMAIL REPORT TO: stephen_denner@urscorp.cc (underscore between stephen and denner)

EMAIL INVOICE TO: (if different to report)

Australian Laboratory Services Pty Ltd

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

Notes: e.g. Highly contaminated samples
e.g. "High PAHs expected".
Extra volume for QC or trace LORs etc.

ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles	NT1	NT2	NT8	W3	Al, Sb, B, Fe, Ga, Li (Dissolved)	Mo, Se, Sr, Th, Ti, U (Dissolved)	Al, Sb, B, Fe, Ga, Li (Total)	Mo, Se, Sr, Th, Ti, U (Total)					
1	PZ06-S	Water	27/2	PM	P, SP, N	3	✓	✓	✓	✓	✓	✓							
2	PZ06-D		27/2	PM	P, SP, N	3	✓	✓	✓	✓	✓	✓							
3	PZ08-S		28/2	AM	P, SP, N	3	✓	✓	✓	✓	✓	✓							
4	PZ08-D		28/2	AM	P, SP, N	3	✓	✓	✓	✓	✓	✓							
5	PZ07-S		28/2	AM	P, SP, N	3	✓	✓	✓	✓	✓	✓							
6	PZ07-D		28/2	AM	P, SP, N	3	✓	✓	✓	✓	✓	✓							
7	PZ05		28/2	PM	P, SP, N	3	✓	✓	✓	✓	✓	✓	Sample # 8						
8	PZ09		2/3	PM	P, SP, N	3	✓	✓	✓	✓	✓	✓	(NO NT2 + ONLY ND's as per						
9	PZ11-D		2/3	PM	P, SP, N	3	✓	✓	✓	✓	✓	✓	Andrew Wilson's						
10	PZ01		3/3	AM	P, SP, N	3	✓	✓	✓	✓	✓	✓	9-3-09 @ 9am						
11	PZ03-S		3/3	PM	P, SP, N	3	✓	✓	✓	✓	✓	✓							
12	PZ03-D		3/3	PM	P, SP, N	3	✓	✓	✓	✓	✓	✓							

Purple bottles frozen as soon as practicable

Environmental Division
Brisbane
Work Order
EB0903756

Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: Andrew Wilson	Date: 4/3/09	Name: C Bryant	Date: 5/3/09	Con' Note No:
Of: URS	Time: 11:30	Of: ALS	Time: 1350	
Name:	Date:	Name:	Date:	Transport Co:
Of:	Time:	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY DOCUMENTATION

Australian Laboratory Services Pty Ltd

CLIENT: BMA	SAMPLER: Andrew Wilson / Shane Stevens
ADDRESS / OFFICE:	MOBILE: 0448 853 004 / 0427 753 236
PROJECT MANAGER (PM): Stephen Denner	PHONE 3243 2146 / 3243 2209
PROJECT ID: 42626162	EMAIL REPORT TO: stephen_denner@urscorp.cc (underscore between stephen and denner)
SITE: Caval Ridge P.O. NO.:	EMAIL INVOICE TO: (if different to report)
RESULTS REQUIRED (Date): QUOTE NO.:	**ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

Notes: e.g. Highly contaminated samples
e.g. "High PAHs expected".
Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		NT1	NT2	NT8	W3	Al, Sb, B, Fe, Ga, Li (Dissolved)	Mo, Se, Sr, Th, Ti, U (Dissolved)	Al, Sb, B, Fe, Ga, Li (Total)	Mo, Se, Sr, Th, Ti, U (Total)						
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles														
13	PZ02	Water	3/3	PM	P, SPN	3	✓	✓	✓	✓	✓	✓								Purple bottles frozen as soon as practicable
14	PZ04		3/3	PM	P, SPN	3	✓	✓	✓	✓	✓	✓								
15	QC01		2/3	PM	P, SP, N	3	✓	✓	✓	✓	✓	✓								
16	QC02		2/3	PM	N	1							✓	✓						
17	QC03		2/3	PM	N	1							✓	✓						
18	QC04		3/3	PM	P, SP, N	3	✓	✓	✓	✓	✓	✓								
19	QC05		3/3	PM	N	1							✓	✓						
20	QC06		3/3	PM	N	1							✓	✓						

Tom ~~Discarded~~ Metals on per Andrew Wilson 9-3-09 @ 9:46 Bottles not filtered

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: Andrew Wilson	Date: 4/3/09	Name:	Date:	Con' Note No:
Of: URS	Time: 11:30	Of:	Time:	
Name:	Date:	Name:	Date:	Transport Co:
Of:	Time:	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

AUSTRALIAN LABORATORY SERVICES P/L

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **EB0903756**

Client	: **URS AUSTRALIA PTY LTD (QLD)**	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2008URSQLD0041 (EN/001/08)
Site	: Caval Ridge		
Sampler	: A.Wilson, S.Stevens	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 05-MAR-2009	Issue Date	: 09-MAR-2009 10:22
Client Requested Due Date	: 17-MAR-2009	Scheduled Reporting Date	: **17-MAR-2009**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 8.0,9.8,24.2,14.8C - Ice present
No. of coolers/boxes	: 4 MEDIUM	No. of samples received	: 20
Sercurity Seal	: Intact.	No. of samples analysed	: 20

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Breaches in recommended extraction / analysis holding times may occur.**
- **The recommended holding time for Nitrite, Nitrate +/or reactive phosphorus analysis is 48 hours from the time of sampling.**
- **Sample labelled PZ09 1lt Green Container was received in esky without a lid and sample was spilt throughout the esky.**
  We were unable to salvage this sample. As per our conversation 09/03 due to this analysis of NT2 and TN, NH3 and TP (from NT8) were unable to be performed. We were however able to perform analysis of Nox from the (NT8)
- **As per converstion 09/03 samples labelled QC05 and QC06 are to have analysis of dissolved metals.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

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

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EG020A-F Dissolved Metals by ICPMS - Suite A	WATER - EG020A-T Total Metals by ICPMS - Suite A	WATER - EG020B-F Dissolved Metals by ICPMS - Suite B	WATER - EG020B-T Total Metals by ICPMS - Suite B	WATER - EG020D-F Dissolved Metals by ICPMS - Suite D	WATER - EG020D-T Total Metals by ICPMS - Suite D	WATER - EK059G Nitrite plus Nitrate as N (NOx) by Discrete Analyser	WATER - EN055 Ionic Balance
EB0903756-001	27-FEB-2009 15:00	PZ06-S	✓		✓		✓			✓
EB0903756-002	27-FEB-2009 15:00	PZ06-D	✓		✓		✓			✓
EB0903756-003	28-FEB-2009 15:00	PZ08-S	✓		✓		✓			✓
EB0903756-004	28-FEB-2009 15:00	PZ08-D	✓		✓		✓			✓
EB0903756-005	28-FEB-2009 15:00	PZ07-S	✓		✓		✓			✓
EB0903756-006	28-FEB-2009 15:00	PZ07-D	✓		✓		✓			✓
EB0903756-007	28-FEB-2009 15:00	PZ05	✓		✓		✓			✓
EB0903756-008	02-MAR-2009 15:00	PZ09	✓		✓		✓		✓	
EB0903756-009	02-MAR-2009 15:00	PZ11-D	✓		✓		✓			✓
EB0903756-010	03-MAR-2009 15:00	PZ01	✓		✓		✓			✓
EB0903756-011	03-MAR-2009 15:00	PZ03-S	✓		✓		✓			✓
EB0903756-012	03-MAR-2009 15:00	PZ03-D	✓		✓		✓			✓
EB0903756-013	03-MAR-2009 15:00	PZ02	✓		✓		✓			✓
EB0903756-014	03-MAR-2009 15:00	PZ04	✓		✓		✓			✓
EB0903756-015	02-MAR-2009 15:00	QC01	✓		✓		✓			✓
EB0903756-016	02-MAR-2009 15:00	QC02		✓		✓		✓		
EB0903756-017	02-MAR-2009 15:00	QC03		✓		✓		✓		
EB0903756-018	03-MAR-2009 15:00	QC04	✓		✓		✓			✓
EB0903756-019	03-MAR-2009 15:00	QC05	✓		✓		✓			
EB0903756-020	03-MAR-2009 15:00	QC06	✓		✓		✓			

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 (EB/PCT) Major Anions (Cl, SO4, Alkalinity)	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P	WATER - W-03 13 Metals (NEPM Suite)
EB0903756-001	27-FEB-2009 15:00	PZ06-S	✓	✓	✓	✓
EB0903756-002	27-FEB-2009 15:00	PZ06-D	✓	✓	✓	✓
EB0903756-003	28-FEB-2009 15:00	PZ08-S	✓	✓	✓	✓
EB0903756-004	28-FEB-2009 15:00	PZ08-D	✓	✓	✓	✓

			WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 (EB/PCT) Major Anions (Cl, SO4, Alkalinity)	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P	WATER - W-03 13 Metals (NEPM Suite)
EB0903756-005	28-FEB-2009 15:00	PZ07-S	✓	✓	✓	✓
EB0903756-006	28-FEB-2009 15:00	PZ07-D	✓	✓	✓	✓
EB0903756-007	28-FEB-2009 15:00	PZ05	✓	✓	✓	✓
EB0903756-008	02-MAR-2009 15:00	PZ09	✓			✓
EB0903756-009	02-MAR-2009 15:00	PZ11-D	✓	✓	✓	✓
EB0903756-010	03-MAR-2009 15:00	PZ01	✓	✓	✓	✓
EB0903756-011	03-MAR-2009 15:00	PZ03-S	✓	✓	✓	✓
EB0903756-012	03-MAR-2009 15:00	PZ03-D	✓	✓	✓	✓
EB0903756-013	03-MAR-2009 15:00	PZ02	✓	✓	✓	✓
EB0903756-014	03-MAR-2009 15:00	PZ04	✓	✓	✓	✓
EB0903756-015	02-MAR-2009 15:00	QC01	✓	✓	✓	✓
EB0903756-018	03-MAR-2009 15:00	QC04	✓	✓	✓	✓

Requested Deliverables

MR STEPHEN DENNER

- *AU Certificate of Analysis - NATA (COA)	Email	stephen_denner@urscorp.com
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	stephen_denner@urscorp.com
- AU Interpretive QC Report (Anon QCI Not Rep) (QCI_NoAnon)	Email	stephen_denner@urscorp.com
- AU QC Report (Anon QC Not Rep) - NATA (QC_NoAnon)	Email	stephen_denner@urscorp.com
- Default - Chain of Custody (COC)	Email	stephen_denner@urscorp.com
- EDI Format - MRED (MRED)	Email	stephen_denner@urscorp.com

RESULTS ADDRESS

- *AU Certificate of Analysis - NATA (COA)	Email	brisbane@urscorp.com
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	brisbane@urscorp.com
- AU Interpretive QC Report (Anon QCI Not Rep) (QCI_NoAnon)	Email	brisbane@urscorp.com
- AU QC Report (Anon QC Not Rep) - NATA (QC_NoAnon)	Email	brisbane@urscorp.com
- Default - Chain of Custody (COC)	Email	brisbane@urscorp.com
- EDI Format - MRED (MRED)	Email	brisbane@urscorp.com

THE ACCOUNTS BRISBANE

- A4 - AU Tax Invoice (INV)	Email	brisbane_accounts@urscorp.com

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB0903756**	Page	: 1 of 10
Client	: **URS AUSTRALIA PTY LTD (QLD)**	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 05-MAR-2009
Sampler	: A.Wilson, S.Stevens	Issue Date	: 17-MAR-2009
Site	: Caval Ridge		
		No. of samples received	: 20
Quote number	: EN/001/08	No. of samples analysed	: 20

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

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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*
Kim McCabe	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

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

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ06-S Client sampling date / time: 27-FEB-2009 15:00 EB0903756-001	PZ06-D 27-FEB-2009 15:00 EB0903756-002	PZ08-S 28-FEB-2009 15:00 EB0903756-003	PZ08-D 28-FEB-2009 15:00 EB0903756-004	PZ07-S 28-FEB-2009 15:00 EB0903756-005
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**554**	**476**	**348**	**433**	**134**
Total Alkalinity as CaCO3	----	1	mg/L	**554**	**476**	**348**	**433**	**134**
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**37**	**60**	**136**	**1350**	**15**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**265**	**312**	**391**	**3510**	**41**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**42**	**33**	**69**	**378**	**33**
Magnesium	7439-95-4	1	mg/L	**77**	**43**	**60**	**360**	**19**
Sodium	7440-23-5	1	mg/L	**223**	**290**	**283**	**2050**	**20**
Potassium	7440-09-7	1	mg/L	**4**	**3**	**19**	**42**	**7**
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.03**	**0.02**	**0.02**	**0.02**	**0.03**
Antimony	7440-36-0	0.001	mg/L	**0.004**	<0.001	<0.001	<0.001	<0.001
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	**0.090**	**0.076**	**0.235**	**0.030**	**0.137**
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	**0.0002**	**0.0002**	**0.0006**	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
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
Gallium	7440-55-3	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
Lithium	7439-93-2	0.001	mg/L	**0.014**	**0.028**	**0.182**	**0.620**	**0.031**
Manganese	7439-96-5	0.001	mg/L	**0.123**	**0.077**	**0.009**	**0.126**	**0.224**
Molybdenum	7439-98-7	0.001	mg/L	**0.012**	**0.003**	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.004**	<0.001	**0.015**	<0.001
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	**1.42**	**0.867**	**0.749**	**6.43**	**0.267**
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	**0.003**	<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	**0.014**	**0.015**	**0.010**	**0.025**	**0.008**
Boron	7440-42-8	0.05	mg/L	**0.25**	**0.25**	**0.38**	**0.67**	**0.07**
Iron	7439-89-6	0.05	mg/L	<0.05	**0.91**	<0.05	**2.95**	**0.63**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ06-S Client sampling date / time: 27-FEB-2009 15:00 EB0903756-001	Client sample ID: PZ06-D Client sampling date / time: 27-FEB-2009 15:00 EB0903756-002	Client sample ID: PZ08-S Client sampling date / time: 28-FEB-2009 15:00 EB0903756-003	Client sample ID: PZ08-D Client sampling date / time: 28-FEB-2009 15:00 EB0903756-004	Client sample ID: PZ07-S Client sampling date / time: 28-FEB-2009 15:00 EB0903756-005
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.04**	**0.29**	<0.01	**1.54**	<0.01
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	**0.02**	<0.01	<0.01
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	**2.9**	<0.1	**2.0**	<0.1
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	<0.1	**2.9**	<0.1	**2.0**	<0.1
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.23**	**0.08**	**0.12**	**0.01**	**0.12**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**19.3**	**19.6**	**20.8**	**136**	**4.14**
^ Total Cations	----	0.01	meq/L	**18.2**	**17.9**	**21.2**	**139**	**4.25**
^ Ionic Balance	----	0.01	%	**2.98**	**4.44**	**0.88**	**1.08**	**1.21**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ07-D Client sampling date / time: 28-FEB-2009 15:00 EB0903756-006	PZ05 28-FEB-2009 15:00 EB0903756-007	PZ09 02-MAR-2009 15:00 EB0903756-008	PZ11-D 02-MAR-2009 15:00 EB0903756-009	PZ01 03-MAR-2009 15:00 EB0903756-010
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**546**	**667**	----	**117**	**670**
Total Alkalinity as CaCO3	----	1	mg/L	**546**	**667**	----	**117**	**670**
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**168**	**406**	----	**320**	**860**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**928**	**5690**	----	**2920**	**6700**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**83**	**414**	**475**	**293**	**411**
Magnesium	7439-95-4	1	mg/L	**87**	**435**	**325**	**137**	**610**
Sodium	7440-23-5	1	mg/L	**682**	**2720**	**1830**	**1410**	**3120**
Potassium	7440-09-7	1	mg/L	**7**	**25**	**16**	**8**	**20**
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.02**	**0.03**	**0.02**	**0.02**	**0.02**
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	**0.001**
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	**0.067**	**0.398**	**0.051**	**0.074**	**0.099**
Cadmium	7440-43-9	0.0001	mg/L	**0.0003**	<0.0001	**0.0003**	<0.0001	**0.0001**
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.002**	**0.002**	**0.002**	<0.001
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	**0.002**
Gallium	7440-55-3	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
Lithium	7439-93-2	0.001	mg/L	**0.076**	**0.485**	**0.470**	**0.810**	**0.619**
Manganese	7439-96-5	0.001	mg/L	**0.027**	**1.09**	**0.196**	**0.034**	**0.153**
Molybdenum	7439-98-7	0.001	mg/L	**0.002**	<0.001	<0.001	**0.004**	<0.001
Nickel	7440-02-0	0.001	mg/L	**0.004**	**0.007**	**0.002**	**0.003**	**0.009**
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	**4.39**	**10.4**	**34.4**	**42.7**	**30.1**
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L	<0.01	**0.01**	<0.01	<0.01	<0.01
Uranium	7440-61-1	0.001	mg/L	<0.001	**0.001**	<0.001	<0.001	**0.006**
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	**0.007**	**0.007**	**0.008**	**0.008**	**0.021**
Boron	7440-42-8	0.05	mg/L	**0.32**	**2.00**	**0.11**	**0.11**	**1.50**
Iron	7439-89-6	0.05	mg/L	**0.47**	**0.46**	**2.56**	**1.32**	**1.11**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ07-D Client sampling date / time: 28-FEB-2009 15:00 EB0903756-006	PZ05 28-FEB-2009 15:00 EB0903756-007	PZ09 02-MAR-2009 15:00 EB0903756-008	PZ11-D 02-MAR-2009 15:00 EB0903756-009	PZ01 03-MAR-2009 15:00 EB0903756-010
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.64**	**1.46**	**2.31**	**2.54**	**2.75**
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	**0.03**	**0.26**	<0.01	**0.17**
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**2.1**	**1.9**	**3.8**	**3.2**	**2.7**
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	**2.1**	**1.9**	**4.0**	**3.2**	**2.8**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.11**	**0.04**	**0.08**	**0.04**	**0.02**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**40.6**	**182**	----	**91.4**	**220**
^ Total Cations	----	0.01	meq/L	**41.2**	**176**	----	**87.4**	**207**
^ Ionic Balance	----	0.01	%	**0.65**	**1.87**	----	**2.27**	**3.10**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: PZ03-S Client sampling date / time: 03-MAR-2009 15:00 EB0903756-011	PZ03-D 03-MAR-2009 15:00 EB0903756-012	PZ02 03-MAR-2009 15:00 EB0903756-013	PZ04 03-MAR-2009 15:00 EB0903756-014	QC01 02-MAR-2009 15:00 EB0903756-015
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	**896**	**680**	**538**	**350**	**99**
Total Alkalinity as CaCO3	----	1	mg/L	**896**	**680**	**538**	**350**	**99**
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**497**	**1080**	**92**	**3**	**719**
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**4730**	**7400**	**352**	**164**	**4230**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**195**	**322**	**36**	**30**	**459**
Magnesium	7439-95-4	1	mg/L	**560**	**657**	**41**	**12**	**313**
Sodium	7440-23-5	1	mg/L	**2250**	**3600**	**413**	**207**	**1760**
Potassium	7440-09-7	1	mg/L	**13**	**28**	**10**	**1**	**16**
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**
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	<0.001	**0.006**	<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	**0.120**	**0.042**	**0.098**	**0.065**	**0.050**
Cadmium	7440-43-9	0.0001	mg/L	**0.0001**	**0.0001**	**0.0002**	<0.0001	**0.0006**
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.002**	**0.002**	**0.001**	**0.002**
Cobalt	7440-48-4	0.001	mg/L	**0.020**	<0.001	<0.001	<0.001	**0.001**
Copper	7440-50-8	0.001	mg/L	**0.002**	**0.002**	<0.001	<0.001	**0.001**
Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	**0.004**	<0.001	<0.001	**0.001**	<0.001
Lithium	7439-93-2	0.001	mg/L	**0.278**	**0.464**	**0.092**	**0.003**	**0.396**
Manganese	7439-96-5	0.001	mg/L	**0.841**	**0.482**	**0.380**	**0.163**	**0.190**
Molybdenum	7439-98-7	0.001	mg/L	**0.002**	**0.001**	**0.026**	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	**0.023**	**0.008**	**0.025**	<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	**6.35**	**7.07**	**0.820**	**0.281**	**34.0**
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium	7440-61-1	0.001	mg/L	**0.013**	<0.001	**0.002**	<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	**0.018**	**0.037**	**0.006**	**0.008**	**0.008**
Boron	7440-42-8	0.05	mg/L	**1.28**	**2.79**	**0.29**	<0.05	**0.08**
Iron	7439-89-6	0.05	mg/L	**0.43**	**3.26**	**0.14**	**2.23**	**2.50**

Analytical Results

Sub-Matrix: WATER				Client sample ID	PZ03-S	PZ03-D	PZ02	PZ04	QC01
				Client sampling date / time	03-MAR-2009 15:00	03-MAR-2009 15:00	03-MAR-2009 15:00	03-MAR-2009 15:00	02-MAR-2009 15:00
Compound	CAS Number	LOR	Unit		EB0903756-011	EB0903756-012	EB0903756-013	EB0903756-014	EB0903756-015
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.09**	**1.33**	**0.07**	**0.19**	**2.47**
EK059G: NOX as N by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.93**	<0.01	<0.01	<0.01	<0.01
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.1**	**1.8**	<0.1	**0.3**	**2.4**
EK062: Total Nitrogen as N									
^ Total Nitrogen as N	----	0.1	mg/L		**1.0**	**1.8**	<0.1	**0.3**	**2.4**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.80**	**0.04**	**0.48**	**0.03**	<0.01
EN055: Ionic Balance									
^ Total Anions	----	0.01	meq/L		**162**	**245**	**22.6**	**11.7**	**136**
^ Total Cations	----	0.01	meq/L		**154**	**227**	**23.4**	**11.5**	**126**
^ Ionic Balance	----	0.01	%		**2.49**	**3.71**	**1.74**	**0.79**	**4.11**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: QC02	QC03	QC04	QC05	QC06
				Client sampling date / time: 02-MAR-2009 15:00	02-MAR-2009 15:00	03-MAR-2009 15:00	03-MAR-2009 15:00	03-MAR-2009 15:00
				EB0903756-016	EB0903756-017	EB0903756-018	EB0903756-019	EB0903756-020
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	----	----	**670**	----	----
Total Alkalinity as CaCO3	----	1	mg/L	----	----	**670**	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	----	----	**1140**	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	----	----	**7250**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	----	**340**	----	----
Magnesium	7439-95-4	1	mg/L	----	----	**690**	----	----
Sodium	7440-23-5	1	mg/L	----	----	**3370**	----	----
Potassium	7440-09-7	1	mg/L	----	----	**29**	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	----	----	**0.46**	----	----
Antimony	7440-36-0	0.001	mg/L	----	----	<0.001	----	----
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	----	----	**0.045**	----	----
Cadmium	7440-43-9	0.0001	mg/L	----	----	**0.0001**	----	----
Chromium	7440-47-3	0.001	mg/L	----	----	**0.002**	----	----
Cobalt	7440-48-4	0.001	mg/L	----	----	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	----	----	**0.002**	----	----
Gallium	7440-55-3	0.001	mg/L	----	----	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	----	----	<0.001	----	----
Lithium	7439-93-2	0.001	mg/L	----	----	**0.475**	----	----
Manganese	7439-96-5	0.001	mg/L	----	----	**0.494**	----	----
Molybdenum	7439-98-7	0.001	mg/L	----	----	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	----	----	**0.007**	----	----
Selenium	7782-49-2	0.01	mg/L	----	----	<0.01	----	----
Strontium	7440-24-6	0.001	mg/L	----	----	**7.13**	----	----
Thorium	7440-29-1	0.001	mg/L	----	----	<0.001	----	----
Titanium	7440-32-6	0.01	mg/L	----	----	<0.01	----	----
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	----	----	**0.038**	----	----
Boron	7440-42-8	0.05	mg/L	----	----	**2.88**	----	----
Iron	7439-89-6	0.05	mg/L	----	----	**3.30**	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: QC02	QC03	QC04	QC05	QC06
				Client sampling date / time: 02-MAR-2009 15:00	02-MAR-2009 15:00	03-MAR-2009 15:00	03-MAR-2009 15:00	03-MAR-2009 15:00
				EB0903756-016	EB0903756-017	EB0903756-018	EB0903756-019	EB0903756-020
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.04**	**0.03**	----	**0.04**	**0.04**
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	----	<0.001	<0.001
Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	----	<0.001	<0.001
Lithium	7439-93-2	0.001	mg/L	<0.001	<0.001	----	<0.001	<0.001
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	----	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	<0.01	<0.01
Strontium	7440-24-6	0.001	mg/L	<0.001	<0.001	----	<0.001	<0.001
Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	----	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	----	<0.01	<0.01
Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	----	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	----	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	----	**0.05**	<0.05
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	----	<0.0001	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	----	----	**1.38**	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	<0.01	----	----
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	**1.9**	----	----
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	----	----	**1.9**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	----	----	**0.05**	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	----	----	**242**	----	----
^ Total Cations	----	0.01	meq/L	----	----	**221**	----	----
^ Ionic Balance	----	0.01	%	----	----	**4.43**	----	----

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **EB0903756**	Page	: 1 of 12
Client	: **URS AUSTRALIA PTY LTD (QLD)**	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Caval Ridge		
C-O-C number	: ----	Date Samples Received	: 05-MAR-2009
Sampler	: A.Wilson, S.Stevens	Issue Date	: 17-MAR-2009
Order number	: ----		
		No. of samples received	: 20
Quote number	: EN/001/08	No. of samples analysed	: 20

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

This Quality Control Report contains the following information:

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

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*
Kim McCabe	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 917420)									
EB0903756-013	PZ02	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	538	540	0.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	538	540	0.4	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 913201)									
EB0903756-001	PZ06-S	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	37	37	0.0	0% - 20%
EB0903780-003	Anonymous	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ED040F: Dissolved Major Anions (QC Lot: 913780)									
EB0903675-003	Anonymous	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903756-007	PZ05	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	406	402	1.0	0% - 20%
ED045P: Chloride by PC Titrator (QC Lot: 917421)									
EB0903756-013	PZ02	ED045-P: Chloride	16887-00-6	1	mg/L	352	354	0.6	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 913202)									
EB0903756-001	PZ06-S	ED093F: Calcium	7440-70-2	1	mg/L	42	42	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	77	77	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	203	202	0.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.0	No Limit
EB0903780-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Magnesium	7439-95-4	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Sodium	7440-23-5	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Potassium	7440-09-7	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
ED093F: Dissolved Major Cations (QC Lot: 913779)									
EB0903675-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Magnesium	7439-95-4	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Sodium	7440-23-5	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		ED093F: Potassium	7440-09-7	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903756-007	PZ05	ED093F: Calcium	7440-70-2	1	mg/L	414	411	0.6	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	435	434	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2720	2710	0.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	25	25	0.0	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 913180)									
EB0903600-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 913180) - continued									
EB0903600-001	Anonymous	EG020A-F: Barium	7440-39-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Copper	7440-50-8	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Lead	7439-92-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Lithium	7439-93-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Boron	7440-42-8	0.05	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Iron	7439-89-6	0.05	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903600-010	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Barium	7440-39-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Copper	7440-50-8	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Lead	7439-92-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Lithium	7439-93-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Boron	7440-42-8	0.05	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Iron	7439-89-6	0.05	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EG020F: Dissolved Metals by ICP-MS (QC Lot: 913181)									
EB0903600-001	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-F: Thorium	7440-29-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-F: Titanium	7440-32-6	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903600-010	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 913181) - continued									
EB0903600-010	Anonymous	EG020B-F: Thorium	7440-29-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-F: Titanium	7440-32-6	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EG020F: Dissolved Metals by ICP-MS (QC Lot: 913182)									
EB0903600-001	Anonymous	EG020D-F: Gallium	7440-55-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903600-010	Anonymous	EG020D-F: Gallium	7440-55-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EG020F: Dissolved Metals by ICP-MS (QC Lot: 913183)									
EB0903756-004	PZ08-D	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0006	0.0007	0.0	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	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	0.030	0.030	0.0	0% - 20%
		EG020A-F: Chromium	7440-47-3	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: Lithium	7439-93-2	0.001	mg/L	0.620	0.662	6.7	0% - 20%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.126	0.129	2.2	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	0.015	0.016	0.0	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.025	0.024	5.3	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	0.67	0.69	3.6	0% - 50%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.95	2.97	0.6	0% - 20%
EB0903756-013	PZ02	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0002	<0.0001	0.0	No Limit
		EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.006	0.006	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	0.098	0.101	2.6	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	<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: Lithium	7439-93-2	0.001	mg/L	0.092	0.088	5.1	0% - 20%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.380	0.371	2.6	0% - 20%
		EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	0.026	0.026	0.0	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.025	0.024	0.0	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.005	21.2	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 913183) - continued									
EB0903756-013	PZ02	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	0.29	0.26	11.9	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.14	0.11	23.3	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 913184)									
EB0903756-004	PZ08-D	EG020B-F: Strontium	7440-24-6	0.001	mg/L	6.43	6.62	3.0	0% - 20%
		EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB0903756-013	PZ02	EG020B-F: Strontium	7440-24-6	0.001	mg/L	0.820	0.817	0.4	0% - 20%
		EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 913185)									
EB0903756-004	PZ08-D	EG020D-F: Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EB0903756-013	PZ02	EG020D-F: Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 913755)									
EB0903600-001	Anonymous	EG020A-T: Antimony	7440-36-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Lithium	7439-93-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Molybdenum	7439-98-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Boron	7440-42-8	0.05	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Iron	7439-89-6	0.05	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903600-011	Anonymous	EG020A-T: Antimony	7440-36-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Lithium	7439-93-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Molybdenum	7439-98-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Aluminium	7429-90-5	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Boron	7440-42-8	0.05	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Iron	7439-89-6	0.05	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EG020T: Total Metals by ICP-MS (QC Lot: 913756)									
EB0903600-001	Anonymous	EG020B-T: Strontium	7440-24-6	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-T: Thorium	7440-29-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-T: Uranium	7440-61-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-T: Titanium	7440-32-6	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903600-011	Anonymous	EG020B-T: Strontium	7440-24-6	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-T: Thorium	7440-29-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020B-T: Uranium	7440-61-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 913756) - continued									
EB0903600-011	Anonymous	EG020B-T: Titanium	7440-32-6	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EG020T: Total Metals by ICP-MS (QC Lot: 913757)									
EB0903600-001	Anonymous	EG020D-T: Gallium	7440-55-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903600-011	Anonymous	EG020D-T: Gallium	7440-55-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EG035F: Dissolved Mercury by FIMS (QC Lot: 917849)									
EB0903711-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903717-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EG035F: Dissolved Mercury by FIMS (QC Lot: 917850)									
EB0903756-002	PZ06-D	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB0903756-012	PZ03-D	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 913255)									
EB0903749-009	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903756-005	PZ07-S	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 913256)									
EB0903756-015	QC01	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	2.63	2.58	1.9	0% - 20%
EK059G: NOX as N by Discrete Analyser (QC Lot: 913712)									
EB0903721-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903756-008	PZ09	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.26	0.31	17.2	0% - 20%
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 912946)									
EB0903753-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903756-005	PZ07-S	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	0.3	108	No Limit
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 916545)									
EB0903756-008	PZ09	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.8	3.8	0.0	0% - 20%
EB0904009-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 912947)									
EB0903753-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903756-005	PZ07-S	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.12	0.08	46.7	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 912948)									
EB0903756-015	QC01	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB0903839-009	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 917420)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	500 mg/L	104	80	114
ED040F: Dissolved Major Anions (QCLot: 913201)								
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1	----	----	----	----
ED040F: Dissolved Major Anions (QCLot: 913780)								
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1	----	----	----	----
ED045P: Chloride by PC Titrator (QCLot: 917421)								
ED045-P: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	98.6	90	110
ED093F: Dissolved Major Cations (QCLot: 913202)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
ED093F: Dissolved Major Cations (QCLot: 913779)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 913180)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.500 mg/L	94.8	70	130
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	0.100 mg/L	102	81	121
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	95.9	75	125
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	121	82	130
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	102	79	123
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	95.2	84	128
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.100 mg/L	106	81	117
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	102	81	121
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	99.5	83	123
EG020A-F: Lithium	7439-93-2	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.100 mg/L	103	79	125
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.100 mg/L	102	83	115
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	102	78	124
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.100 mg/L	104	80	126
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.100 mg/L	101	72	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 913180) - continued								
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	106	81	130
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.50 mg/L	107	70	129
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.50 mg/L	112	76	128
EG020F: Dissolved Metals by ICP-MS (QCLot: 913181)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.500 mg/L	100	83	117
EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	0.100 mg/L	102	75	125
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 913182)								
EG020D-F: Gallium	7440-55-3	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 913183)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.500 mg/L	93.8	70	130
EG020A-F: Antimony	7440-36-0	0.001	mg/L	<0.001	0.100 mg/L	102	81	121
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	96.6	75	125
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	124	82	130
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	104	79	123
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	95.9	84	128
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.100 mg/L	102	81	117
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	100	81	121
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	100	83	123
EG020A-F: Lithium	7439-93-2	0.001	mg/L	<0.001	----	----	----	----
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.100 mg/L	102	79	125
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.100 mg/L	100	83	115
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	101	78	124
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.100 mg/L	99.8	80	126
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.100 mg/L	98.6	72	120
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	104	81	130
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.50 mg/L	104	70	129
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.50 mg/L	114	76	128
EG020F: Dissolved Metals by ICP-MS (QCLot: 913184)								
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.500 mg/L	100	83	117
EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
EG020B-F: Titanium	7440-32-6	0.01	mg/L	<0.01	0.100 mg/L	101	75	125
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 913185)								
EG020D-F: Gallium	7440-55-3	0.001	mg/L	<0.001	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 913755)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 913755) - continued								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.500 mg/L	107	74	128
EG020A-T: Antimony	7440-36-0	0.001	mg/L	<0.001	0.100 mg/L	92.7	80	114
EG020A-T: Lithium	7439-93-2	0.001	mg/L	<0.001	----	----	----	----
EG020A-T: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.100 mg/L	90.3	80	112
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.100 mg/L	86.5	73	119
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.500 mg/L	98.4	70	128
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.500 mg/L	108	70	130
EG020T: Total Metals by ICP-MS (QCLot: 913756)								
EG020B-T: Strontium	7440-24-6	0.001	mg/L	<0.001	0.500 mg/L	92.8	73	119
EG020B-T: Thorium	7440-29-1	0.001	mg/L	<0.001	----	----	----	----
EG020B-T: Titanium	7440-32-6	0.01	mg/L	<0.01	0.100 mg/L	103	74	120
EG020B-T: Uranium	7440-61-1	0.001	mg/L	<0.001	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 913757)								
EG020D-T: Gallium	7440-55-3	0.001	mg/L	<0.001	----	----	----	----
EG035F: Dissolved Mercury by FIMS (QCLot: 917849)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.010 mg/L	101	84	120
EG035F: Dissolved Mercury by FIMS (QCLot: 917850)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.010 mg/L	94.2	84	120
EK055G: Ammonia as N by Discrete Analyser (QCLot: 913255)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	96.2	70	128
EK055G: Ammonia as N by Discrete Analyser (QCLot: 913256)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	105	70	128
EK059G: NOX as N by Discrete Analyser (QCLot: 913712)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	98.4	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 912946)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10.0 mg/L	77.7	70	115
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 916545)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10.0 mg/L	81.0	70	115
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 912947)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.2 mg/L	90.5	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 912948)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.2 mg/L	101	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045P: Chloride by PC Titrator (QCLot: 917421)							
EB0903756-014	PZ04	ED045-P: Chloride	16887-00-6	40 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 913180)							
EB0903600-002	Anonymous	EG020A-F: Aluminium	7429-90-5	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Antimony	7440-36-0	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Arsenic	7440-38-2	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Beryllium	7440-41-7	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Barium	7440-39-3	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Cadmium	7440-43-9	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Chromium	7440-47-3	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Cobalt	7440-48-4	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Copper	7440-50-8	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Lead	7439-92-1	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Manganese	7439-96-5	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Molybdenum	7439-98-7	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Nickel	7440-02-0	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Selenium	7782-49-2	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Vanadium	7440-62-2	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Zinc	7440-66-6	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-F: Boron	7440-42-8	Anonymous	Anonymous	Anonymous	Anonymous
EG020F: Dissolved Metals by ICP-MS (QCLot: 913183)							
EB0903756-005	PZ07-S	EG020A-F: Aluminium	7429-90-5	0.5 mg/L	93.7	70	130
		EG020A-F: Antimony	7440-36-0	0.100 mg/L	89.5	70	130
		EG020A-F: Arsenic	7440-38-2	0.100 mg/L	99.8	70	130
		EG020A-F: Beryllium	7440-41-7	0.100 mg/L	119	70	130
		EG020A-F: Barium	7440-39-3	0.5 mg/L	100	70	130
		EG020A-F: Cadmium	7440-43-9	0.100 mg/L	106	70	130
		EG020A-F: Chromium	7440-47-3	0.100 mg/L	93.1	70	130
		EG020A-F: Cobalt	7440-48-4	0.100 mg/L	105	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	102	70	130
		EG020A-F: Lead	7439-92-1	0.100 mg/L	101	70	130
		EG020A-F: Manganese	7439-96-5	0.100 mg/L	103	70	130
		EG020A-F: Molybdenum	7439-98-7	0.100 mg/L	99.1	70	130
		EG020A-F: Nickel	7440-02-0	0.100 mg/L	102	70	130
		EG020A-F: Selenium	7782-49-2	0.100 mg/L	108	70	130
		EG020A-F: Vanadium	7440-62-2	0.100 mg/L	104	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 913183) - continued							
EB0903756-005	PZ07-S	EG020A-F: Zinc	7440-66-6	0.2 mg/L	107	70	130
		EG020A-F: Boron	7440-42-8	0.5 mg/L	102	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 917849)							
EB0903711-002	Anonymous	EG035F: Mercury	7439-97-6	Anonymous	Anonymous	Anonymous	Anonymous
EG035F: Dissolved Mercury by FIMS (QCLot: 917850)							
EB0903756-003	PZ08-S	EG035F: Mercury	7439-97-6	0.010 mg/L	78.8	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 913255)							
EB0903749-010	Anonymous	EK055G: Ammonia as N	7664-41-7	Anonymous	Anonymous	Anonymous	Anonymous
EK055G: Ammonia as N by Discrete Analyser (QCLot: 913256)							
EB0903756-018	QC04	EK055G: Ammonia as N	7664-41-7	0.8 mg/L	77.5	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 913712)							
EB0903721-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	Anonymous	Anonymous	Anonymous	Anonymous
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 912946)							
EB0903753-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	Anonymous	Anonymous	Anonymous	Anonymous
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 916545)							
EB0903849-009	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	Anonymous	Anonymous	Anonymous	Anonymous
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 912947)							
EB0903753-002	Anonymous	EK067G: Total Phosphorus as P	----	Anonymous	Anonymous	Anonymous	Anonymous
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 912948)							
EB0903756-018	QC04	EK067G: Total Phosphorus as P	----	1.0 mg/L	98.7	70	130

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB0903756**	Page	: 1 of 11
Client	: URS AUSTRALIA PTY LTD (QLD)	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Caval Ridge		
C-O-C number	: ----	Date Samples Received	: 05-MAR-2009
Sampler	: A.Wilson, S.Stevens	Issue Date	: 17-MAR-2009
Order number	: ----		
		No. of samples received	: 20
Quote number	: EN/001/08	No. of samples analysed	: 20

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

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

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

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

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural								
PZ11-D,	QC01	**02-MAR-2009**	---	---	----	**13-MAR-2009**	16-MAR-2009	✓
Clear Plastic Bottle - Natural								
PZ01,	PZ03-S,	**03-MAR-2009**	---	---	----	**13-MAR-2009**	17-MAR-2009	✓
PZ03-D,	PZ02,							
PZ04,	QC04							
Clear Plastic Bottle - Natural								
PZ06-S,	PZ06-D	**27-FEB-2009**	---	---	----	**13-MAR-2009**	13-MAR-2009	✓
Clear Plastic Bottle - Natural								
PZ08-S,	PZ08-D,	**28-FEB-2009**	---	---	----	**13-MAR-2009**	14-MAR-2009	✓
PZ07-S,	PZ07-D,							
PZ05								
ED040F: Dissolved Major Anions								
Clear Plastic Bottle - Natural								
PZ11-D,	QC01	**02-MAR-2009**	---	---	----	**10-MAR-2009**	30-MAR-2009	✓
Clear Plastic Bottle - Natural								
PZ01,	PZ03-S,	**03-MAR-2009**	---	---	----	**10-MAR-2009**	31-MAR-2009	✓
PZ03-D,	PZ02,							
PZ04,	QC04							
Clear Plastic Bottle - Natural								
PZ06-S,	PZ06-D	**27-FEB-2009**	---	---	----	**09-MAR-2009**	27-MAR-2009	✓
Clear Plastic Bottle - Natural								
PZ08-S,	PZ08-D,	**28-FEB-2009**	---	---	----	**10-MAR-2009**	28-MAR-2009	✓
PZ07-S,	PZ07-D,							
PZ05								

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
ED045P: Chloride by PC Titrator							
Clear Plastic Bottle - Natural PZ11-D, QC01	**02-MAR-2009**	---	---	----	**13-MAR-2009**	30-MAR-2009	✓
Clear Plastic Bottle - Natural PZ01, PZ03-S, PZ03-D, PZ02, PZ04, QC04	**03-MAR-2009**	---	---	----	**13-MAR-2009**	31-MAR-2009	✓
Clear Plastic Bottle - Natural PZ06-S, PZ06-D	**27-FEB-2009**	---	---	----	**13-MAR-2009**	27-MAR-2009	✓
Clear Plastic Bottle - Natural PZ08-S, PZ08-D, PZ07-S, PZ07-D, PZ05	**28-FEB-2009**	---	---	----	**13-MAR-2009**	28-MAR-2009	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural PZ11-D, QC01	**02-MAR-2009**	---	---	----	**10-MAR-2009**	30-MAR-2009	✓
Clear Plastic Bottle - Natural PZ01, PZ03-S, PZ03-D, PZ02, PZ04, QC04	**03-MAR-2009**	---	---	----	**10-MAR-2009**	31-MAR-2009	✓
Clear Plastic Bottle - Natural PZ06-S, PZ06-D	**27-FEB-2009**	---	---	----	**09-MAR-2009**	27-MAR-2009	✓
Clear Plastic Bottle - Natural PZ08-S, PZ08-D, PZ07-S, PZ07-D, PZ05	**28-FEB-2009**	---	---	----	**10-MAR-2009**	28-MAR-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered PZ09	**02-MAR-2009**	---	---	----	**10-MAR-2009**	30-MAR-2009	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered PZ09, PZ11-D, QC01	**02-MAR-2009**	---	---	----	**09-MAR-2009**	29-AUG-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered PZ01, PZ03-S, PZ03-D, PZ02, PZ04, QC04	**03-MAR-2009**	---	---	----	**09-MAR-2009**	30-AUG-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered PZ06-S, PZ06-D	**27-FEB-2009**	---	---	----	**09-MAR-2009**	26-AUG-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered PZ08-S, PZ08-D, PZ07-S, PZ07-D, PZ05	**28-FEB-2009**	---	---	----	**09-MAR-2009**	27-AUG-2009	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered								
QC02,	QC03	**02-MAR-2009**	**10-MAR-2009**	29-AUG-2009	✓	**10-MAR-2009**	29-AUG-2009	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered								
QC05,	QC06	**03-MAR-2009**	**10-MAR-2009**	30-AUG-2009	✓	**10-MAR-2009**	30-AUG-2009	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered								
PZ09,	PZ11-D,	**02-MAR-2009**	**----**	----	----	**13-MAR-2009**	30-MAR-2009	✓
QC01								
Clear Plastic Bottle - Nitric Acid; Filtered								
PZ01,	PZ03-S,	**03-MAR-2009**	**----**	----	----	**13-MAR-2009**	31-MAR-2009	✓
PZ03-D,	PZ02,							
PZ04,	QC04							
Clear Plastic Bottle - Nitric Acid; Filtered								
PZ06-S,	PZ06-D	**27-FEB-2009**	**----**	----	----	**13-MAR-2009**	27-MAR-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered								
PZ08-S,	PZ08-D,	**28-FEB-2009**	**----**	----	----	**13-MAR-2009**	28-MAR-2009	✓
PZ07-S,	PZ07-D,							
PZ05								
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulphuric Acid								
PZ09,	PZ11-D,	**02-MAR-2009**	**----**	----	----	**09-MAR-2009**	30-MAR-2009	✓
QC01								
Clear Plastic Bottle - Sulphuric Acid								
PZ01,	PZ03-S,	**03-MAR-2009**	**----**	----	----	**09-MAR-2009**	31-MAR-2009	✓
PZ03-D,	PZ02,							
PZ04,	QC04							
Clear Plastic Bottle - Sulphuric Acid								
PZ06-S,	PZ06-D	**27-FEB-2009**	**----**	----	----	**09-MAR-2009**	27-MAR-2009	✓
Clear Plastic Bottle - Sulphuric Acid								
PZ08-S,	PZ08-D,	**28-FEB-2009**	**----**	----	----	**09-MAR-2009**	28-MAR-2009	✓
PZ07-S,	PZ07-D,							
PZ05								

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: NOX as N by Discrete Analyser							
Clear Plastic Bottle - Sulphuric Acid PZ09, PZ11-D, QC01	**02-MAR-2009**	**----**	----	----	**10-MAR-2009**	30-MAR-2009	✓
Clear Plastic Bottle - Sulphuric Acid PZ09	**02-MAR-2009**	**----**	----	----	**11-MAR-2009**	30-MAR-2009	✓
Clear Plastic Bottle - Sulphuric Acid PZ01, PZ03-S, PZ03-D, PZ02, PZ04, QC04	**03-MAR-2009**	**----**	----	----	**10-MAR-2009**	31-MAR-2009	✓
Clear Plastic Bottle - Sulphuric Acid PZ06-S, PZ06-D	**27-FEB-2009**	**----**	----	----	**10-MAR-2009**	27-MAR-2009	✓
Clear Plastic Bottle - Sulphuric Acid PZ08-S, PZ08-D, PZ07-S, PZ07-D, PZ05	**28-FEB-2009**	**----**	----	----	**10-MAR-2009**	28-MAR-2009	✓
EK061: Total Kjeldahl Nitrogen (TKN)							
Clear Plastic Bottle - Sulphuric Acid PZ11-D, QC01	**02-MAR-2009**	**10-MAR-2009**	30-MAR-2009	✓	**10-MAR-2009**	30-MAR-2009	✓
Clear Plastic Bottle - Sulphuric Acid PZ09	**02-MAR-2009**	**12-MAR-2009**	30-MAR-2009	✓	**12-MAR-2009**	30-MAR-2009	✓
Clear Plastic Bottle - Sulphuric Acid PZ01, PZ03-S, PZ03-D, PZ02, PZ04, QC04	**03-MAR-2009**	**10-MAR-2009**	31-MAR-2009	✓	**10-MAR-2009**	31-MAR-2009	✓
Clear Plastic Bottle - Sulphuric Acid PZ06-S, PZ06-D	**27-FEB-2009**	**10-MAR-2009**	27-MAR-2009	✓	**10-MAR-2009**	27-MAR-2009	✓
Clear Plastic Bottle - Sulphuric Acid PZ08-S, PZ08-D, PZ07-S, PZ07-D, PZ05	**28-FEB-2009**	**10-MAR-2009**	28-MAR-2009	✓	**10-MAR-2009**	28-MAR-2009	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulphuric Acid PZ09, PZ11-D, QC01	**02-MAR-2009**	**10-MAR-2009**	30-MAR-2009	✓	**10-MAR-2009**	30-MAR-2009	✓
Clear Plastic Bottle - Sulphuric Acid PZ01, PZ03-S, PZ03-D, PZ02, PZ04, QC04	**03-MAR-2009**	**10-MAR-2009**	31-MAR-2009	✓	**10-MAR-2009**	31-MAR-2009	✓
Clear Plastic Bottle - Sulphuric Acid PZ06-S, PZ06-D	**27-FEB-2009**	**10-MAR-2009**	27-MAR-2009	✓	**10-MAR-2009**	27-MAR-2009	✓
Clear Plastic Bottle - Sulphuric Acid PZ08-S, PZ08-D, PZ07-S, PZ07-D, PZ05	**28-FEB-2009**	**10-MAR-2009**	28-MAR-2009	✓	**10-MAR-2009**	28-MAR-2009	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	1	6	**16.7**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	3	29	**10.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	1	6	**16.7**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	4	39	**10.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	33	**12.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	4	33	**12.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite D	EG020D-F	4	33	**12.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	4	36	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	4	40	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	39	**10.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	5	**40.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	6	51	**11.8**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite B	EG020B-T	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite D	EG020D-T	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	4	39	**10.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	6	**16.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	2	29	**6.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	1	6	**16.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	2	39	**5.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	**6.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	33	**6.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	39	**5.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	5	**20.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	51	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite B	EG020B-T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	29	**6.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	1	6	**16.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	2	39	**5.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	**6.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	33	**6.1**	**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		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Dissolved Metals by ICP-MS - Suite D	EG020D-F	2	33	**6.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	2	36	**5.6**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	40	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	39	**5.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	5	**20.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	51	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite B	EG020B-T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite D	EG020D-T	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	29	**6.9**	**5.0**	✓	ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	1	6	**16.7**	**5.0**	✓	ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	2	39	**5.1**	**5.0**	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	**6.1**	**5.0**	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	39	**5.1**	**5.0**	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	5	**20.0**	**5.0**	✓	ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	51	**5.9**	**5.0**	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.0**	**5.0**	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.1**	**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
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by both manual measurement and automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Major Anions - Filtered	ED040F	WATER	APHA 21st ed., 3120 Sulfur and/or Silcon content is determined by ICP/AES and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Chloride by PC Titrator	ED045-P	WATER	APHA 21st ed., 4500 Cl - B. Automated Silver Nitrate titration.
Major Cations - Filtered	ED093F	WATER	APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite B	EG020B-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite D	EG020D-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite D	EG020D-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. 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 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 Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg-D25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500 N org / NO3. 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)
Ionic Balance by PCT and ICPAES	EN055	WATER	APHA 21st Ed. 1030F. 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)
Digestion for Total Recoverable Metals	EN25	WATER	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED045P: Chloride by PC Titrator	EB0903756-014	PZ04	**Chloride**	16887-00-6	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.

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

Outliers : Frequency of Quality Control Samples

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

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

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