

Project Manager:

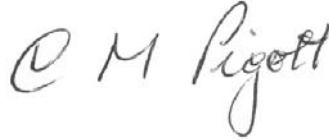


Stephen Denner
Associate Hydrogeologist

URS Australia Pty Ltd

Level 16, 240 Queen Street
Brisbane, QLD 4000
GPO Box 302, QLD 4001
Australia

Project Director:



Chris Piggot
Senior Principal

Tel: 61 7 3243 2111
Fax: 61 7 3243 2199

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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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Introduction

- 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 through 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.

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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**.

Extent of Field Investigations

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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.

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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.

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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**.

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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 | <p>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.</p> <p>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.</p> <p>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.</p> <p>The following monitoring wells were purged using bailers: Pz03-S, Pz06-S, Pz07-S and Pz08-S.</p> <p>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.</p> <p>Immediately following purging, a groundwater sample was collected from each monitoring well using the same method as used to purge the bore.</p> <p>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.</p> |
| Sample Preservation | Samples were placed in laboratory-supplied bottles containing appropriate preservatives. Samples were stored at $\pm 4^{\circ}\text{C}$ 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**.

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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**.

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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

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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.

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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 gravelly 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 aeromagnetism shows 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 Mm³ of basalt in the area of Horse Creek. The areal extent of the basalt is approximately 7.2 Mm², 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,

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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.

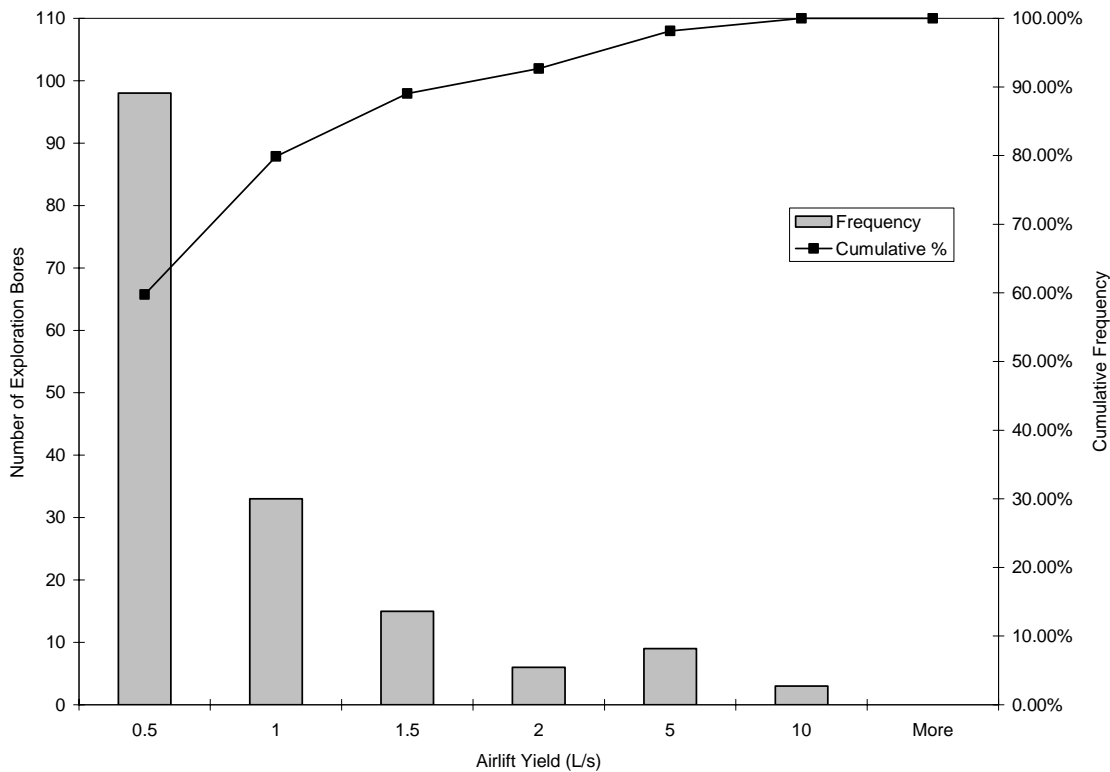
Interpreted hydraulic conductivity values determined during investigations as part of this study are presented in **Section 3.2**. The testing indicates that the cleats and joints in the coal are less open with depth, with a corresponding decrease in permeability.

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**.

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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**.

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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

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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.

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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 ($\mu\text{S}/\text{cm}$) | | | 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 [$\mu\text{S}/\text{cm}$] = 1.5 \times 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.

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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.

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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:

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- 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 (m³/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)

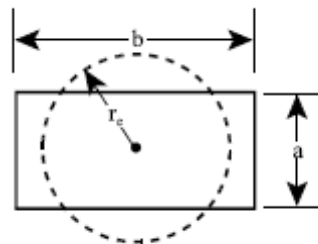
r_e = radius of “well” (m)

For the aquifer R can be estimated as

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

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;

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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 (m ³ /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 |

Potential Impacts and Mitigation Measures

Section 5

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 $\pm 27,900 \text{ m}^3/\text{day}$ (up to $\pm 96,600 \text{ m}^3/\text{day}$) for the Horse Pit and $\pm 22,300 \text{ m}^3/\text{day}$ (up to $\pm 78,800 \text{ m}^3/\text{day}$) for the Heyford Pit. These ingress rates equate to $\pm 2 \text{ m}^3/\text{day}$ (up to $\pm 7 \text{ m}^3/\text{day}$) 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.

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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 $\mu\text{S}/\text{cm}$ (median 679 $\mu\text{S}/\text{cm}$), 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

Potential Impacts and Mitigation Measures

Section 5

1861 $\mu\text{S}/\text{cm}$ 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.

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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, NO_x, 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

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Potential Impacts and Mitigation Measures

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.

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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.

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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 |
| Date Sampled |
| Sample Type |

| PZ01 | | PZ02 | | | PZ03-D | | | | | |
|----------------|----------------|----------------|----------------|----------------|----------------|------------------|----------------|------------------|----------------|------------------|
| 10/09/2008 | 3/03/2009 | 7/06/2008 | 10/09/2008 | 3/03/2009 | 7/06/2008 | | 10/09/2008 | | 3/03/2009 | |
| 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 |
| Date Sampled |
| Sample Type |

| PZ01 | | PZ02 | | | PZ03-D | | | | | |
|----------------|----------------|----------------|----------------|----------------|----------------|------------------|----------------|------------------|----------------|------------------|
| 10/09/2008 | 3/03/2009 | 7/06/2008 | 10/09/2008 | 3/03/2009 | 7/06/2008 | | 10/09/2008 | | 3/03/2009 | |
| 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 |
| Date Sampled |
| Sample Type |

| PZ03-S | | | PZ04 | | | PZ05 | PZ06-D | | | |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|----------------|----------------|
| 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 |
| 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 |
| Date Sampled |
| Sample Type |

| PZ03-S | | | PZ04 | | | PZ05 | PZ06-D | | | |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|----------------|----------------|
| 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 |
| 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 |
| Date Sampled |
| Sample Type |

| PZ06-S | | | PZ07-D | | | PZ07-S | | |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 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 |
| 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 |
| Date Sampled |
| Sample Type |

| PZ06-S | | | PZ07-D | | | PZ07-S | | |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 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 |
| 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 |
| Date Sampled |
| Sample Type |

| PZ08-D | | | PZ08-S | | | PZ09 | | |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|
| 6/06/2008 | 9/09/2008 | 28/02/2009 | 6/06/2008 | 9/09/2008 | 28/02/2009 | 8/09/2008 | 2/03/2009 | |
| 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 |
| Date Sampled |
| Sample Type |

| PZ08-D | | | PZ08-S | | | PZ09 | | |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|
| 6/06/2008 | 9/09/2008 | 28/02/2009 | 6/06/2008 | 9/09/2008 | 28/02/2009 | 8/09/2008 | 2/03/2009 | |
| 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 | 6/06/2008 | 9/09/2008 | 28/02/2009 | 6/06/2008 | 9/09/2008 | 28/02/2009 | 8/09/2008 | 2/03/2009 | 2/03/2009 |
|---------------------------|--------|-------|---|--|------------------------------------|-----------|--------------|---------------|--------------|--------------|-------------|--------------|---------------|---------------|
| 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 |
| Date Sampled |
| Sample Type |

| | | | |
|--|----------------|----------------|----------------|
| | PZ10 | PZ11-D | |
| | 8/09/2008 | 8/09/2008 | 2/03/2009 |
| | 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 | | | | | | | | |

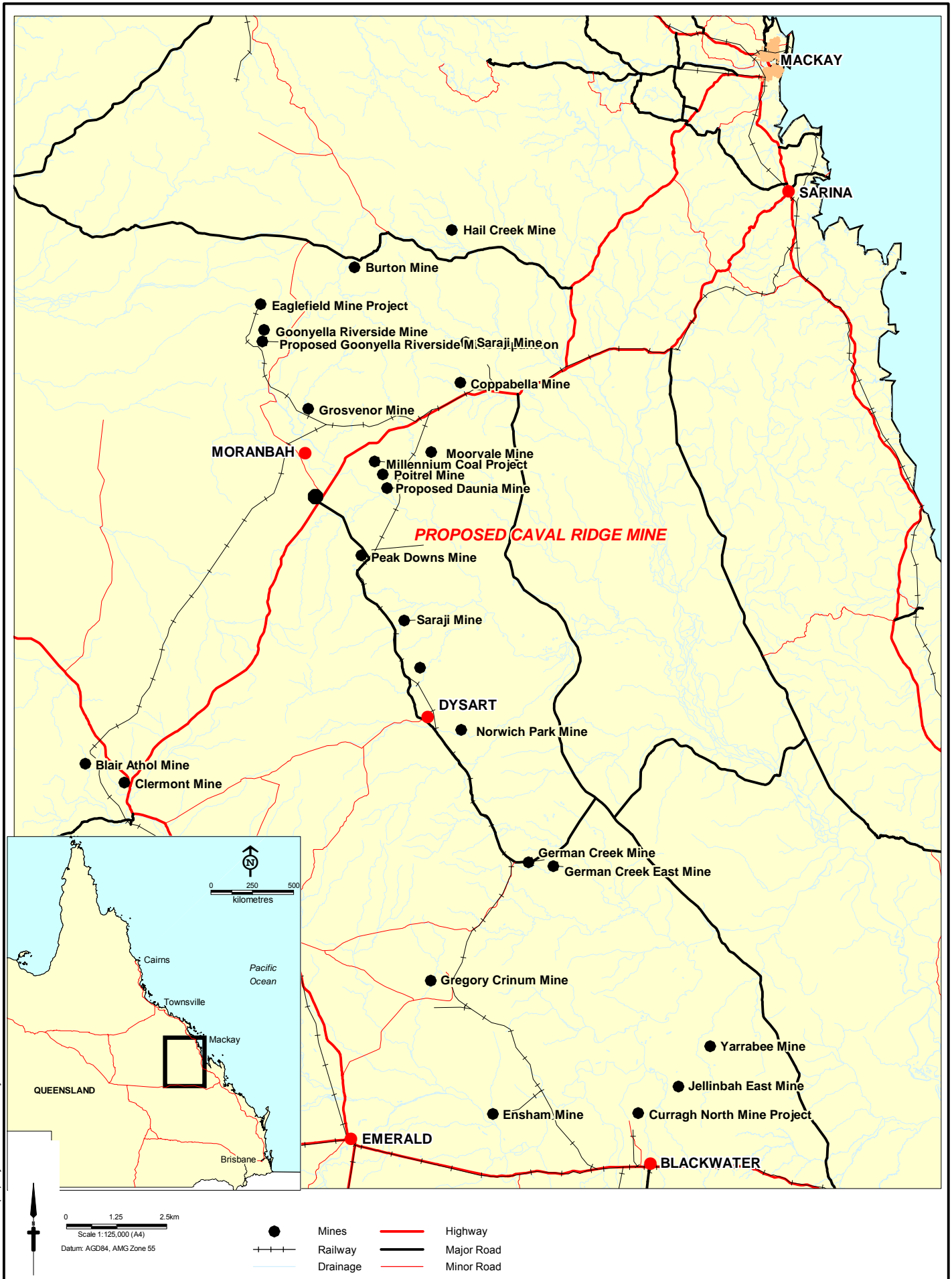
Caval Ridge Project EIS
Groundwater Monitoring Wells
Analytical Results Table

| |
|---------------------|
| Location |
| Date Sampled |
| Sample Type |



| | | | |
|--|----------------|----------------|----------------|
| | PZ10 | PZ11-D | |
| | 8/09/2008 | 8/09/2008 | 2/03/2009 |
| | Primary Sample | Primary Sample | Primary Sample |

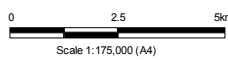
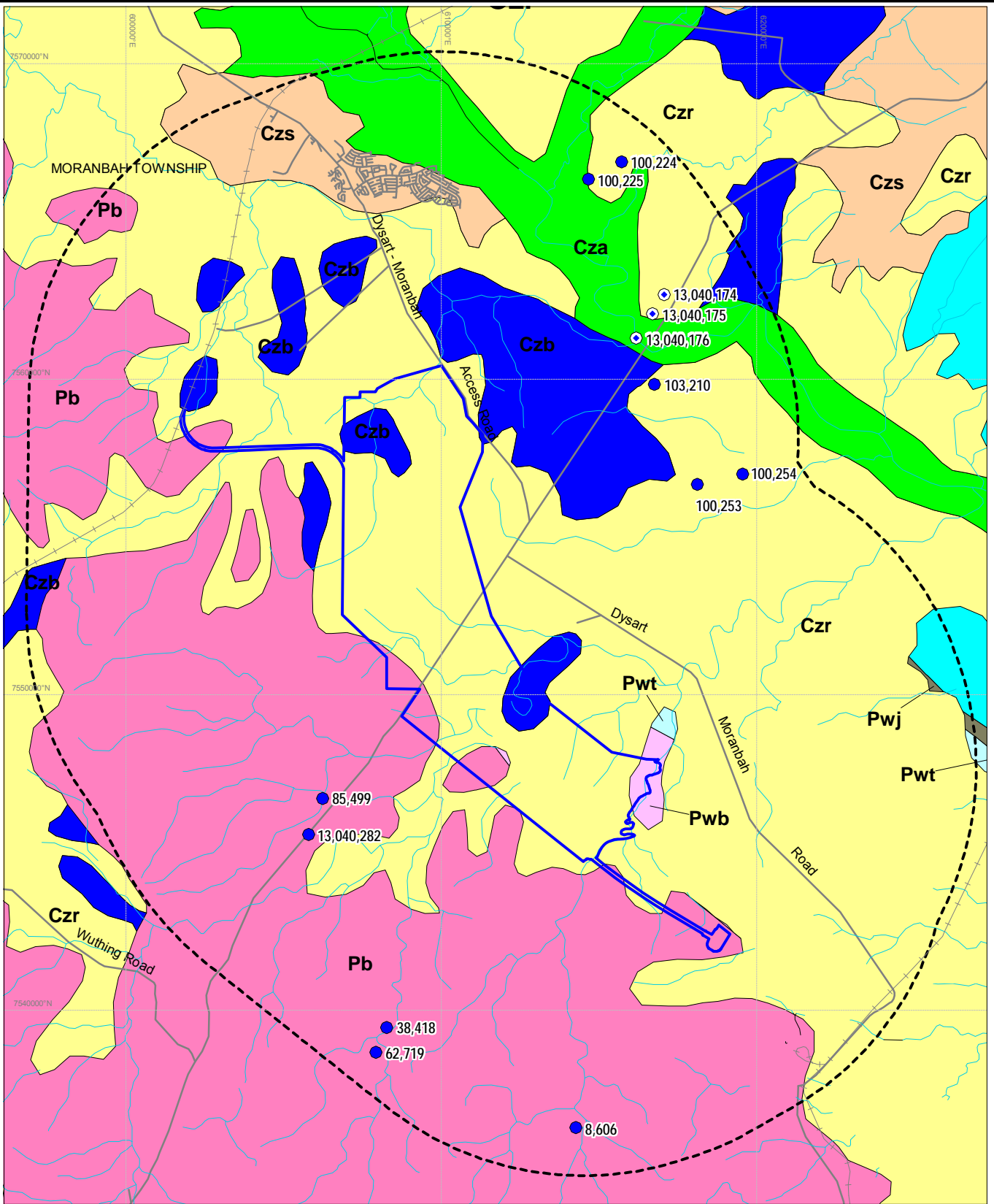
| Analyte | LOR | Units | ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems | ANZECC (2000) - Livestock Drinking Water - Beef Cattle | ADWG (2004) - Human Drinking Water | | | |
|--|--------|-------|---|--|------------------------------------|--------------|--------------|--------------|
| Metals (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



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| | | | | | | | | | | | | |
|---|--|------------------------------|--------------|------------------|-------------------|-----------------------------|--|---|-----------|-------|--|----|
| Client  BHP Billiton Mitsubishi Alliance | Project CAVAL RIDGE PROJECT GROUNDWATER REPORT | Title STUDY AREA LOCALITY | | | | | | | | | | |
|  | <table border="1"> <tr> <td>Drawn: VH</td> <td>Approved: SD</td> <td>Date: 12-02-2009</td> </tr> <tr> <td>Job No: 4262 6158</td> <td colspan="2">File No: 42626158-g-138.wor</td> </tr> </table> | Drawn: VH | Approved: SD | Date: 12-02-2009 | Job No: 4262 6158 | File No: 42626158-g-138.wor | | <table border="1"> <tr> <td>Figure: 1</td> <td>Rev:A</td> </tr> <tr> <td></td> <td>A4</td> </tr> </table> | Figure: 1 | Rev:A | | A4 |
| Drawn: VH | Approved: SD | Date: 12-02-2009 | | | | | | | | | | |
| Job No: 4262 6158 | File No: 42626158-g-138.wor | | | | | | | | | | | |
| Figure: 1 | Rev:A | | | | | | | | | | | |
| | A4 | | | | | | | | | | | |

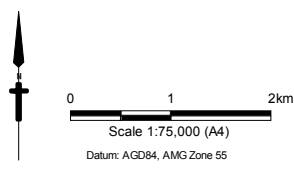
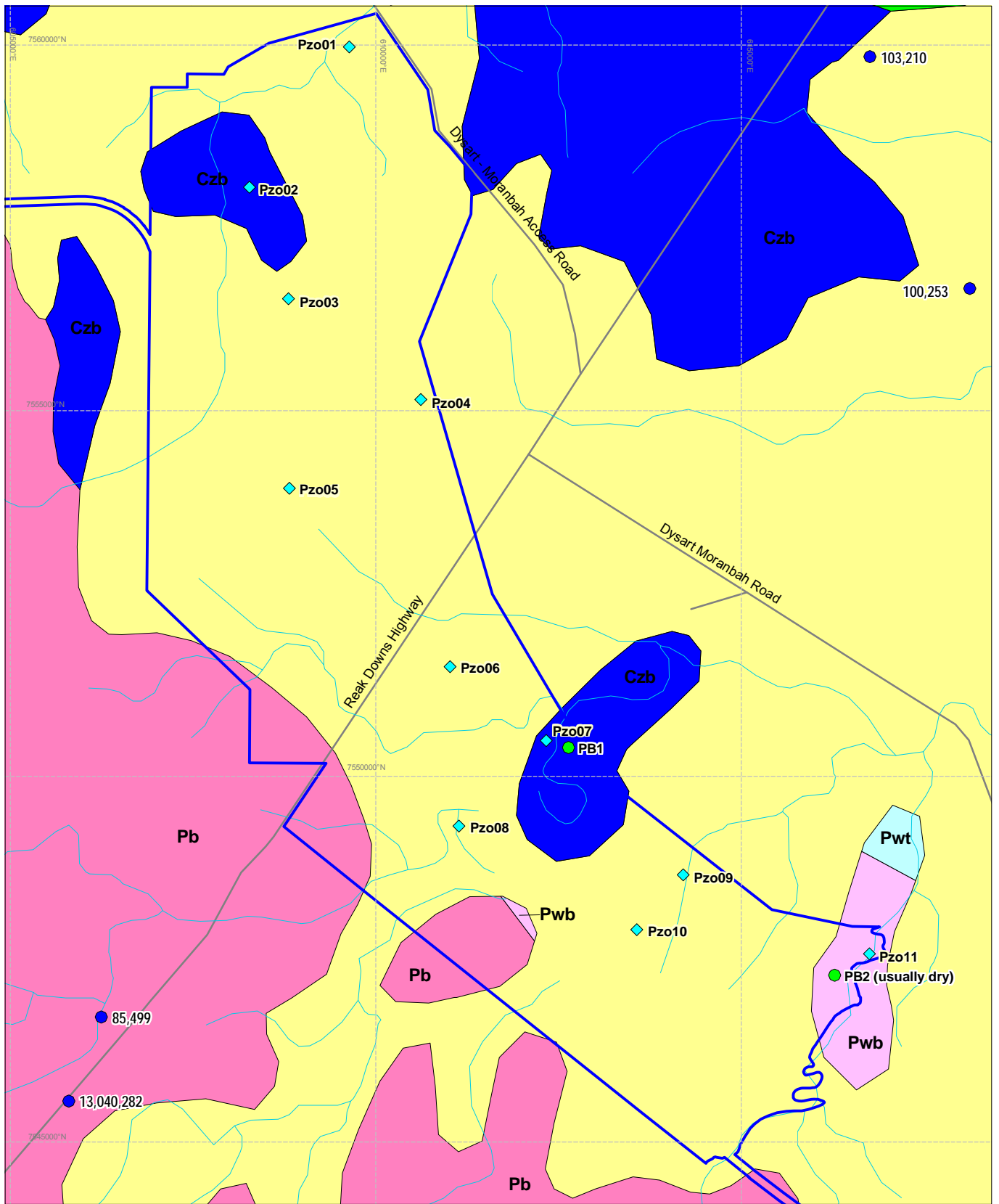


Source: Client Supplied Data (December 2007),
Old Gov. DME Geological Mapping, 2007

- | | |
|--|---|
| Cza Quaternary Alluvium | ● DNRW Registered Bore |
| Czb Undifferentiated Tertiary Basalts | ● DNRW Registered Bore (Abandoned and destroyed) |
| Czr Undifferentiated Tertiary Sediments | Pb Geological Boundary and Geological Regime |
| Czs Sutor Creek Formation | Project Area |
| Pwj Rangal Coal Measures | 10km Project Buffer |
| Pwt Fair Hill Formation | |
| Pwb Moranbah Coal Measures | |
| Pb Back Creek Group | |

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| | | |
|--|--|---|
| <p>Client</p> <p>BHP Billiton Mitsubishi Alliance</p> | <p>Project</p> <p style="text-align: center;">CAVAL RIDGE PROJECT GROUNDWATER IMPACT ASSESSMENT</p> | <p>Title</p> <p style="text-align: center;">LOCATION OF BORES WITHIN 10km OF SITE - REGISTERED WITH DNRW OVERLAIN ON GEOLOGY</p> |
| <p>Drawn: VH Approved: SD Date: 12-02-2009</p> | | <p>Figure: 2</p> |
| <p>Job No: 4262 6158 File No: 42626158-g-139.wor</p> | | |

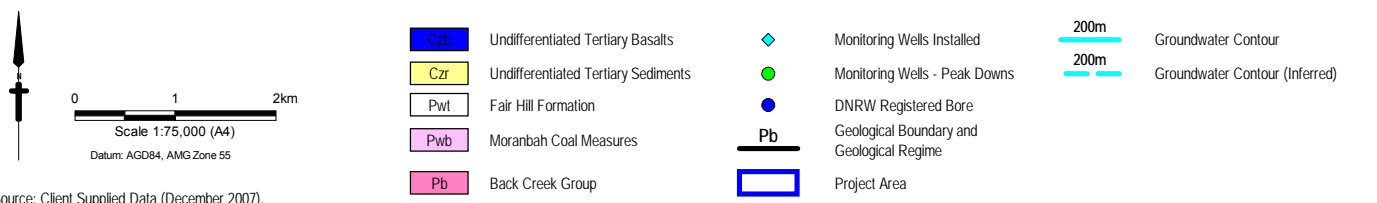
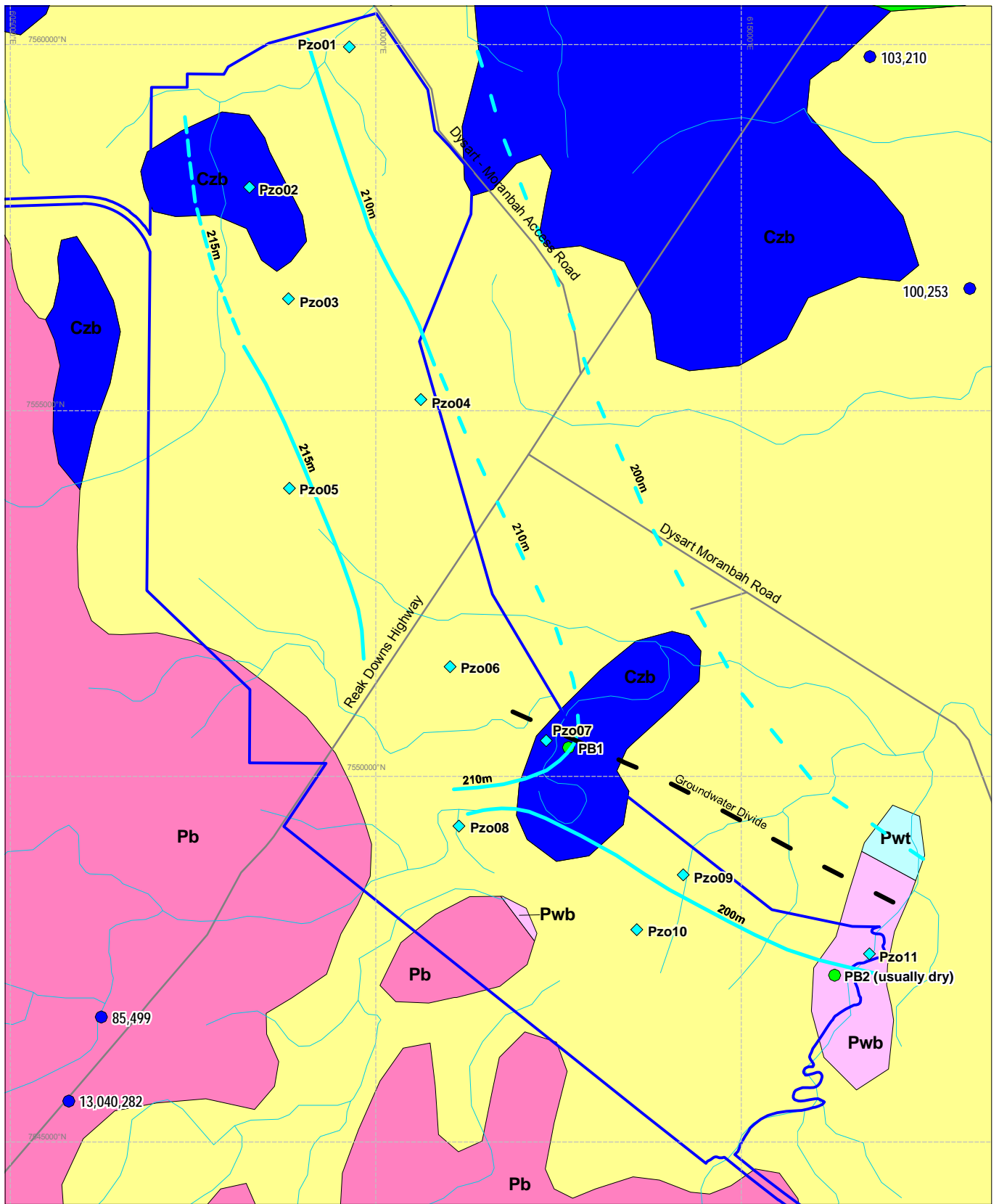


- Czb Undifferentiated Tertiary Basalts
- Czs Undifferentiated Tertiary Sediments
- Pwt Fair Hill Formation
- Pwb Moranbah Coal Measures
- Pb Back Creek Group
- Monitoring Wells Installed
- Monitoring Wells - Peak Downs
- DNRW Registered Bore
- Geological Boundary and Geological Regime
- Project Area

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



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| | | |
|---------------|---|---|
| <p>Client</p> | <p>Project</p> <p>CAVAL RIDGE PROJECT GROUNDWATER IMPACT ASSESSMENT</p> | <p>Title</p> <p>LOCATION OF GROUNDWATER MONITORING WELLS INSTALLED AROUND THE PROJECT AREA</p> |
| | <p>Drawn: VH Approved: SD Date: 12-02-2009</p> <p>Job No: 4262 6158 File No: 42626158-g-140.wor</p> | <p>Figure: 3</p> |



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

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| | | | | |
|--|---|---|--|-----------|
| Client  BHP Billiton Mitsubishi Alliance  | Project CAVAL RIDGE PROJECT GROUNDWATER IMPACT ASSESSMENT | | Title GROUNDWATER ELEVATION CONTOURS OF PERMIAN MORANBAH COAL MEASURES | |
| | Drawn: VH Job No: 4262 6158 | Approved: SD File No: 42626158-g-141.wor | Date: 12-02-2009 | Figure: 4 |

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

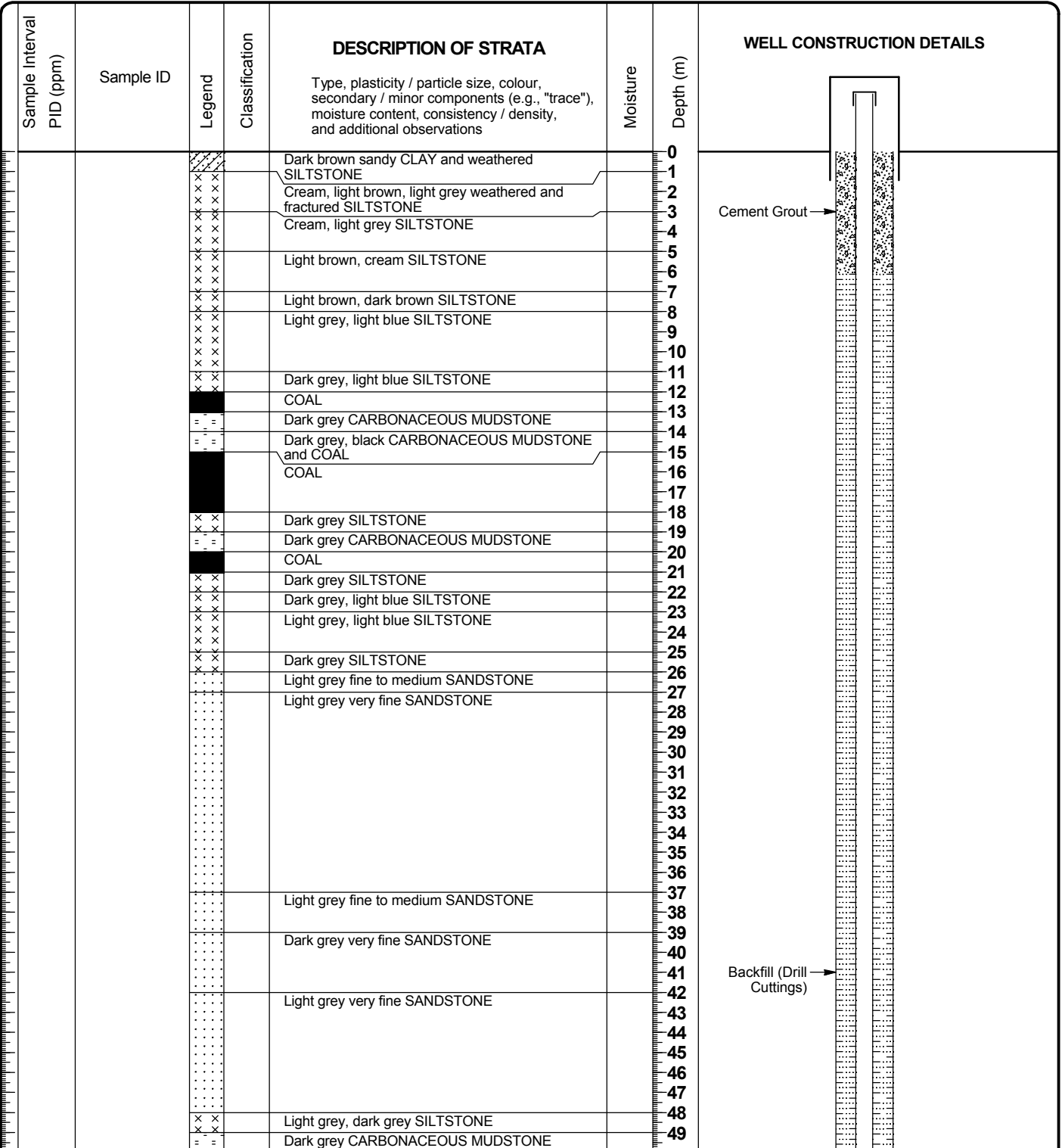
| Sample Point | Easting (m) | Northing (m) | Sample Date | pH | EC (µS/cm) | Depth to Water (mBTOC) |
|--------------|-------------|--------------|------------------|------|------------|------------------------|
| PB1 | 612634.076 | 7550391.974 | 27/11/2007 9:50 | 7.06 | 1474 | 16.99 |
| | | | 12/09/2007 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

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 | Client: BMA Coal |
| Drilling Contractor: Capricorn Weston Drilling | | Project No.: 42626162 | Location: Peak Downs QLD | |
| Logged By: AW | Bore Size: 165 mm | Relative Level: mRL | Drill Type: Rotary Air | |
| Checked By: SD | Total Depth: 85.50 m | Coordinates: mN mE | Drill Model: UDR | |
| Date Started: 12-5-08 | Casing Size: 50 mm | Permit No: | Drill Fluid: Air | |
| Date Finished: 13-5-08 | | | | |



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**

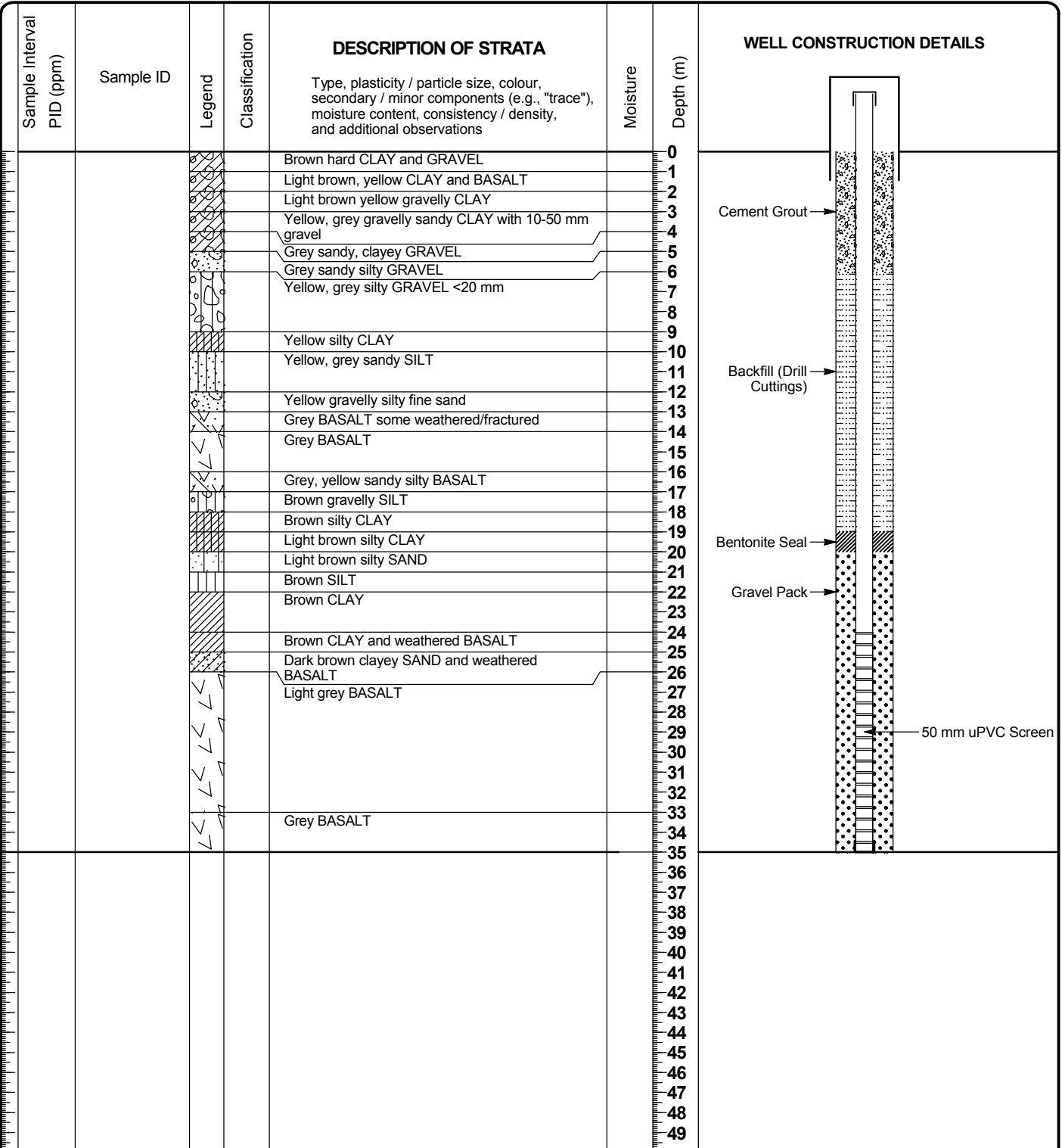
Project Reference: **Caval Ridge EIS**

| 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) | WELL CONSTRUCTION DETAILS |
|------------------------------|-----------|---------|----------------|--|----------|-----------|---|
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE and COAL | | 50 | <p>Bentonite Seal →</p> <p>Gravel Pack →</p> <p>50 mm uPVC Screen →</p> |
| | | " " | | COAL | | 51 | |
| | | " " | | Dark grey CARBONACEOUS MUDSTONE | | 52 | |
| | | " " | | Dark grey SILTSTONE | | 53 | |
| | | " " | | Dark grey CARBONACEOUS MUDSTONE | | 54 | |
| | | x x x x | | Dark grey SILTSTONE | | 55 | |
| | | x x x x | | Dark grey SILTSTONE | | 56 | |
| | | x x x x | | Dark grey SILTSTONE | | 57 | |
| | | x x x x | | Dark grey SILTSTONE | | 58 | |
| | | . | | Light grey very fine SANDSTONE | | 59 | |
| | | . | | Dark grey fine to medium SANDSTONE | | 60 | |
| | | . | | Dark grey fine to medium SANDSTONE | | 61 | |
| | | . | | Dark grey fine to medium SANDSTONE | | 62 | |
| | | . | | Dark grey fine to medium SANDSTONE | | 63 | |
| | | . | | Dark grey fine to medium SANDSTONE | | 64 | |
| | | . | | Dark grey fine to medium SANDSTONE | | 65 | |
| | | . | | Dark grey fine to medium SANDSTONE | | 66 | |
| | | . | | Dark grey fine to medium SANDSTONE | | 67 | |
| | | . | | Dark grey fine to medium SANDSTONE | | 68 | |
| | | . | | Dark grey fine to medium SANDSTONE | | 69 | |
| | | . | | Dark grey fine to medium SANDSTONE | | 70 | |
| | | . | | Dark grey fine SANDSTONE | | 71 | |
| | | . | | Dark grey fine SANDSTONE | | 72 | |
| | | . | | Light grey, dark grey fine to medium SANDSTONE | | 73 | |
| | | . | | Light grey, dark grey fine to medium SANDSTONE | | 74 | |
| | | . | | Dark grey fine SANDSTONE | | 75 | |
| | | . | | Dark grey fine SANDSTONE | | 76 | |
| | | . | | Light grey fine to medium SANDSTONE | | 77 | |
| | | . | | Dark grey fine SANDSTONE | | 78 | |
| | | . | | Dark grey fine SANDSTONE | | 79 | |
| | | x x x x | | Dark grey SILTSTONE | | 80 | |
| | | x x x x | | Dark grey SILTSTONE | | 81 | |
| | | x x x x | | Dark grey SILTSTONE | | 82 | |
| | | " " | | Dark grey, light brown CARBONACEOUS MUDSTONE | | 83 | |
| | | " " | | COAL | | 84 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 85 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 86 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 87 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 88 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 89 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 90 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 91 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 92 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 93 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 94 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 95 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 96 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 97 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 98 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 99 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 100 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 101 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 102 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 103 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 104 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 105 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 106 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 107 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 108 | |
| | | " " | | Dark grey, black CARBONACEOUS MUDSTONE | | 109 | |

MOD_WELL_CAVAL RIDGE BORE LOGS.GPJ WCC.AUS.GDT 7/10/08

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 | Client: BMA Coal |
| Drilling Contractor: Capricorn Weston Drilling | | Project No.: 42626162 | Location: Peak Downs QLD | |
| Logged By: DG | Bore Size: 165 mm | Relative Level: mRL | Drill Type: Rotary Air | |
| Checked By: SD | Total Depth: 35.00 m | Coordinates: mN mE | Drill Model: UDR | |
| Date Started: 20-5-08 | Casing Size: 50 mm | Permit No: | Drill Fluid: Air | |
| Date Finished: 20-5-08 | | | | |



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**

Client: **BMA Coal**

Drilling Contractor: **Capricorn Weston Drilling**

Project No.: **42626162**

Location: **Peak Downs QLD**

Logged By: **AW**

Bore Size: **165 mm**

Relative Level: **mRL**

Drill Type: **Rotary Air**

Checked By: **SD**

Total Depth: **42.80 m**

Coordinates: **mN**

Drill Model: **UDR**

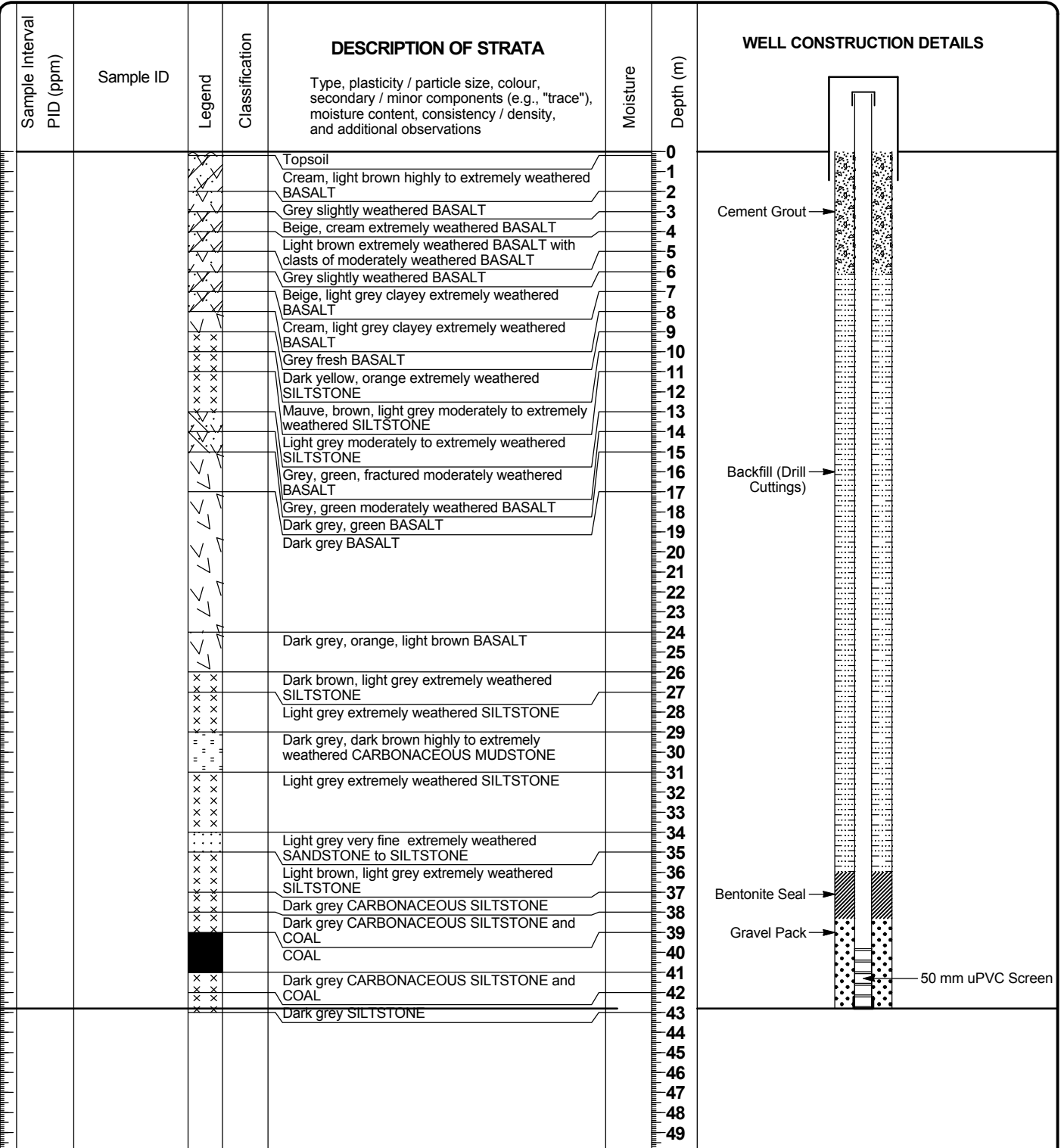
Date Started: **15-5-08**

Casing Size: **50 mm**

Permit No:

Drill Fluid: **Air**

Date Finished: **16-5-08**



MONITORING WELL Pz03-S

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**

Client: **BMA Coal**

Drilling Contractor: **Capricorn Weston Drilling**

Project No.: **42626162**

Location: **Peak Downs QLD**

Logged By: **AW**

Bore Size: **165 mm**

Relative Level: **mRL**

Drill Type: **Rotary Air**

Checked By: **SD**

Total Depth: **26.50 m**

Coordinates: **mN**

Drill Model: **UDR**

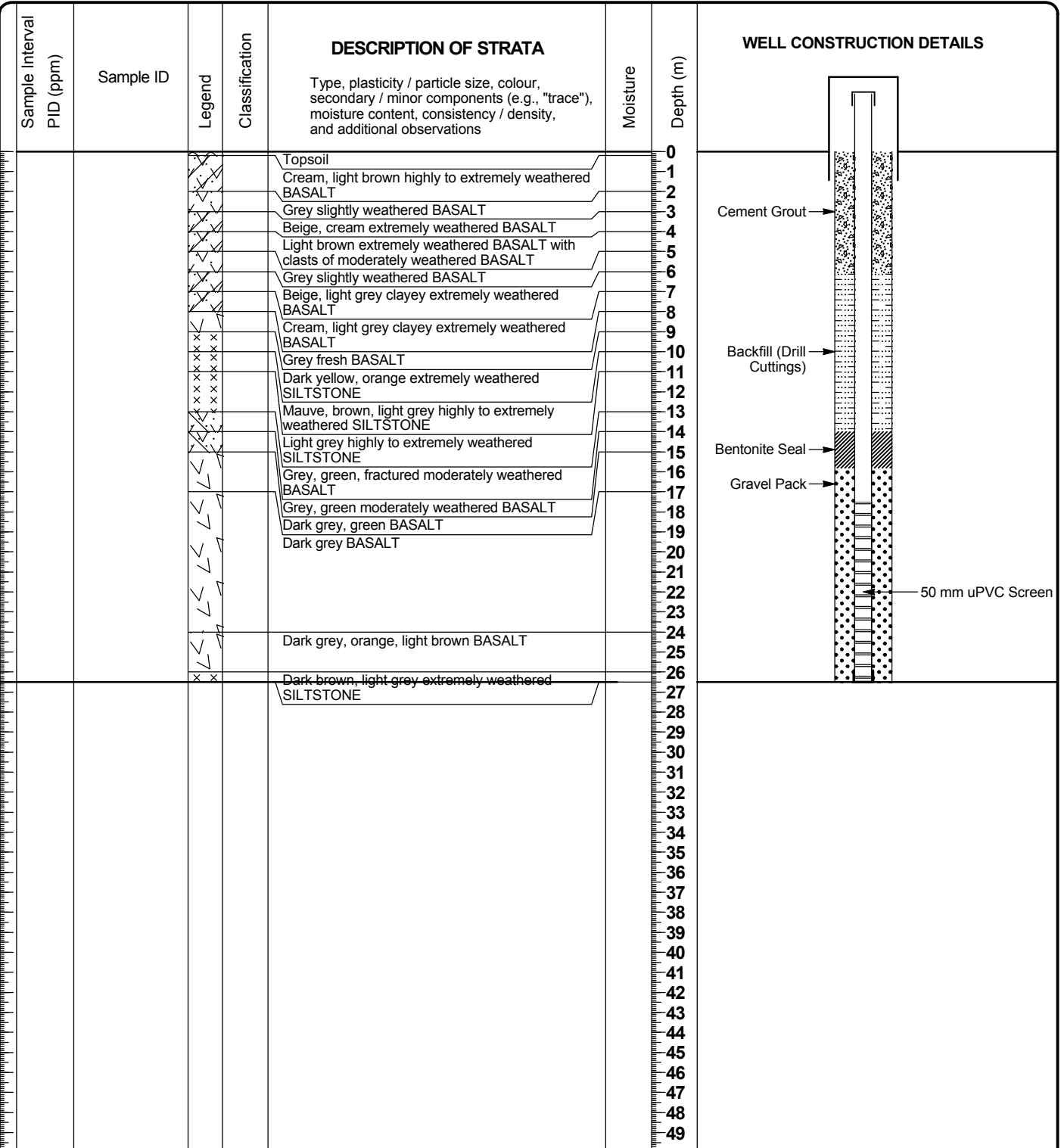
Date Started: **16-5-08**

Casing Size: **50 mm**

Permit No:

Drill Fluid: **Air**

Date Finished: **16-5-08**



MONITORING WELL Pz04

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**

Client: **BMA Coal**

Drilling Contractor: **Capricorn Weston Drilling**

Project No.: **42626162**

Location: **Peak Downs QLD**

Logged By: **AW**

Bore Size: **165 mm**

Relative Level: **mRL**

Drill Type: **Rotary Air**

Checked By: **SD**

Total Depth: **93.10 m**

Coordinates: **mN**

Drill Model: **UDR**

Date Started: **14-5-08**

Casing Size: **50 mm**

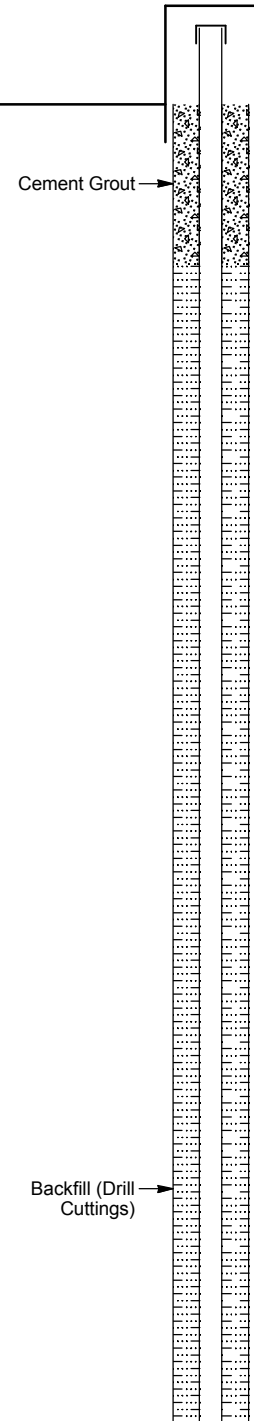
mE

Drill Fluid: **Air**

Date Finished: **15-4-08**

Permit No:

| 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 |
|------------------------------|-----------|--------|----------------|--|----------|-----------|---------------------------|
| | | | | 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 | |
| | | | | | | 7 | |
| | | | | Light grey CLAYSTONE | | 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 | |
| | | | | Light grey, light blue CLAYSTONE | | 18 | |
| | | | | | | 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 | |



MONITORING WELL Pz04

URS Australia Pty Ltd
Level 14, 240 Queen St, Brisbane QLD

Phone +61 7 3243 2111
Fax +61 7 3243 2199

Project No.: **42626162**

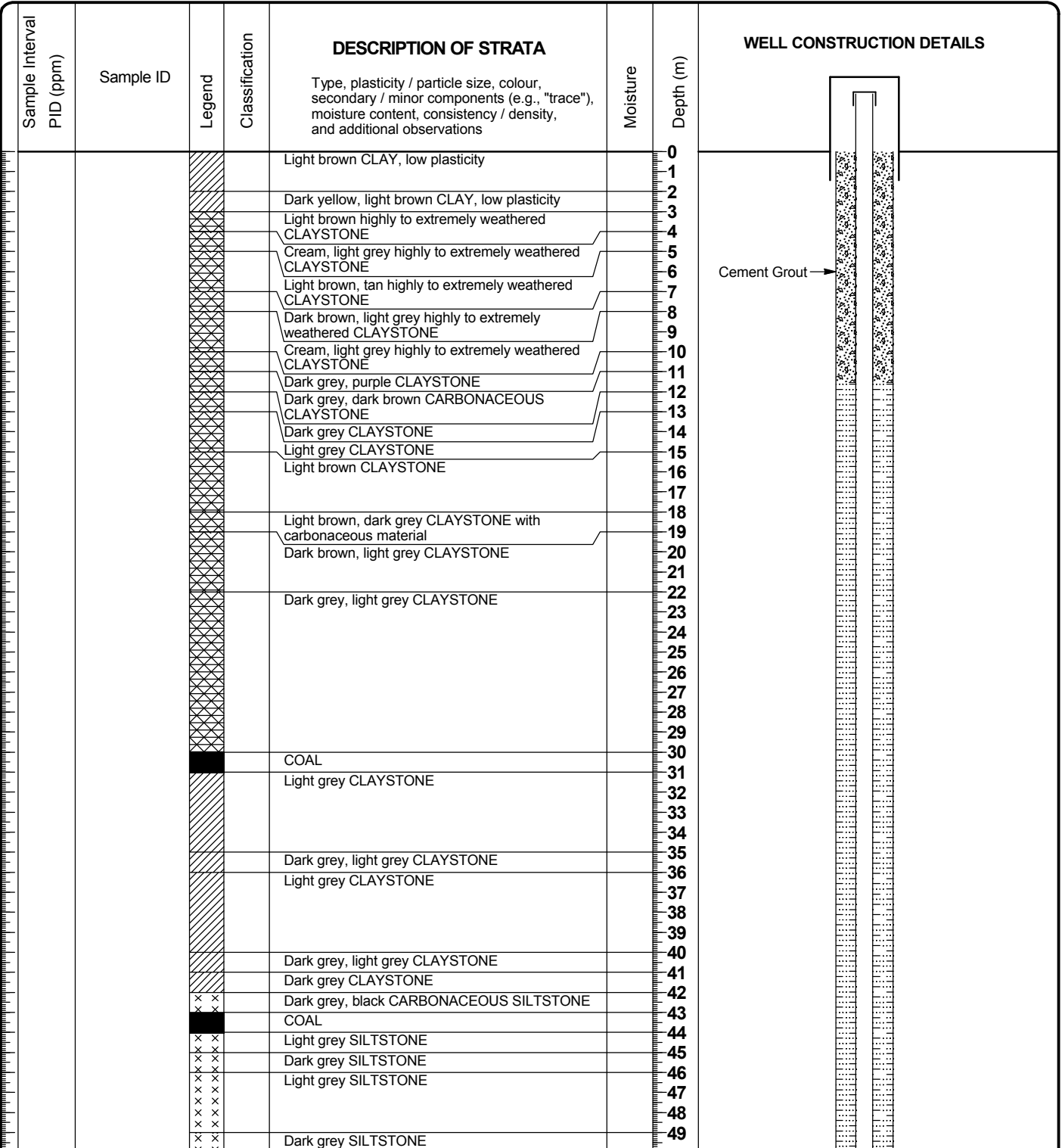
Project Reference: **Caval Ridge EIS**

| 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) | WELL CONSTRUCTION DETAILS |
|------------------------------|-----------|--------|----------------|--|----------|-----------|---|
| | | x x x | | Dark grey SILTSTONE | | 50 | <p>Bentonite Seal →</p> <p>Gravel Pack →</p> <p>50 mm uPVC Screen</p> |
| | | x x x | | Dark grey CARBONACEOUS SILTSTONE | | 51 | |
| | | ■ | | COAL | | 52 | |
| | | x x x | | Dark grey CARBONACEOUS SILTSTONE | | 53 | |
| | | x x x | | Dark grey SILTSTONE | | 54 | |
| | | ■ | | COAL | | 55 | |
| | | x x x | | Dark grey, black CARBONACEOUS SILTSTONE | | 56 | |
| | | x x x | | COAL | | 57 | |
| | | ■ | | COAL | | 58 | |
| | | x x x | | Light grey, light blue SILTSTONE | | 59 | |
| | | x x x | | Light blue, light grey SILTSTONE | | 60 | |
| | | x x x | | | | 61 | |
| | | x x x | | | | 62 | |
| | | x x x | | | | 63 | |
| | | x x x | | | | 64 | |
| | | x x x | | | | 65 | |
| | | x x x | | | | 66 | |
| | | x x x | | | | 67 | |
| | | x x x | | | | 68 | |
| | | x x x | | | | 69 | |
| | | x x x | | | | 70 | |
| | | x x x | | | | 71 | |
| | | x x x | | | | 72 | |
| | | x x x | | | | 73 | |
| | | x x x | | | | 74 | |
| | | x x x | | | | 75 | |
| | | x x x | | | | 76 | |
| | | x x x | | | | 77 | |
| | | x x x | | | | 78 | |
| | | x x x | | | | 79 | |
| | | x x x | | | | 80 | |
| | | x x x | | | | 81 | |
| | | x x x | | | | 82 | |
| | | x x x | | | | 83 | |
| | | x x x | | | | 84 | |
| | | x x x | | | | 85 | |
| | | x x x | | | | 86 | |
| | | x x x | | | | 87 | |
| | | x x x | | Dark grey SILTSTONE | | 88 | |
| | | x x x | | COAL | | 89 | |
| | | ■ | | COAL | | 90 | |
| | | x x x | | Dark grey CARBONACEOUS SILTSTONE | | 91 | |
| | | x x x | | | | 92 | |
| | | x x x | | | | 93 | |
| | | x x x | | | | 94 | |
| | | x x x | | | | 95 | |
| | | x x x | | | | 96 | |
| | | x x x | | | | 97 | |
| | | x x x | | | | 98 | |
| | | x x x | | | | 99 | |
| | | x x x | | | | 100 | |
| | | x x x | | | | 101 | |
| | | x x x | | | | 102 | |
| | | x x x | | | | 103 | |
| | | x x x | | | | 104 | |
| | | x x x | | | | 105 | |
| | | x x x | | | | 106 | |
| | | x x x | | | | 107 | |
| | | x x x | | | | 108 | |
| | | x x x | | | | 109 | |

MOD_WELL_CAVAL RIDGE BORE LOGS.GPJ WCC.AUS.GDT 7/10/08

MONITORING WELL Pz05

| | | | | |
|---|------------------------------|--|---|-------------------------|
| 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 | Client: BMA Coal |
| Drilling Contractor: Capricorn Weston Drilling | | Project No.: 42626162 | Location: Peak Downs QLD | |
| Logged By: AW | Bore Size: 165 mm | Relative Level: mRL | Drill Type: Rotary Air | |
| Checked By: SD | Total Depth: 118.00 m | Coordinates: mN mE | Drill Model: UDR | |
| Date Started: 16-5-08 | Casing Size: 50 mm | Permit No: | Drill Fluid: Air | |
| Date Finished: 17-5-08 | | | | |



MONITORING WELL Pz05

 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) | WELL CONSTRUCTION DETAILS |
|------------------------------|-----------|--------|----------------|--|----------|-----------|---------------------------|
| | | x x x | | Light grey SILTSTONE | | 50 | |
| | | x x x | | | | 51 | |
| | | x x x | | | | 52 | |
| | | x x x | | | | 53 | |
| | | x x x | | | | 54 | |
| | | x x x | | | | 55 | |
| | | x x x | | Light grey SILTSTONE and very fine SANDSTONE | | 56 | |
| | | x x x | | Light grey very fine to medium SANDSTONE | | 57 | |
| | | x x x | | | | 58 | |
| | | x x x | | | | 59 | |
| | | x x x | | Dark grey SILTSTONE | | 60 | |
| | | x x x | | Light grey very fine to medium SANDSTONE | | 61 | |
| | | x x x | | | | 62 | |
| | | x x x | | | | 63 | |
| | | x x x | | | | 64 | |
| | | x x x | | | | 65 | |
| | | x x x | | | | 66 | |
| | | x x x | | | | 67 | |
| | | x x x | | | | 68 | |
| | | x x x | | | | 69 | |
| | | x x x | | | | 70 | |
| | | x x x | | | | 71 | |
| | | x x x | | | | 72 | |
| | | x x x | | | | 73 | |
| | | x x x | | | | 74 | |
| | | x x x | | | | 75 | |
| | | x x x | | Dark grey CARBONACEOUS MUDSTONE and COAL | | 76 | |
| | | x x x | | Dark grey very fine to medium CARBONACEOUS SANDSTONE | | 77 | |
| | | x x x | | Light grey very fine to medium SANDSTONE | | 78 | |
| | | x x x | | Light grey SILTSTONE | | 79 | |
| | | x x x | | | | 80 | |
| | | x x x | | | | 81 | |
| | | x x x | | | | 82 | |
| | | x x x | | | | 83 | |
| | | x x x | | | | 84 | |
| | | x x x | | Dark grey slightly CARBONACEOUS SILTSTONE | | 85 | |
| | | x x x | | Dark grey SILTSTONE | | 86 | |
| | | x x x | | | | 87 | |
| | | x x x | | | | 88 | |
| | | x x x | | Light grey SILTSTONE | | 89 | |
| | | x x x | | | | 90 | |
| | | x x x | | | | 91 | |
| | | x x x | | | | 92 | |
| | | x x x | | | | 93 | |
| | | x x x | | | | 94 | |
| | | x x x | | | | 95 | |
| | | x x x | | | | 96 | |
| | | x x x | | Light grey sandy SILTSTONE | | 97 | |
| | | x x x | | Light grey SILTSTONE | | 98 | |
| | | x x x | | | | 99 | |
| | | x x x | | | | 100 | |
| | | x x x | | Dark grey fine CARBONACEOUS SANDSTONE and COAL | | 101 | |
| | | x x x | | Dark grey SILTSTONE | | 102 | |
| | | x x x | | | | 103 | |
| | | x x x | | | | 104 | |
| | | x x x | | Light grey SILTSTONE | | 105 | |
| | | x x x | | Dark grey SILTSTONE | | 106 | |
| | | x x x | | Light grey SILTSTONE | | 107 | |
| | | x x x | | Dark grey SILTSTONE | | 108 | |
| | | x x x | | Light grey SILTSTONE | | 109 | |

MONITORING WELL Pz05

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) | WELL CONSTRUCTION DETAILS |
|------------------------------|-----------|-----------------------|----------------|--|----------|-----------|---|
| | | x x x x x | | | | 110 | <p>Bentonite Seal →</p> <p>Gravel Pack →</p> <p>50 mm uPVC Screen →</p> |
| | | x x x x x | | Dark grey, black CARBONACEOUS MUDSTONE | | 111 | |
| | | x x x x x | | Dark grey, black CARBONACEOUS SILTSTONE | | 112 | |
| | | x x x x x | | Dark grey, black CARBONACEOUS SILTSTONE | | 113 | |
| | | x x x x x | | Dark grey, black CARBONACEOUS SILTSTONE | | 114 | |
| | | x x x x x | | COAL | | 115 | |
| | | x x x x x | | Dark grey, black CARBONACEOUS SILTSTONE and COAL | | 116 | |
| | | x x x x x | | Dark grey, black CARBONACEOUS SILTSTONE | | 117 | |
| | | x x x x x | | Dark grey, black CARBONACEOUS SILTSTONE | | 118 | |
| | | | | | | 119 | |
| | | | | | | 120 | |
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MONITORING WELL Pz06-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**

Client: **BMA Coal**

Drilling Contractor: **Capricorn Weston Drilling**

Project No.: **42626162**

Location: **Peak Downs QLD**

Logged By: **AW**

Bore Size: **165 mm**

Relative Level: **mRL**

Drill Type: **Rotary Air**

Checked By: **SD**

Total Depth: **84.00 m**

Coordinates: **mN**

Drill Model: **UDR**

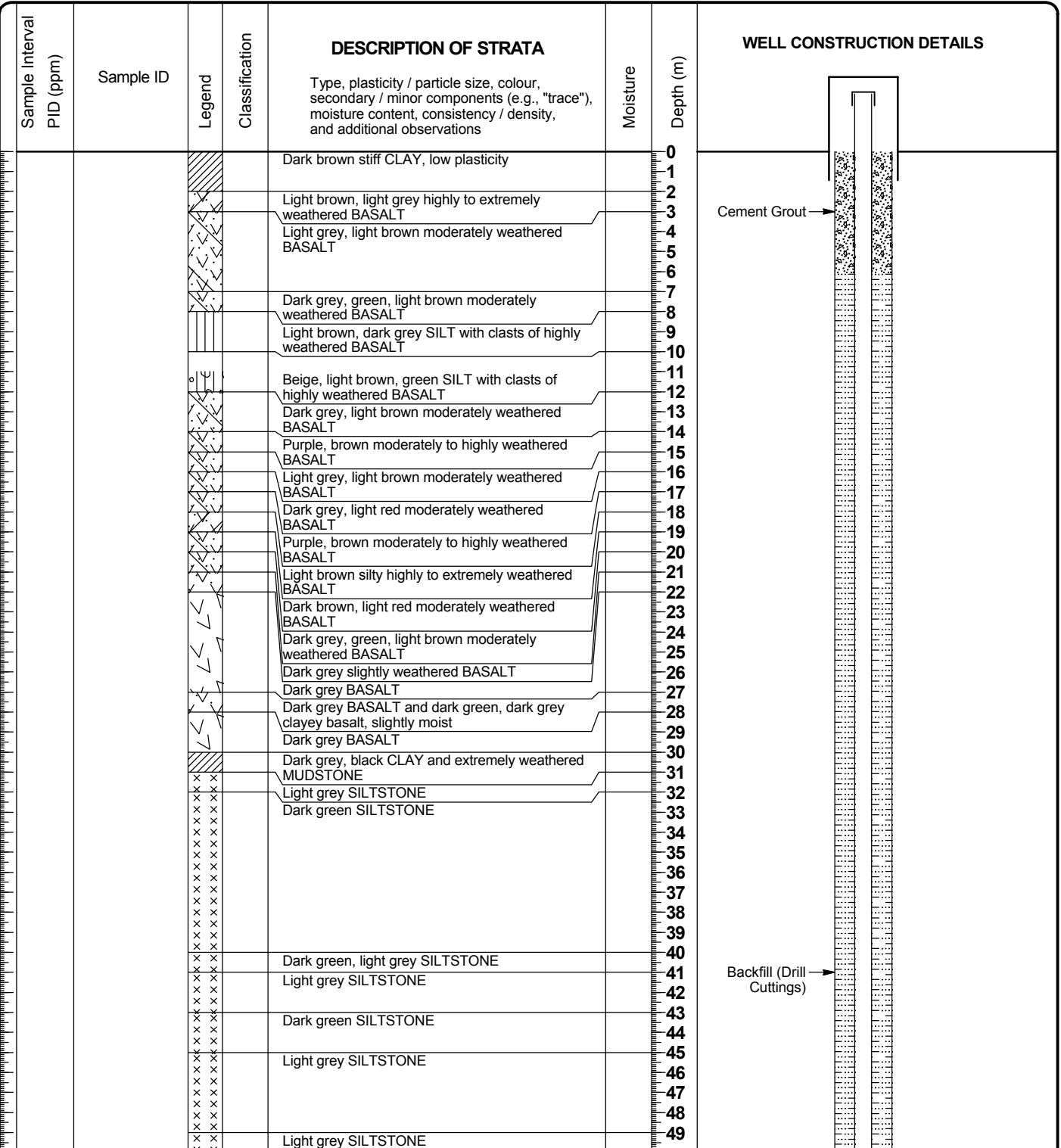
Date Started: **19-5-08**

Casing Size: **50 mm**

Permit No:

Drill Fluid: **Air**

Date Finished: **19-5-08**



MONITORING WELL Pz06-D

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) | WELL CONSTRUCTION DETAILS |
|------------------------------|-----------|---------|----------------|--|----------|-----------|---|
| | | x x x x | | | | 50 | <p>Bentonite Seal</p> <p>Gravel Pack</p> <p>50 mm uPVC Screen</p> |
| | | x x x x | | | | 51 | |
| | | x x x x | | | | 52 | |
| | | x x x x | | | | 53 | |
| | | x x x x | | | | 54 | |
| | | x x x x | | | | 55 | |
| | | x x x x | | | | 56 | |
| | | x x x x | | | | 57 | |
| | | x x x x | | | | 58 | |
| | | x x x x | | | | 59 | |
| | | x x x x | | | | 60 | |
| | | x x x x | | Light grey fine SANDSTONE | | 61 | |
| | | x x x x | | | | 62 | |
| | | x x x x | | Light grey fine to medium SANDSTONE | | 63 | |
| | | x x x x | | Light grey fine SANDSTONE | | 64 | |
| | | x x x x | | | | 65 | |
| | | x x x x | | Dark grey fine SANDSTONE | | 66 | |
| | | x x x x | | | | 67 | |
| | | x x x x | | | | 68 | |
| | | x x x x | | | | 69 | |
| | | x x x x | | | | 70 | |
| | | x x x x | | | | 71 | |
| | | x x x x | | | | 72 | |
| | | x x x x | | | | 73 | |
| | | x x x x | | | | 74 | |
| | | x x x x | | | | 75 | |
| | | x x x x | | | | 76 | |
| | | x x x x | | Black, dark grey CARBONACEOUS SILTSTONE and COAL | | 77 | |
| | | x x x x | | COAL | | 78 | |
| | | x x x x | | | | 79 | |
| | | x x x x | | | | 80 | |
| | | x x x x | | | | 81 | |
| | | x x x x | | | | 82 | |
| | | x x x x | | Dark grey SILTSTONE | | 83 | |
| | | x x x x | | | | 84 | |
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MOD_WELL CAVAL RIDGE BORE LOGS.GPJ WCC.AUS.GDT 7/10/08

MONITORING WELL Pz06-S

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**

Client: **BMA Coal**

Drilling Contractor: **Capricorn Weston Drilling**

Project No.: **42626162**

Location: **Peak Downs QLD**

Logged By: **AW**

Bore Size: **165 mm**

Relative Level: **mRL**

Drill Type: **Rotary Air**

Checked By: **SD**

Total Depth: **31.00 m**

Coordinates: **mN**

Drill Model: **UDR**

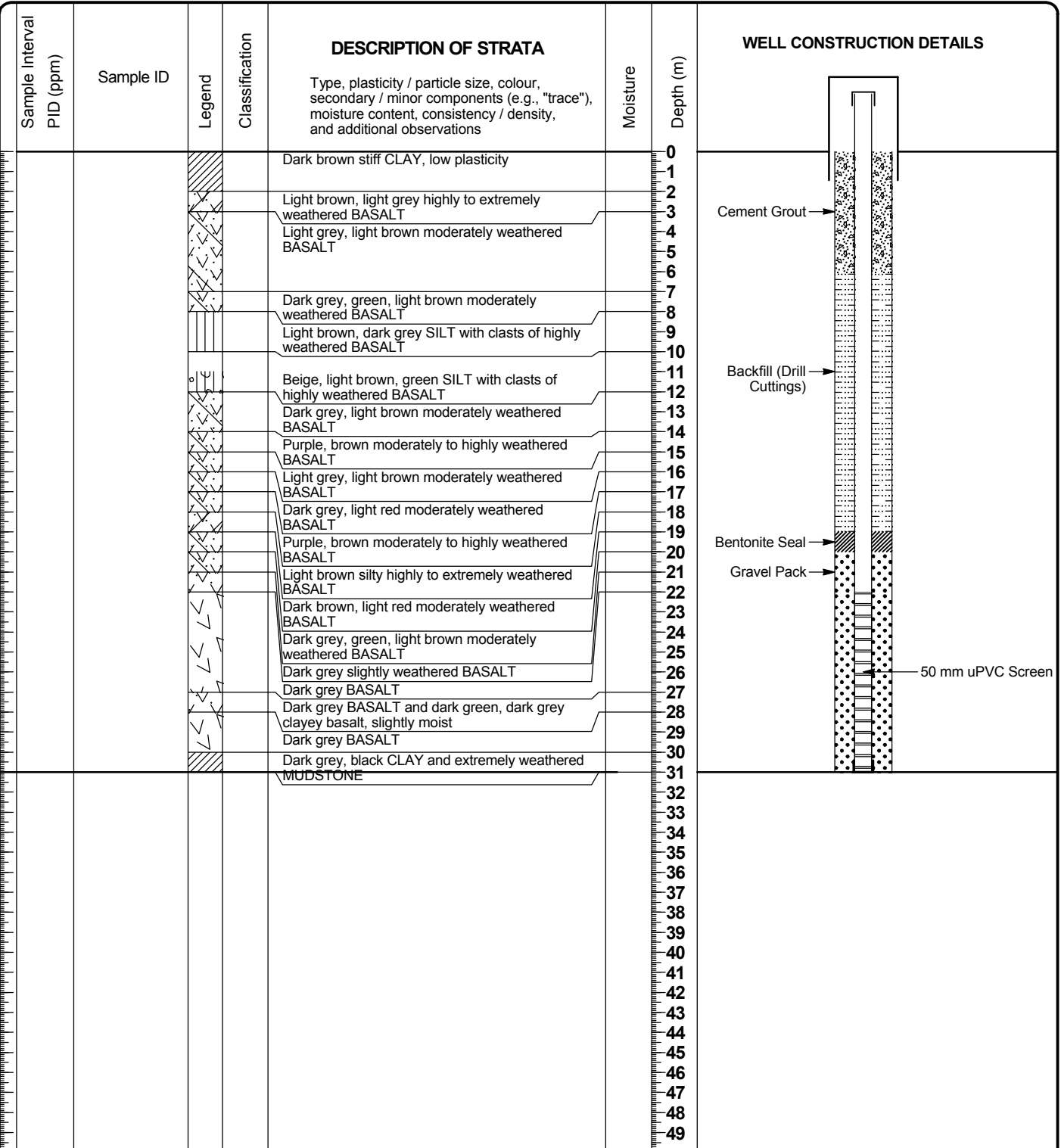
Date Started: **19-5-08**

Casing Size: **50 mm**

Permit No:

Drill Fluid: **Air**

Date Finished: **19-5-08**



MONITORING WELL Pz07-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**

Client: **BMA Coal**

Drilling Contractor: **Capricorn Weston Drilling**

Project No.: **42626162**

Location: **Peak Downs QLD**

Logged By: **AW**

Bore Size: **165 mm**

Relative Level: **mRL**

Drill Type: **Rotary Air**

Checked By: **SD**

Total Depth: **44.00 m**

Coordinates: **mN**

Drill Model: **UDR**

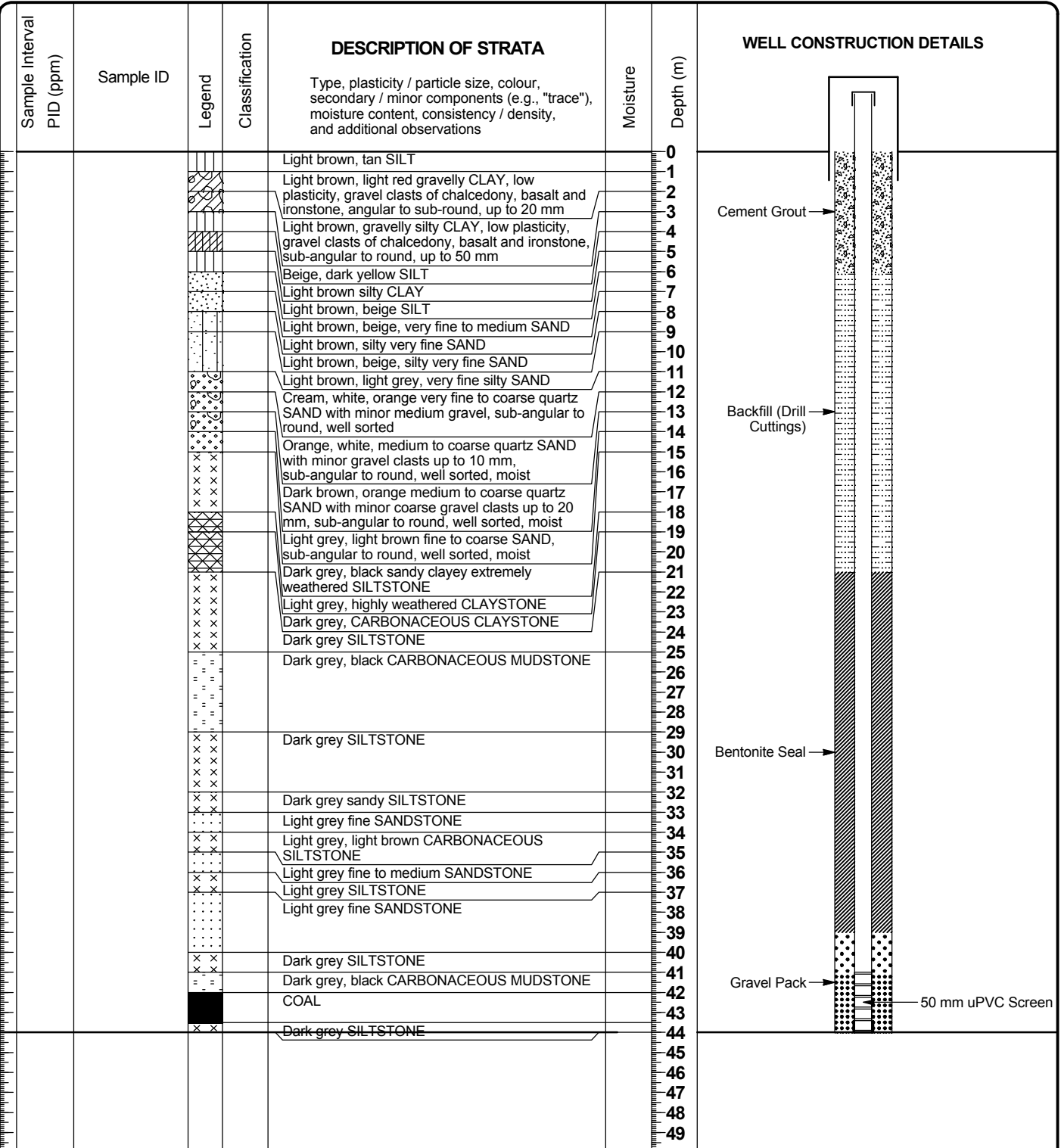
Date Started: **18-5-08**

Casing Size: **50 mm**

Permit No:

Drill Fluid: **Air**

Date Finished: **18-5-08**



MONITORING WELL Pz07-S

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**

Client: **BMA Coal**

Drilling Contractor: **Capricorn Weston Drilling**

Project No.: **42626162**

Location: **Peak Downs QLD**

Logged By: **AW**

Bore Size: **165 mm**

Relative Level: **mRL**

Drill Type: **Rotary Air**

Checked By: **SD**

Total Depth: **16.00 m**

Coordinates: **mN**

Drill Model: **UDR**

Date Started: **18-5-08**

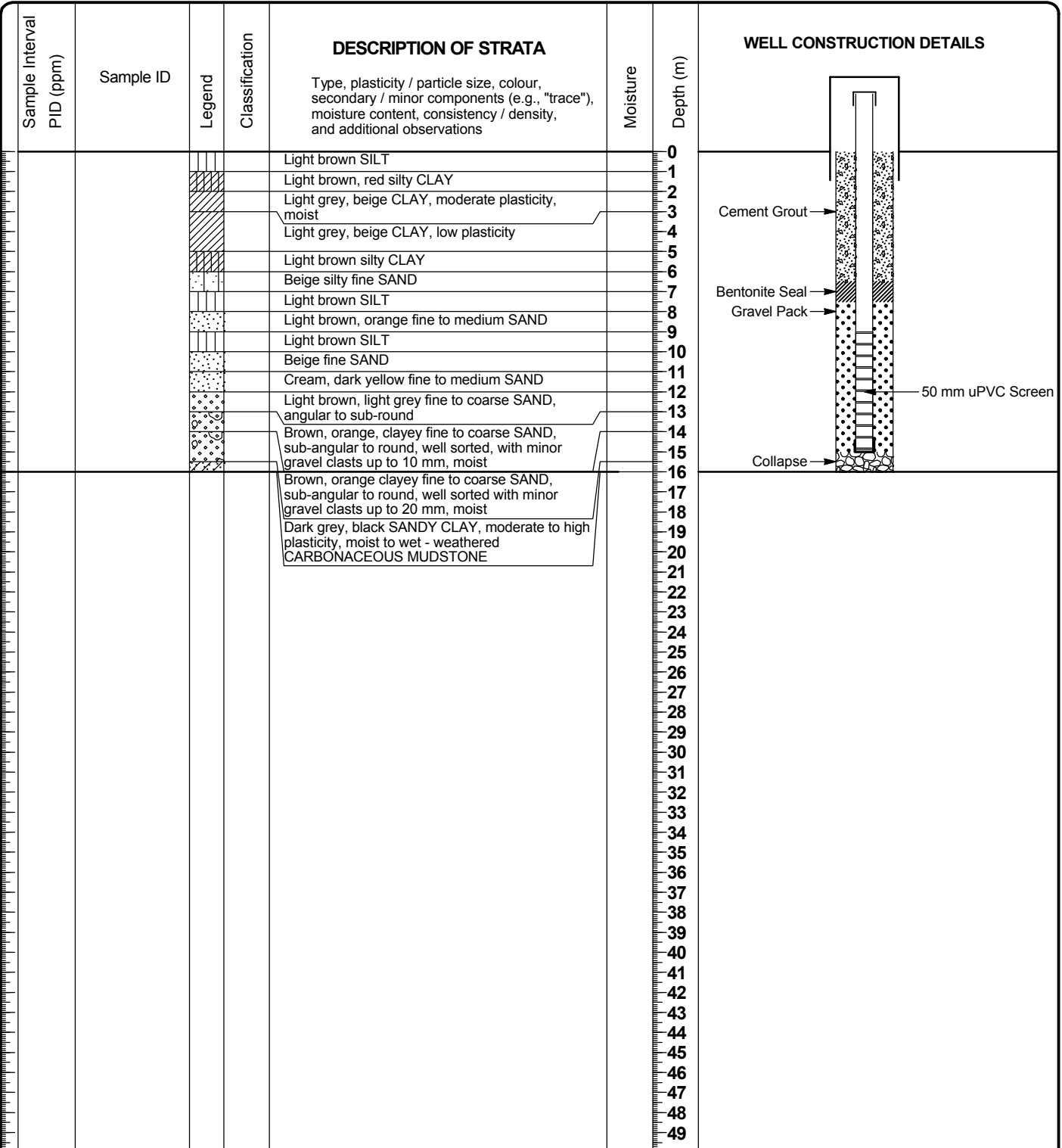
Casing Size: **50 mm**

mE

Drill Fluid: **Air**

Date Finished: **18-5-08**

Permit No:



MONITORING WELL Pz08-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**

Client: **BMA Coal**

Drilling Contractor: **Capricorn Weston Drilling**

Project No.: **42626162**

Location: **Peak Downs QLD**

Logged By: **AW**

Bore Size: **165 mm**

Relative Level: **mRL**

Drill Type: **Rotary Air**

Checked By: **SD**

Total Depth: **63.00 m**

Coordinates: **mN**

Drill Model: **UDR**

Date Started: **17-5-08**

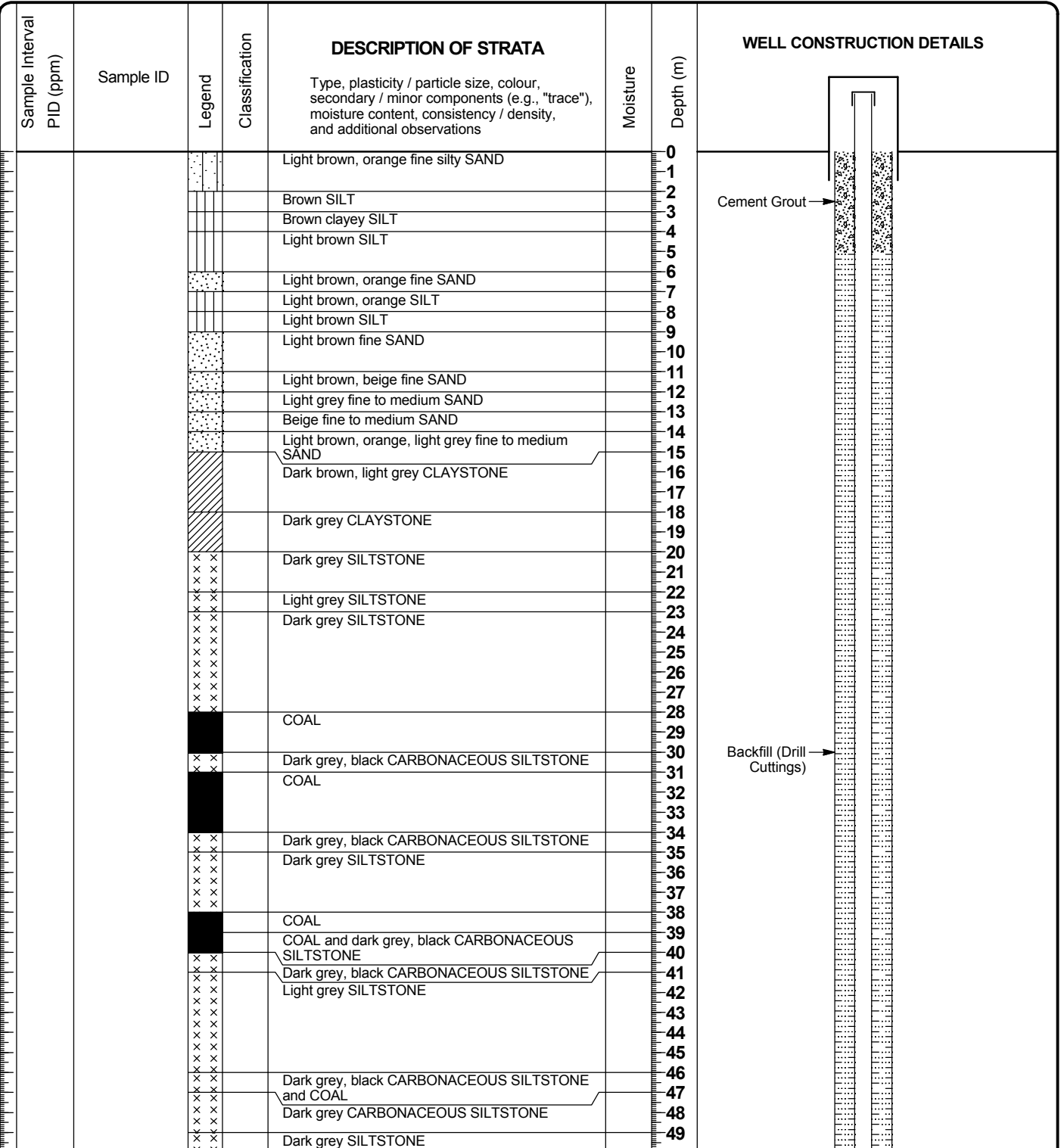
Casing Size: **50 mm**

mE

Drill Fluid: **Air**

Date Finished: **17-5-08**

Permit No:



MONITORING WELL Pz08-D

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) | WELL CONSTRUCTION DETAILS |
|------------------------------|-----------|---------|----------------|--|----------|-----------|---|
| | | x x x x | | | | 50 | <p>Bentonite Seal</p> <p>Gravel Pack</p> <p>50 mm uPVC Screen</p> |
| | | x x x x | | | | 51 | |
| | | x x x x | | | | 52 | |
| | | x x x x | | Light grey SILTSTONE | | 53 | |
| | | x x x x | | Light grey very fine sandy SILTSTONE | | 54 | |
| | | x x x x | | Light grey SANDSTONE | | 55 | |
| | | x x x x | | | | 56 | |
| | | x x x x | | | | 57 | |
| | | x x x x | | | | 58 | |
| | | x x x x | | Dark grey, black CARBONACEOUS SILTSTONE | | 59 | |
| | | x x x x | | Dark grey SILTSTONE, possibly fractured, water | | 60 | |
| | | x x x x | | Dark grey SILTSTONE possibly fractured | | 61 | |
| | | x x x x | | | | 62 | |
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MONITORING WELL Pz08-S

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**

Client: **BMA Coal**

Drilling Contractor: **Capricorn Weston Drilling**

Project No.: **42626162**

Location: **Peak Downs QLD**

Logged By: **AW**

Bore Size: **165 mm**

Relative Level: **mRL**

Drill Type: **Rotary Air**

Checked By: **SD**

Total Depth: **16.00 m**

Coordinates: **mN**

Drill Model: **UDR**

Date Started: **17-5-08**

Casing Size: **50 mm**

mE

Drill Fluid: **Air**

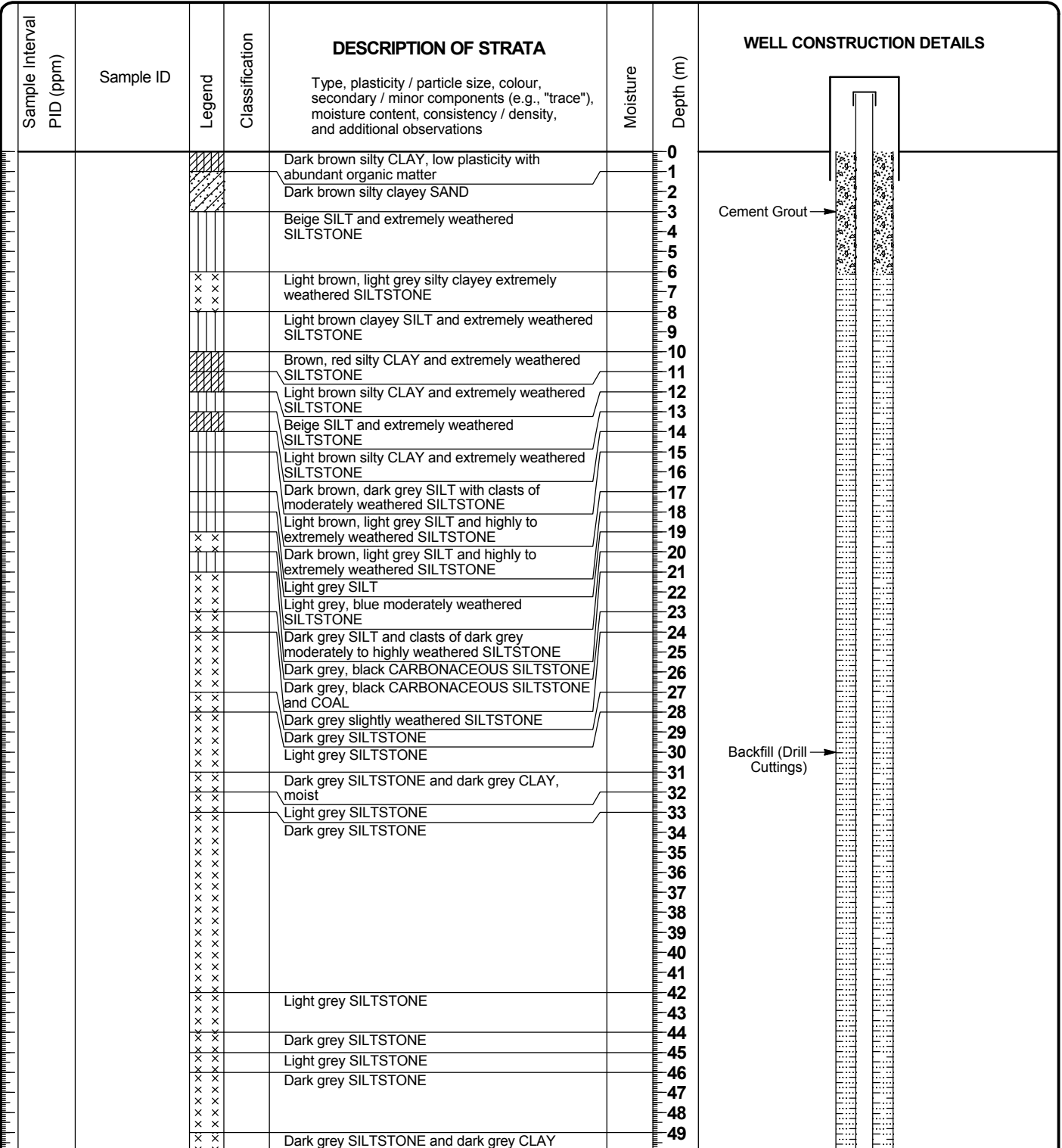
Date Finished: **17-5-08**

Permit No:

| 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 brown, orange fine silty SAND | | 0 | |
| | | | | Brown SILT | | 1 | |
| | | | | Brown clayey SILT | | 2 | |
| | | | | Light brown SILT | | 3 | |
| | | | | | | 4 | |
| | | | | Light brown, orange fine SAND | | 5 | |
| | | | | Light brown, orange SILT | | 6 | |
| | | | | Light brown SILT | | 7 | |
| | | | | Light brown fine SAND | | 8 | |
| | | | | Light brown, beige fine SAND | | 9 | |
| | | | | Light grey fine to medium SAND | | 10 | |
| | | | | Beige fine to medium SAND | | 11 | |
| | | | | Light brown, orange, light grey fine to medium SAND | | 12 | |
| | | | | Dark brown, light grey CLAYSTONE | | 13 | |
| | | | | | | 14 | |
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MONITORING WELL Pz09

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|---|-----------------------------|--|---|---------------------------------|
| 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 | Client: BMA Coal |
| Drilling Contractor: Capricorn Weston Drilling | | | Project No.: 42626162 | Location: Peak Downs QLD |
| Logged By: AW | Bore Size: 165 mm | Relative Level: mRL | Drill Type: Rotary Air | |
| Checked By: SD | Total Depth: 77.00 m | Coordinates: mN | Drill Model: UDR | |
| Date Started: 21-5-08 | Casing Size: 50 mm | mE | Drill Fluid: Air | |
| Date Finished: 23-5-08 | | Permit No: | | |



MONITORING WELL Pz09

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) | WELL CONSTRUCTION DETAILS |
|------------------------------|-----------|-------------------|----------------|--|----------|-----------|---|
| | | x x x | | Light grey SILTSTONE | | 50 | <p>Bentonite Seal</p> <p>Gravel Pack</p> <p>50 mm uPVC Screen</p> |
| | | x x x | | Light grey, black SILTSTONE | | 51 | |
| | | x x x | | Light grey SILTSTONE | | 52 | |
| | | x x x | | Dark grey SILTSTONE | | 53 | |
| | | x x x | | Dark grey SILTSTONE | | 54 | |
| | | x x x | | Dark grey SILTSTONE | | 55 | |
| | | x x x | | Dark grey SILTSTONE | | 56 | |
| | | x x x | | Dark grey SILTSTONE | | 57 | |
| | | x x x | | Dark grey SILTSTONE | | 58 | |
| | | x x x | | Dark grey SILTSTONE | | 59 | |
| | | x x x | | Dark grey SILTSTONE | | 60 | |
| | | x x x | | Light grey SILTSTONE | | 61 | |
| | | Diagonal Hatching | | Light grey, dark grey CLAY, moist | | 62 | |
| | | x x x | | Light grey SILTSTONE | | 63 | |
| | | x x x | | Light grey SILTSTONE | | 64 | |
| | | x x x | | Dark grey SILTSTONE - hard | | 65 | |
| | | x x x | | Light grey SILTSTONE | | 66 | |
| | | Diagonal Hatching | | Light grey CLAY, slightly moist | | 67 | |
| | | x x x | | Light grey moderately weathered SILTSTONE | | 68 | |
| | | x x x | | Dark grey SILTSTONE | | 69 | |
| | | Black | | COAL | | 70 | |
| | | Black | | COAL | | 71 | |
| | | x x x | | Dark grey, black, light brown CARBONACEOUS SILTSTONE | | 72 | |
| | | x x x | | Dark grey, black, light brown CARBONACEOUS SILTSTONE | | 73 | |
| | | x x x | | Dark grey, black, light brown CARBONACEOUS SILTSTONE | | 74 | |
| | | Black | | COAL | | 75 | |
| | | x x x | | Light grey SILTSTONE | | 76 | |
| | | x x x | | Light grey SILTSTONE | | 77 | |
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MONITORING WELL Pz10

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**

Client: **BMA Coal**

Drilling Contractor: **Capricorn Weston Drilling**

Project No.: **42626162**

Location: **Peak Downs QLD**

Logged By: **AW**

Bore Size: **165 mm**

Relative Level: **mRL**

Drill Type: **Rotary Air**

Checked By: **SD**

Total Depth: **83.00 m**

Coordinates: **mN**

Drill Model: **UDR**

Date Started: **20-5-08**

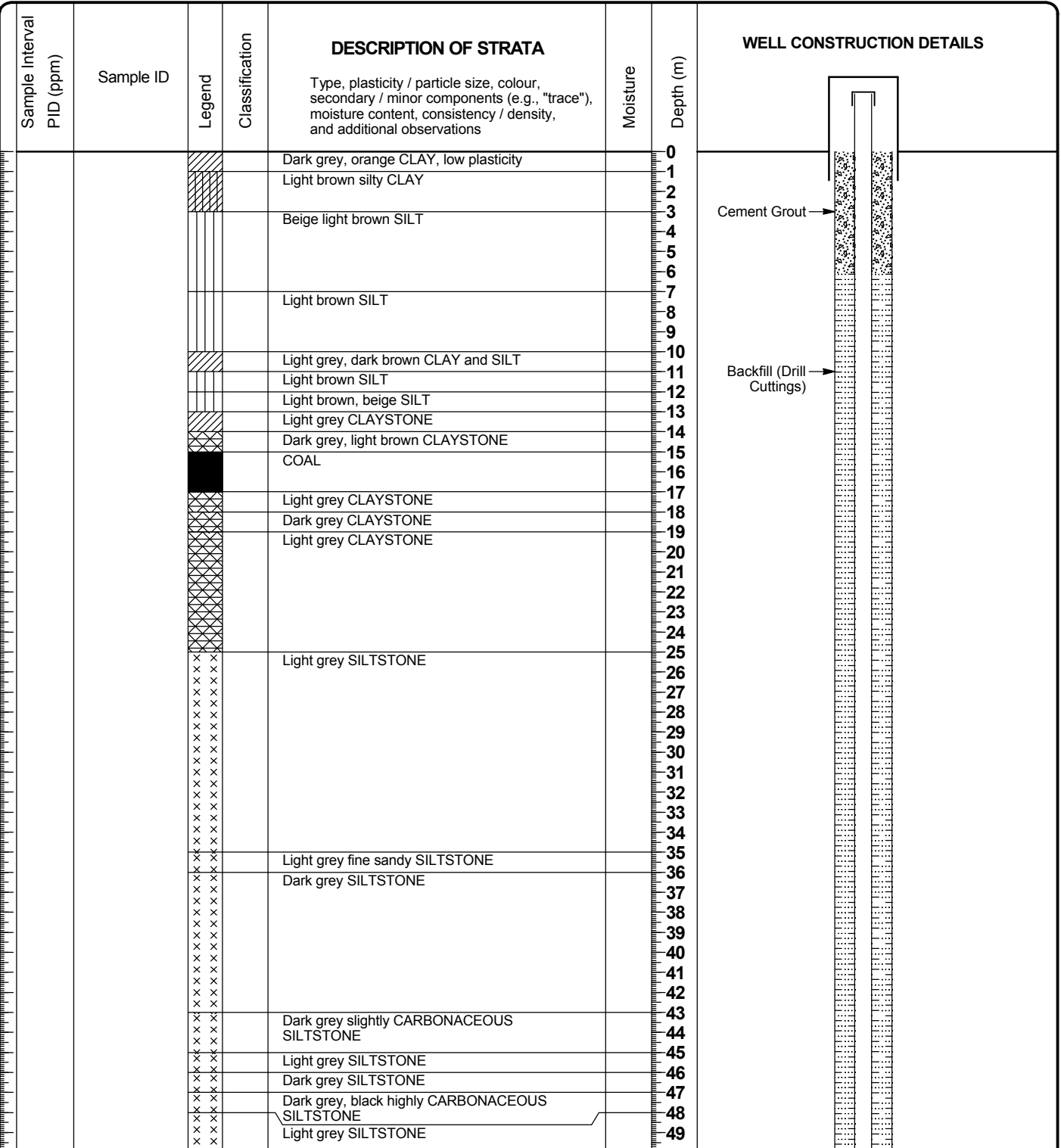
Casing Size: **50 mm**

mE

Drill Fluid: **Air**

Date Finished: **21-5-08**

Permit No:



MONITORING WELL Pz10

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) | WELL CONSTRUCTION DETAILS |
|------------------------------|-----------|--------|----------------|--|----------|-----------|---|
| | | | | COAL | | 50 | <p>Bentonite Seal</p> <p>Gravel Pack</p> <p>50 mm uPVC Screen</p> |
| | | | | COAL and CARBONACEOUS SILTSTONE | | 51 | |
| | | | | Light grey SILTSTONE | | 52 | |
| | | | | Dark grey SILTSTONE | | 53 | |
| | | | | Light grey SILTSTONE | | 54 | |
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| | | | | | | 76 | |
| | | | | Dark grey clayey slightly CARBONACEOUS MUDSTONE | | 77 | |
| | | | | Dark brown MUDSTONE | | 78 | |
| | | | | COAL with some highly CARBONACEOUS MUDSTONE | | 79 | |
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MOD_WELL_CAVAL RIDGE BORE LOGS.GPJ WCC.AUS.GDT 7/10/08

MONITORING WELL Pz11-S and Pz11D

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**

Client: **BMA Coal**

Drilling Contractor: **Capricorn Weston Drilling**

Project No.: **42626162**

Location: **Peak Downs QLD**

Logged By: **AW**

Bore Size: **165 mm**

Relative Level: **mRL**

Drill Type: **Rotary Air**

Checked By: **SD**

Total Depth: **58.00 m**

Coordinates: **mN**

Drill Model: **UDR**

Date Started: **21-5-08**

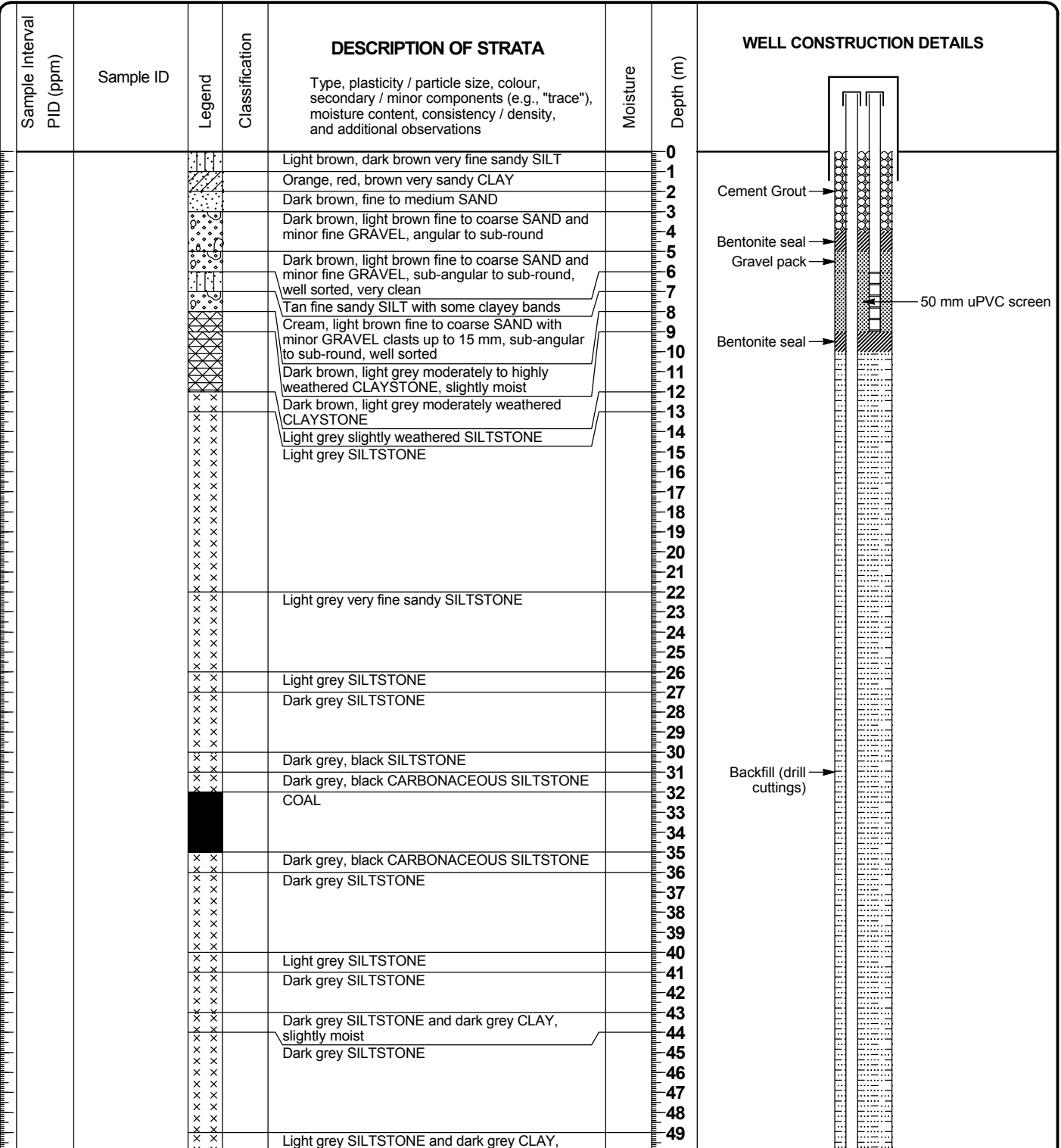
Casing Size: **50 mm**

mE

Drill Fluid: **Air**

Date Finished: **21-5-08**

Permit No:



Falling/Rising Head Test Data

Appendix D

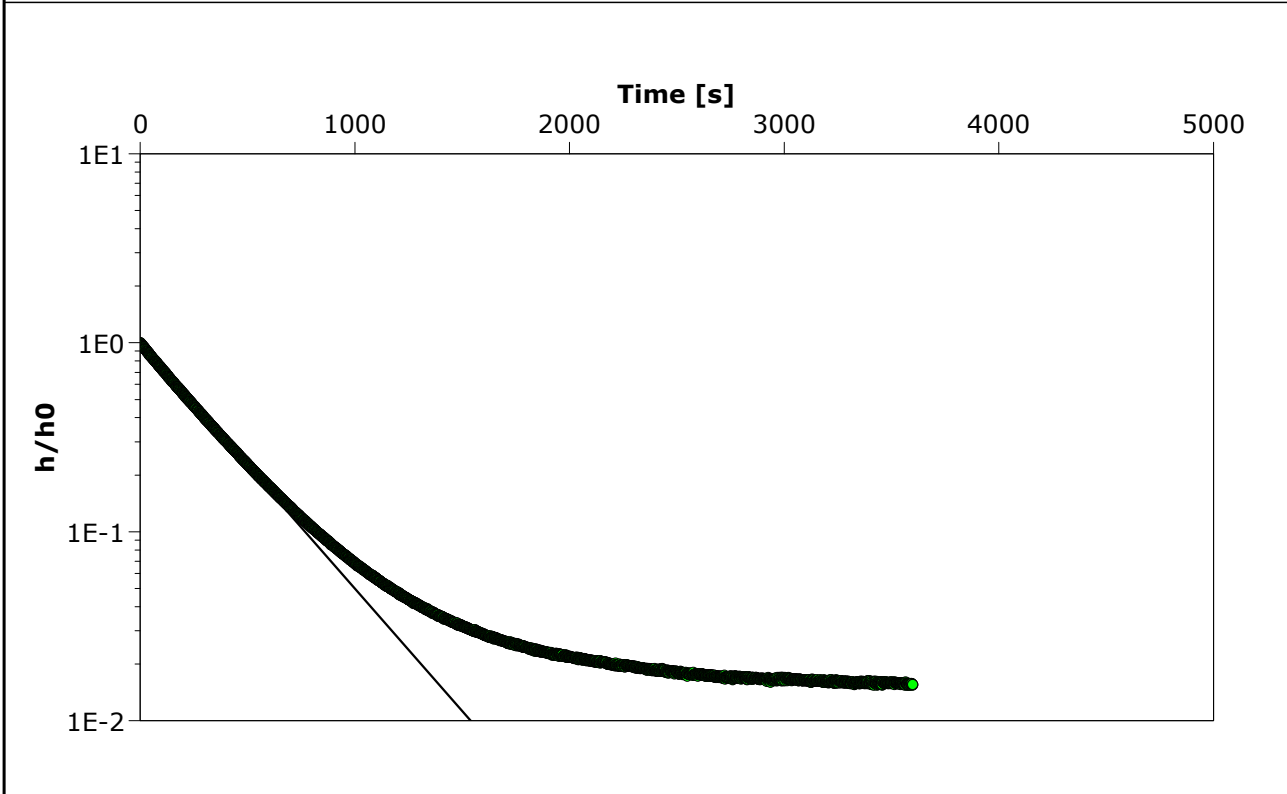


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| | |
|----------------------------------|-----------------|
| Slug Test Analysis Report | |
| Project: | Caval Ridge EIS |
| Number: | 42626162 |
| Client: | BMA Coal |

| | | |
|---------------------------|--------------------|----------------------|
| 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

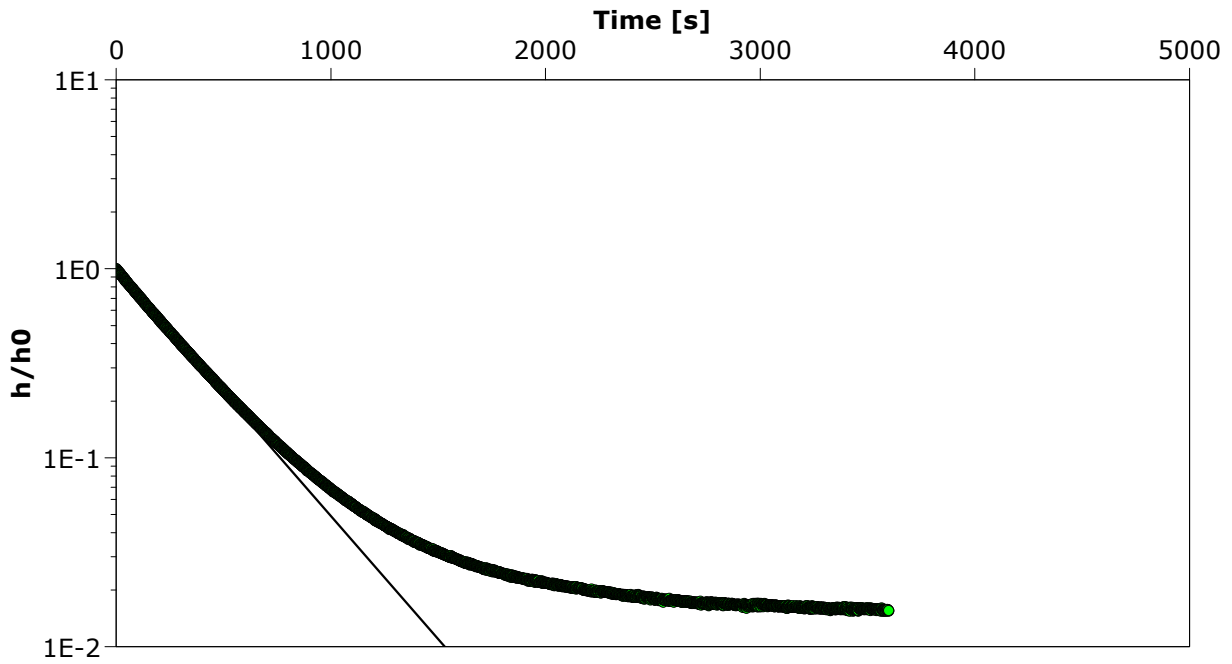
Test date: 8/06/2008

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

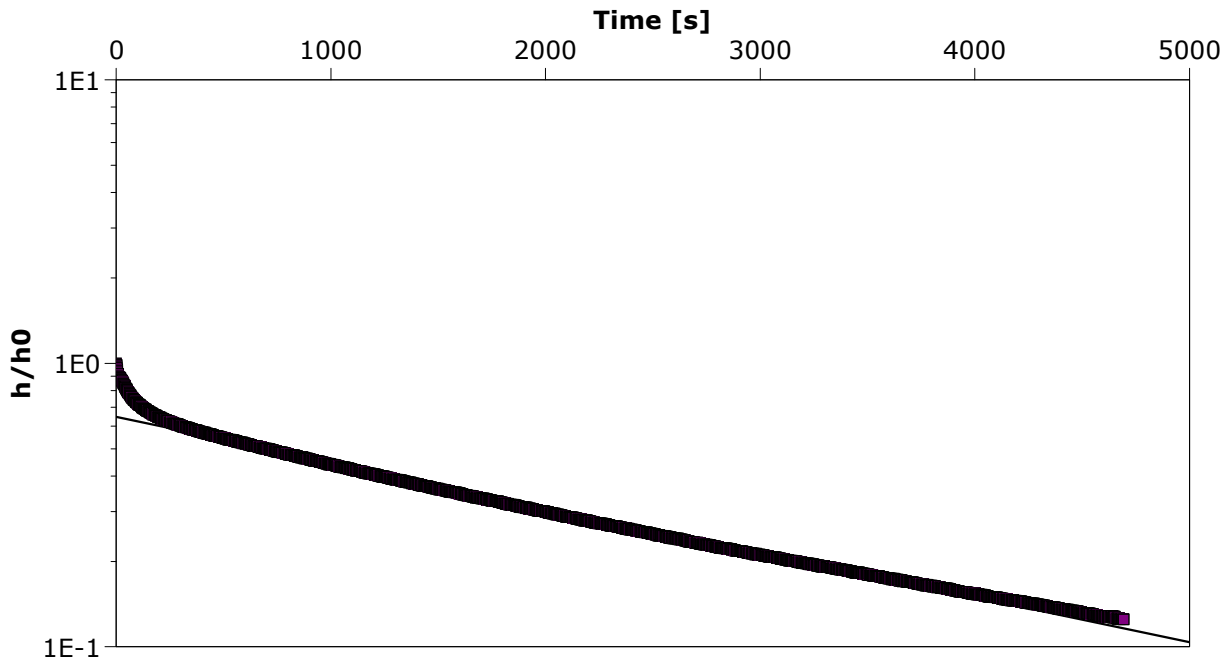
Test date: 8/06/2008

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} | |

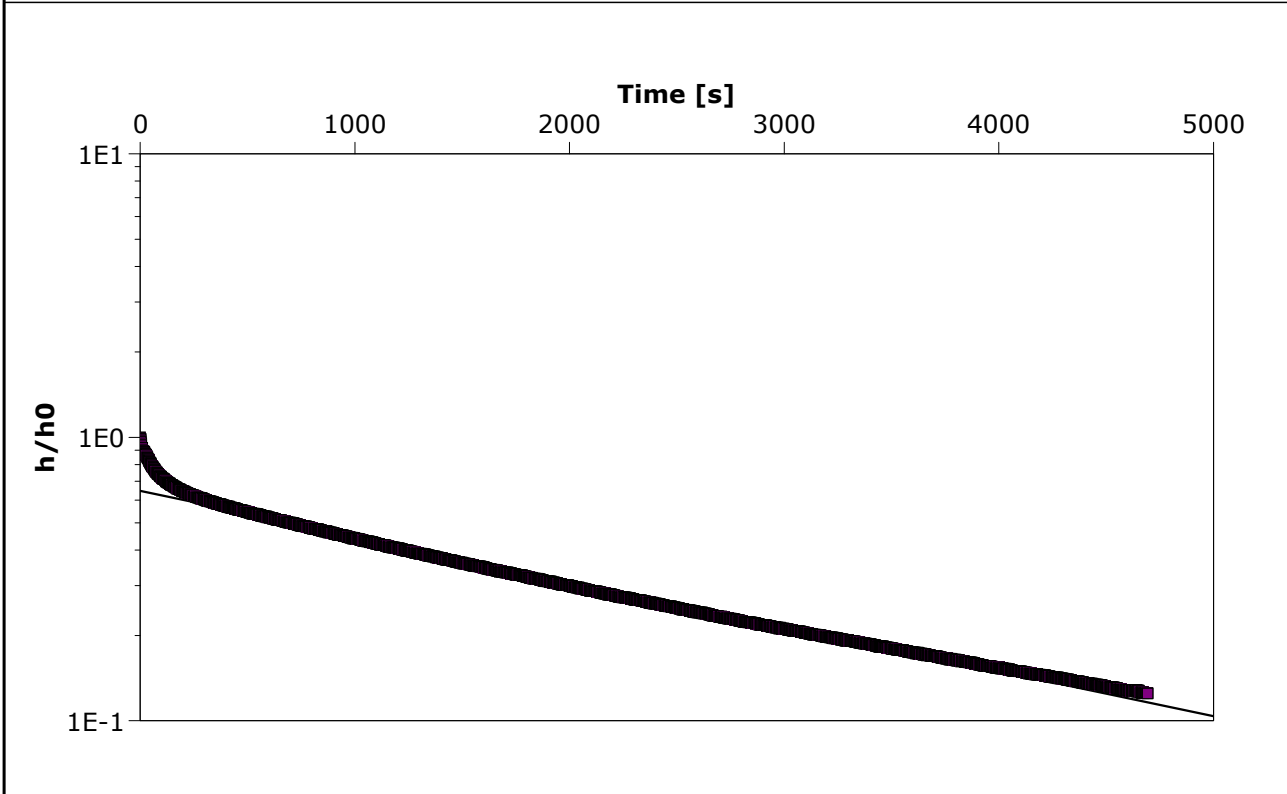


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| | |
|----------------------------------|-----------------|
| Slug Test Analysis Report | |
| Project: | Caval Ridge EIS |
| Number: | 42626162 |
| Client: | BMA Coal |

| | | |
|---------------------------|-----------------|----------------------|
| 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

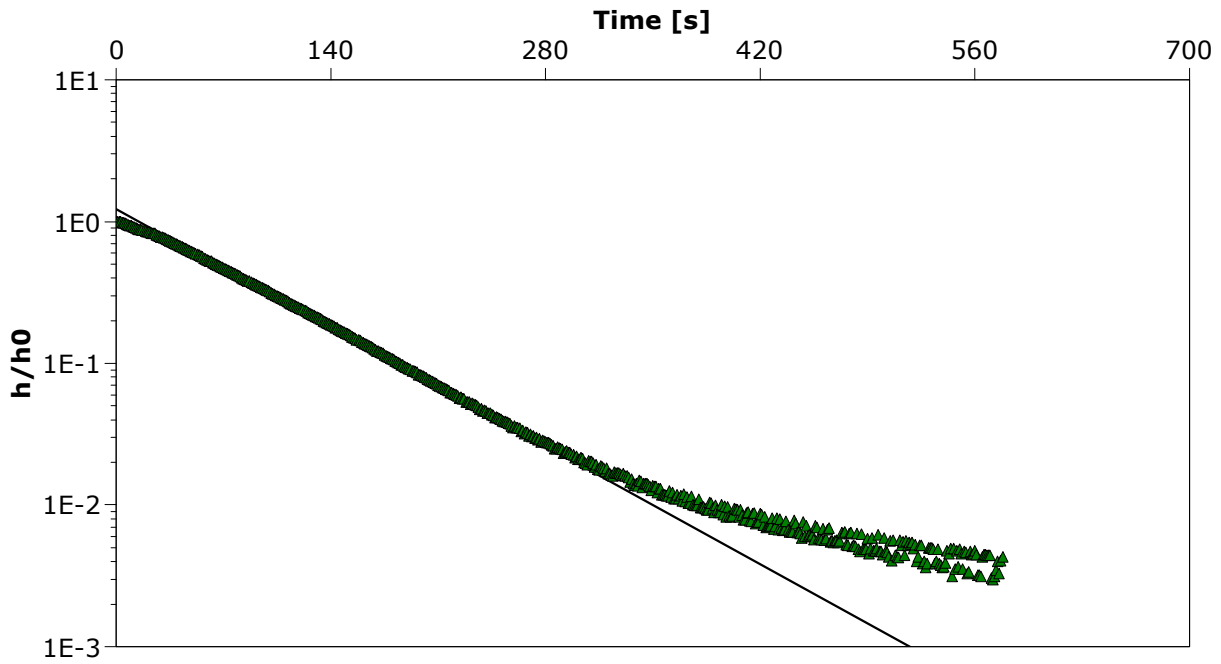
Test date: 7/06/2008

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

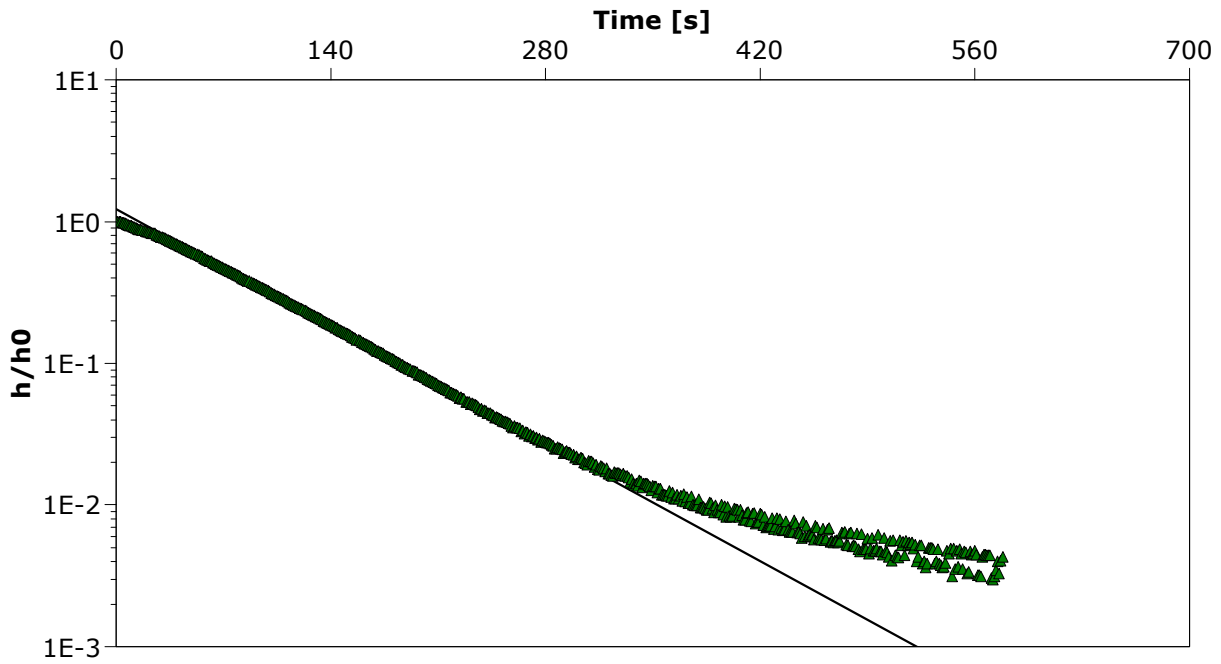
Test date: 7/06/2008

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

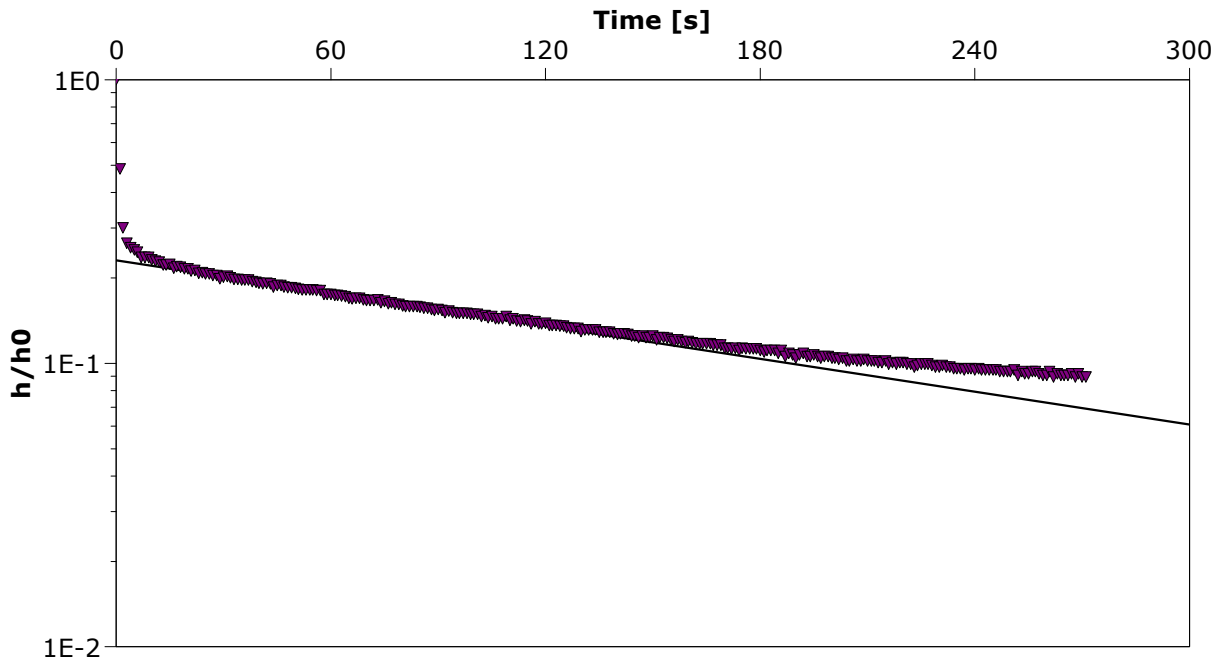
Test date: 10/09/2008

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

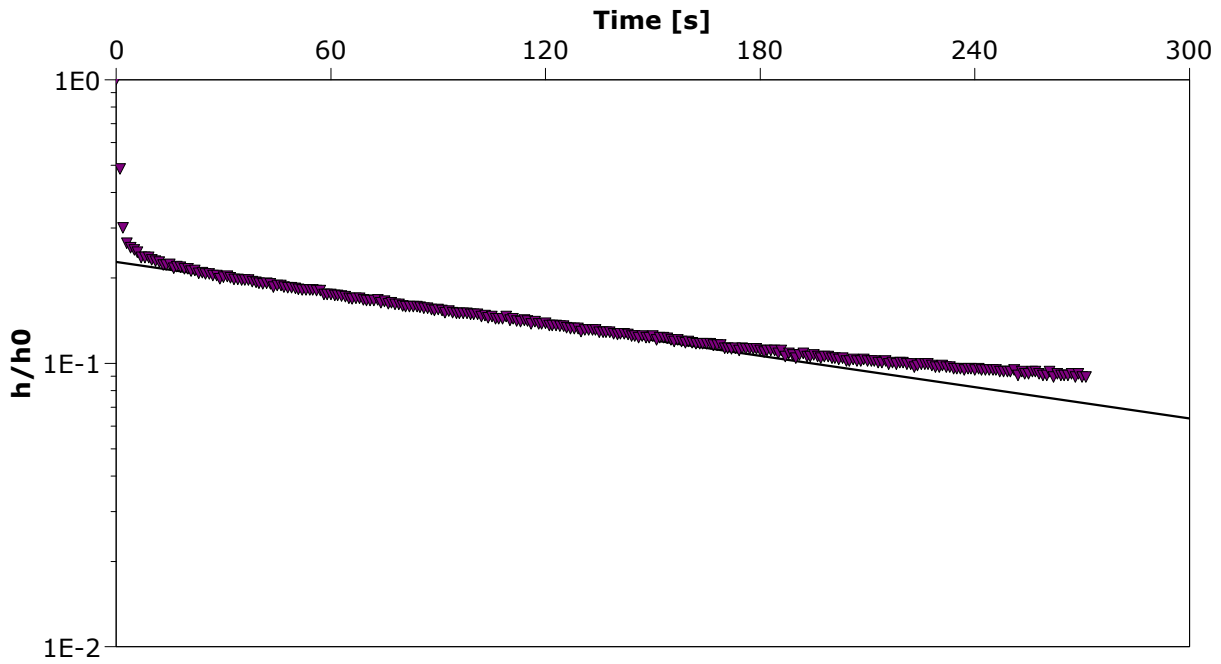
Test date: 10/09/2008

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

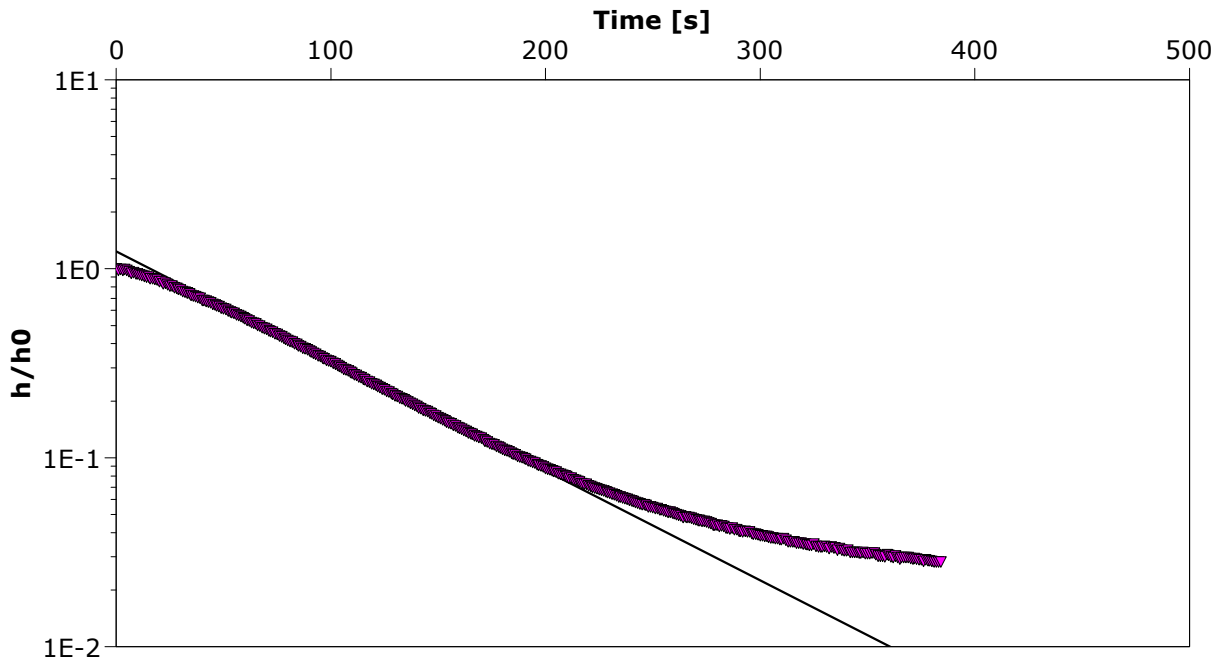
Test date: 3/06/2008

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

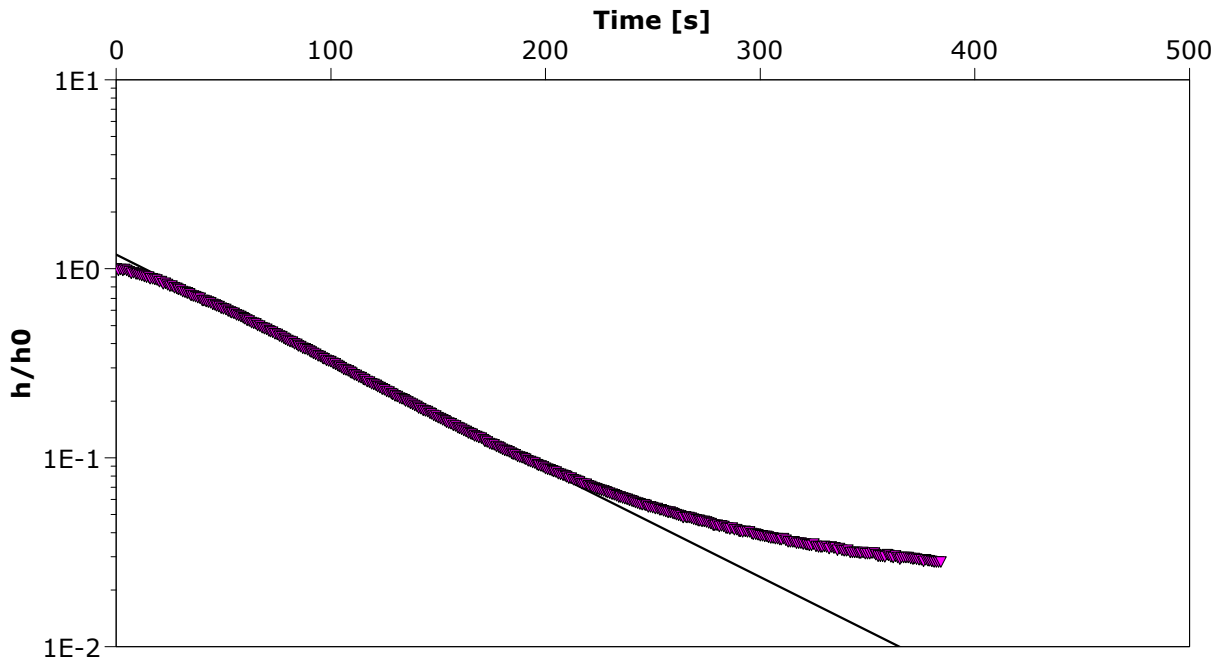
Test date: 3/06/2008

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

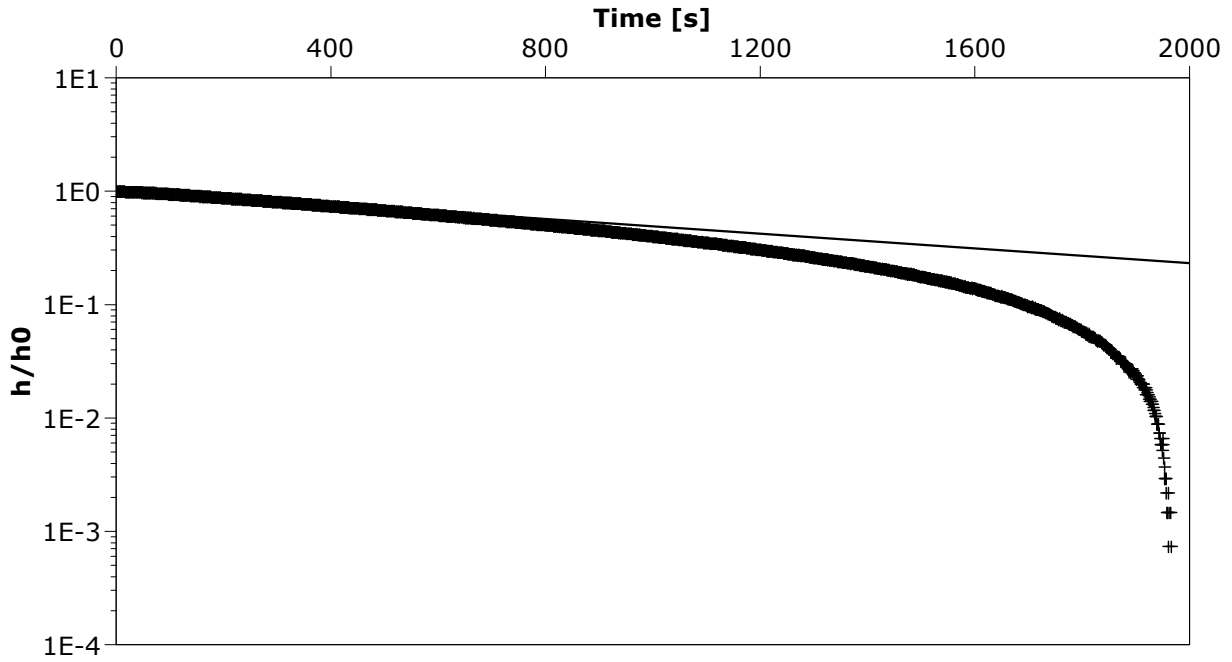
Test date: 10/09/2008

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

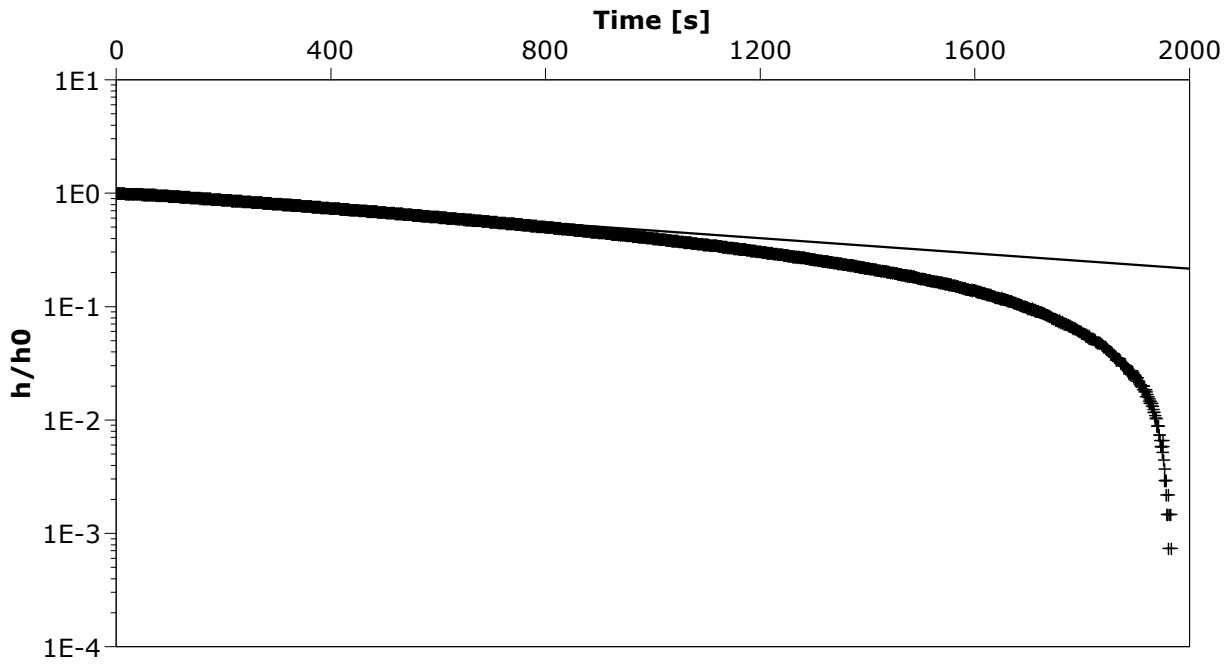
Test date: 10/09/2008

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

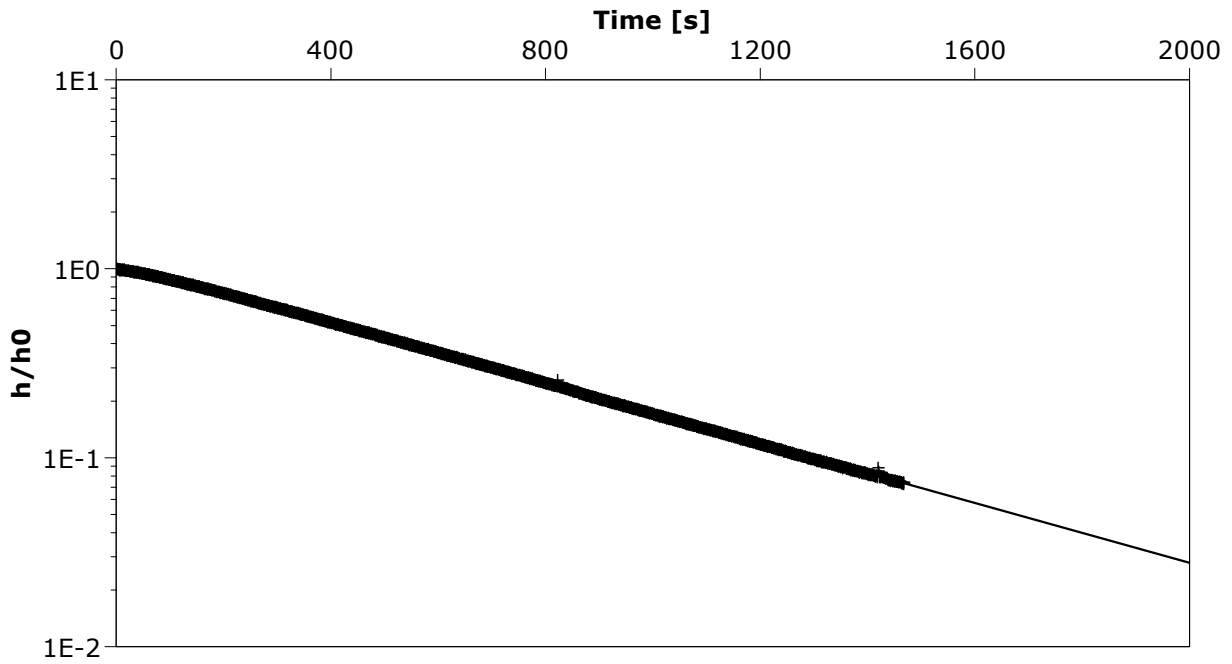
Test date: 5/06/2008

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

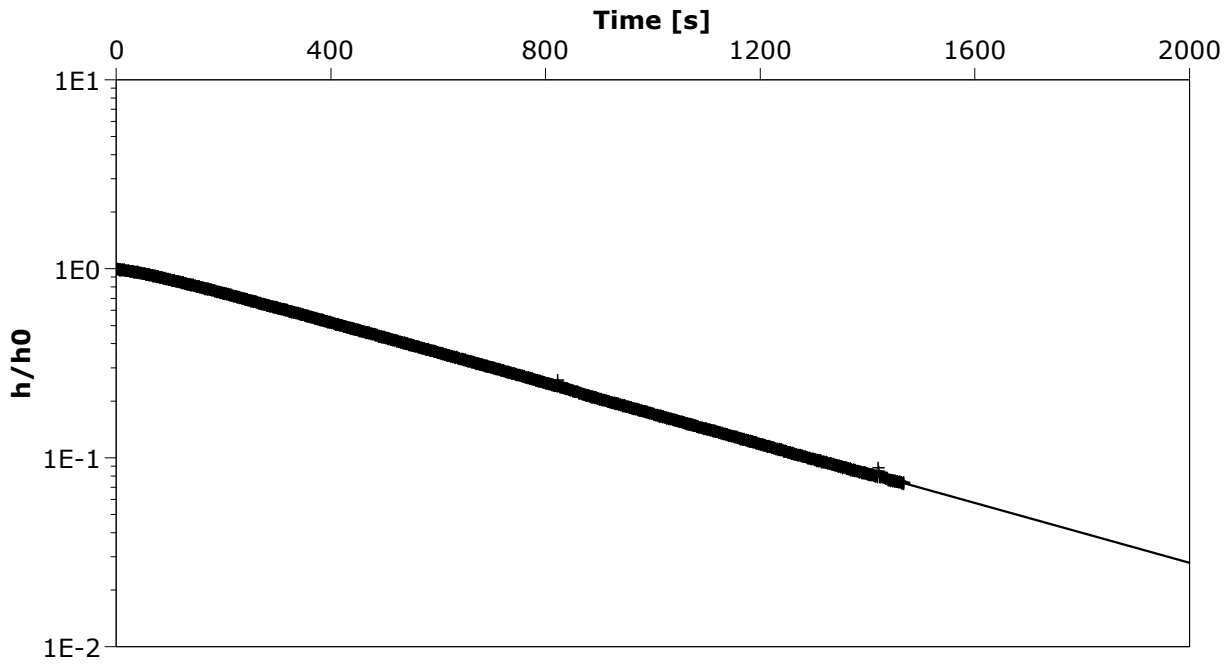
Test date: 5/06/2008

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

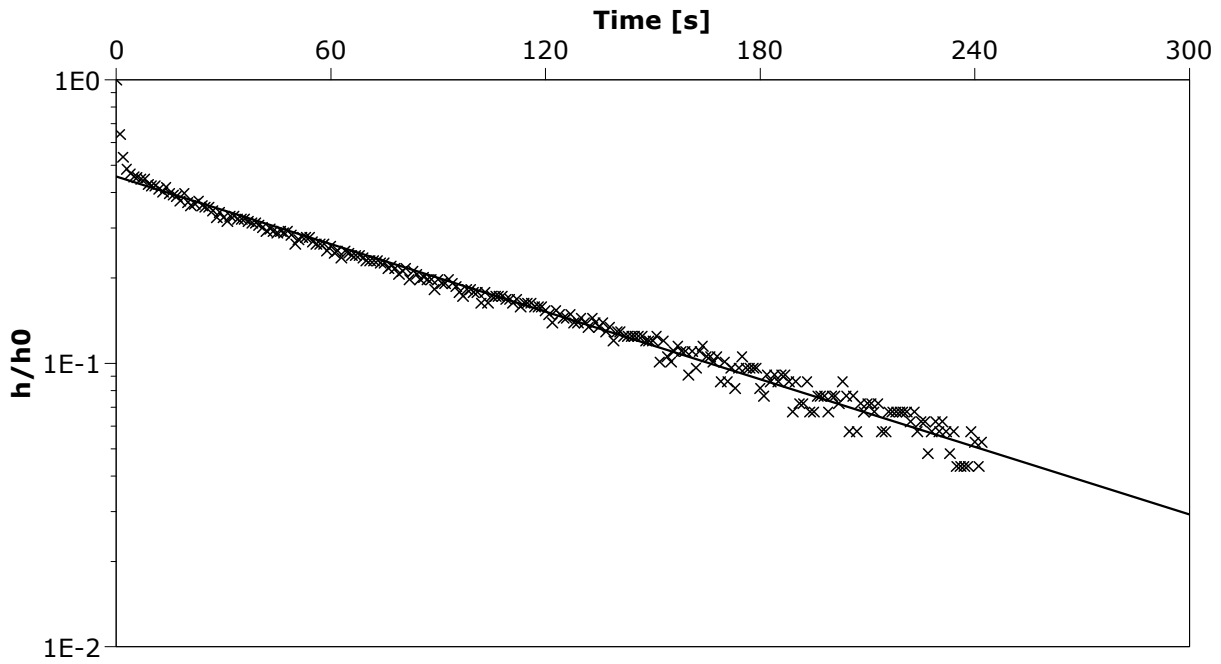
Test date: 10/09/2008

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

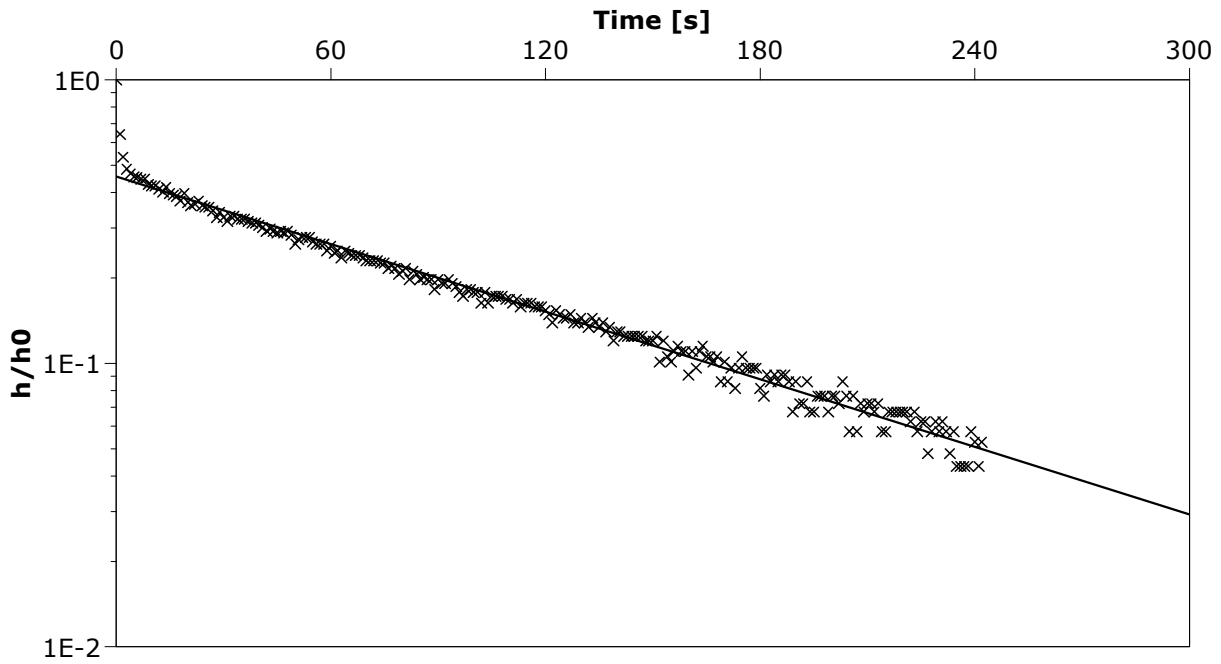
Test date: 10/09/2008

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} | |

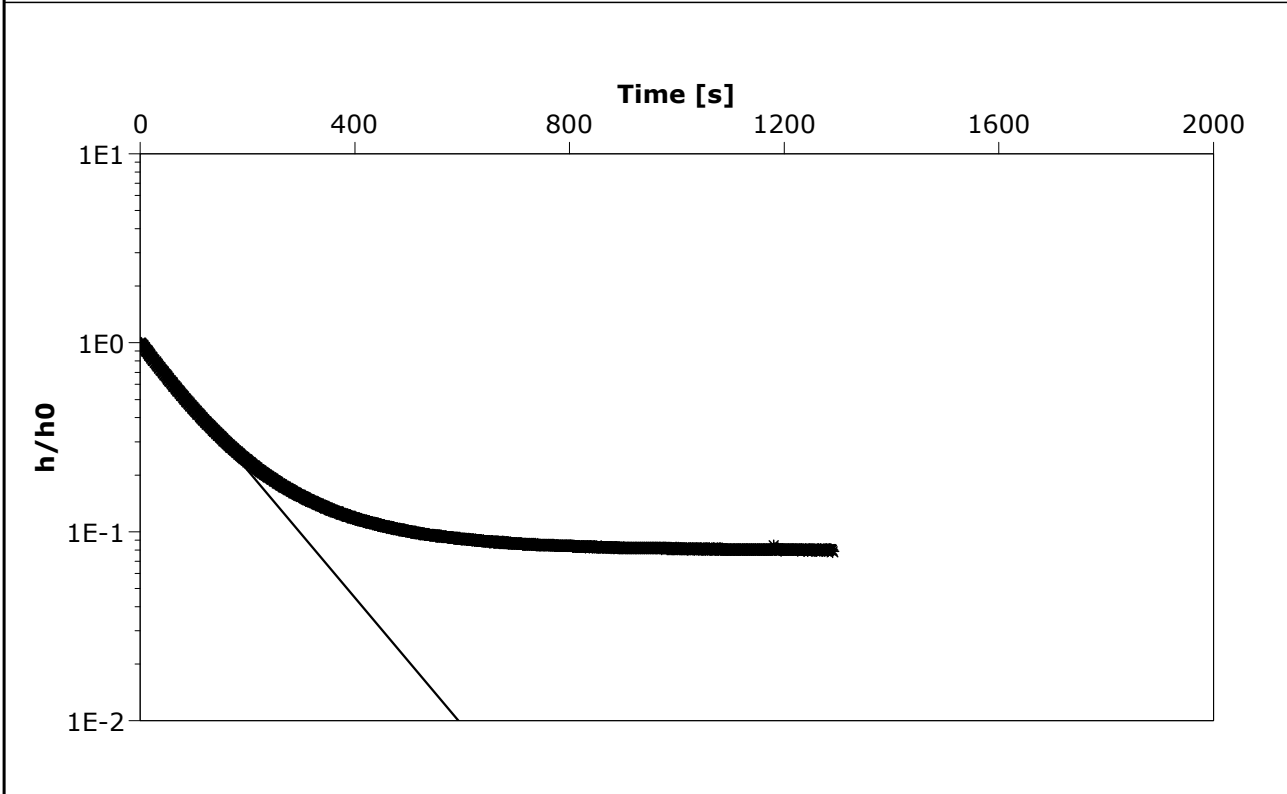


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| | |
|----------------------------------|-----------------|
| Slug Test Analysis Report | |
| Project: | Caval Ridge EIS |
| Number: | 42626162 |
| Client: | BMA Coal |

| | | |
|---------------------------|----------------------|----------------------|
| 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

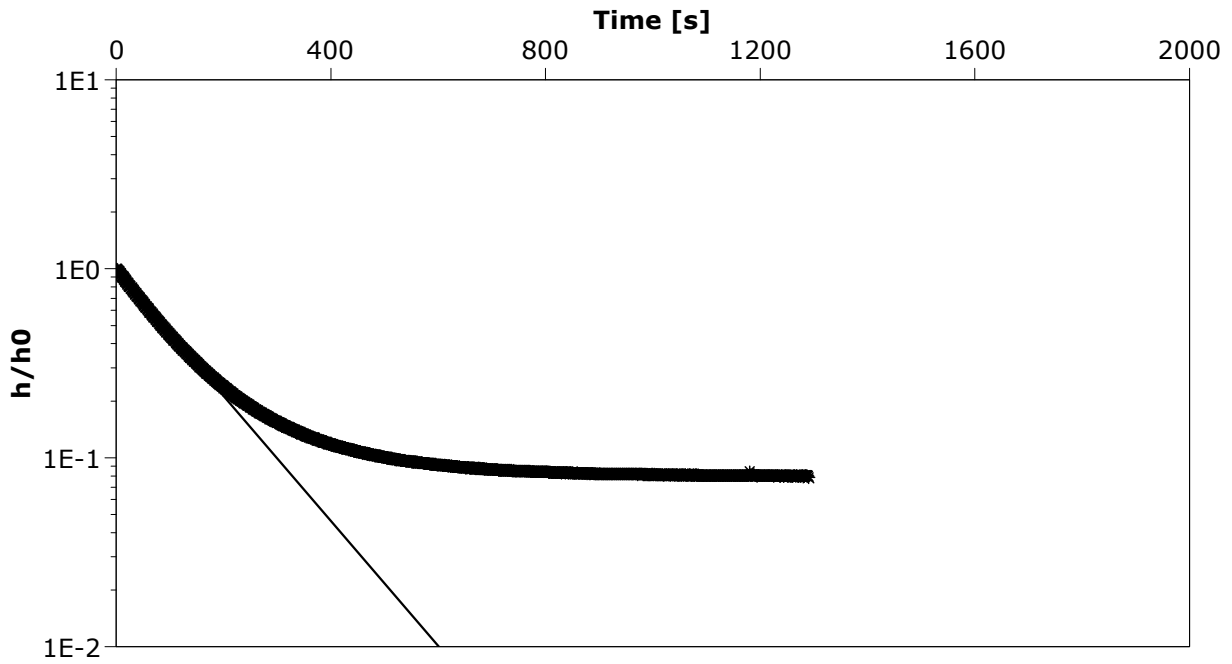
Test date: 5/06/2008

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} | |



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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

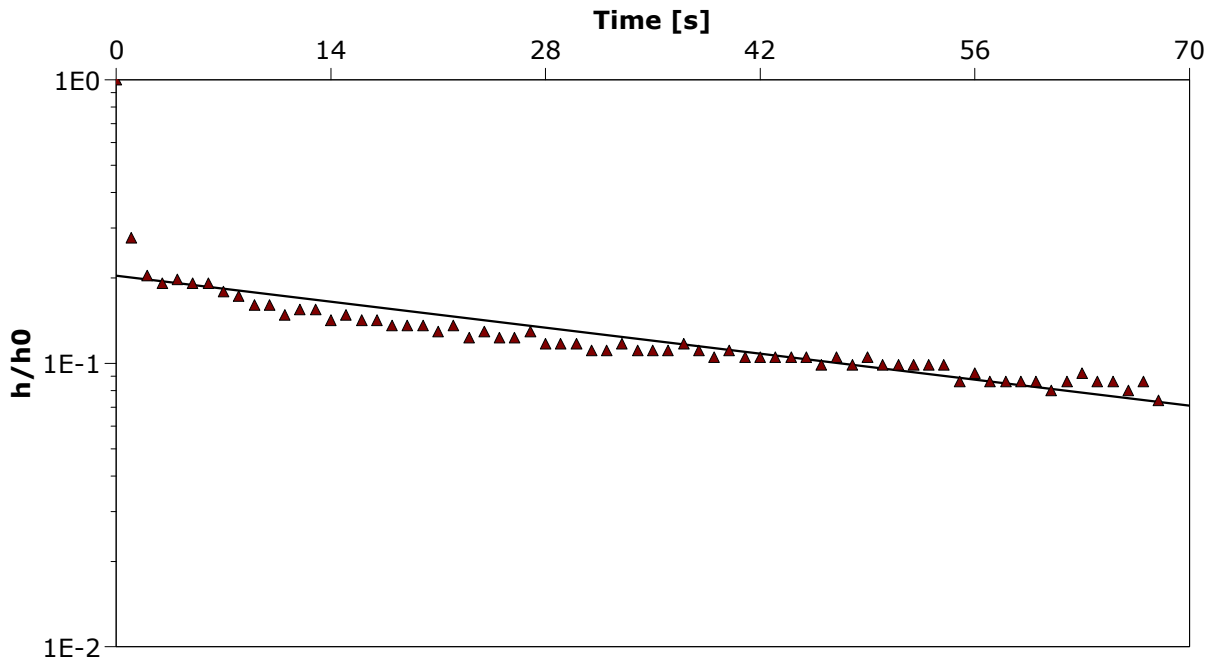
Test date: 9/09/2008

Analysis performed by: SD

Pz07-S Bower & 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} |



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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

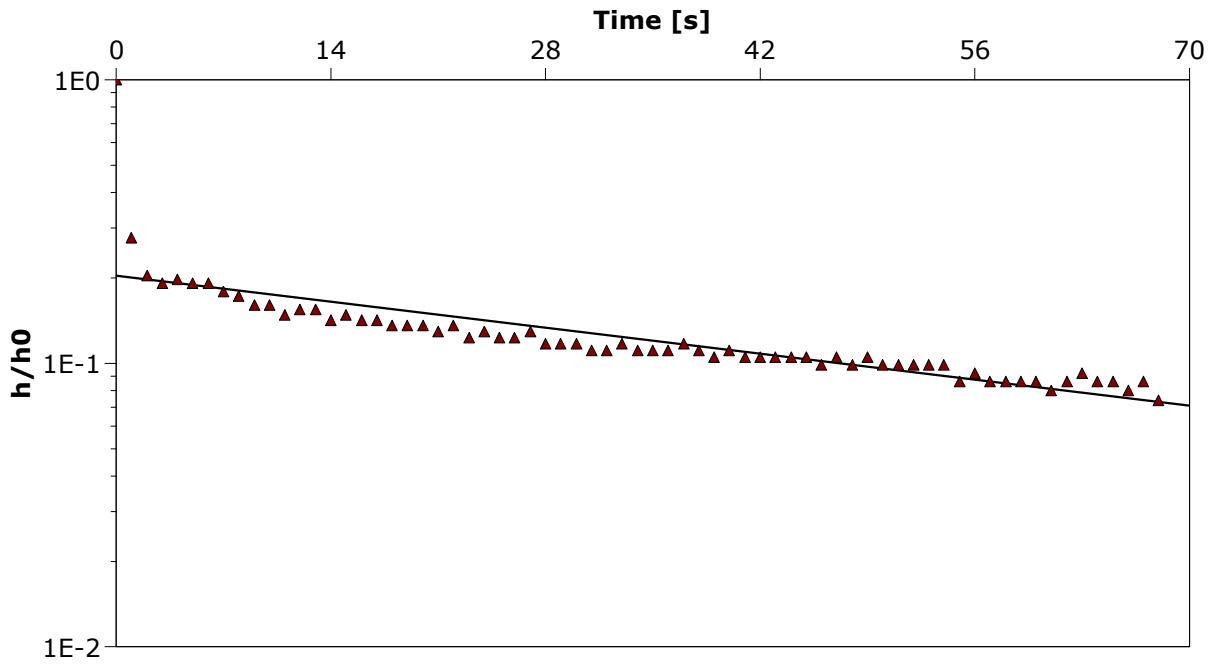
Test date: 9/09/2008

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

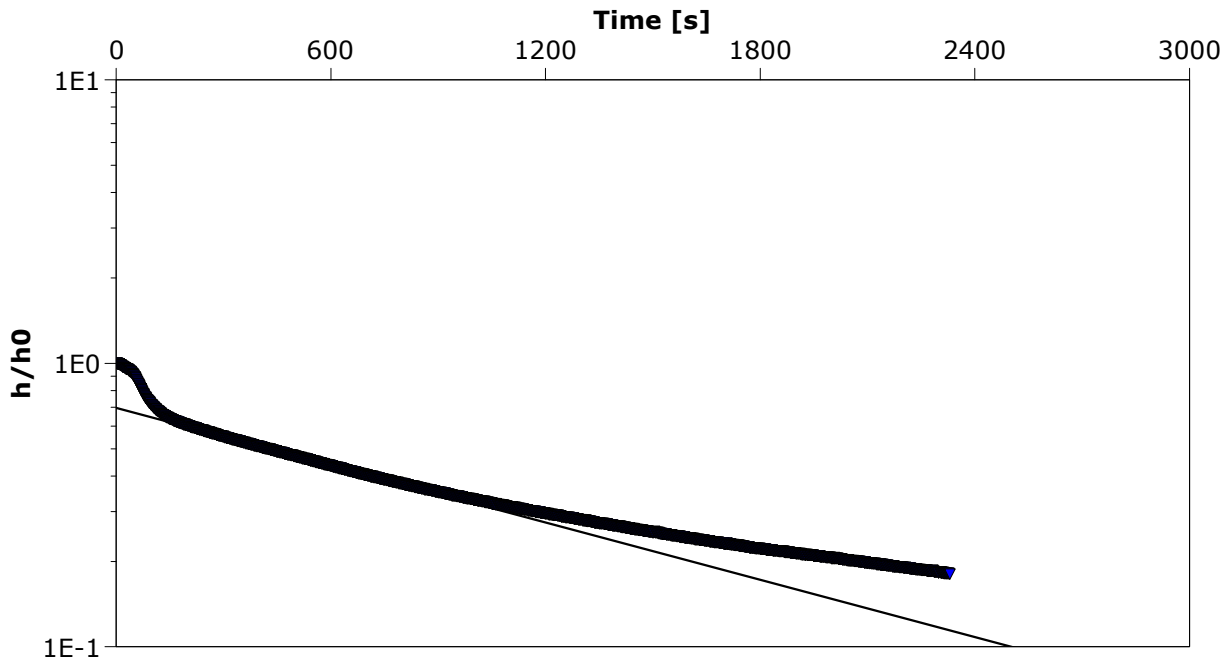
Test date: 6/06/2008

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

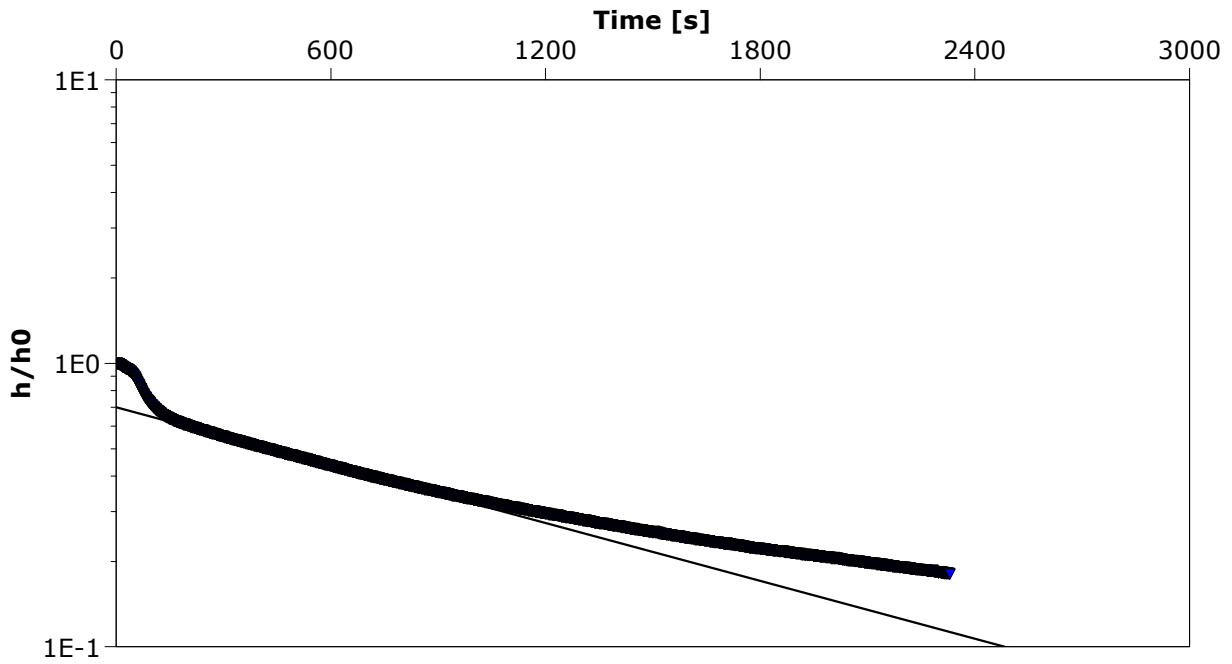
Test date: 6/06/2008

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

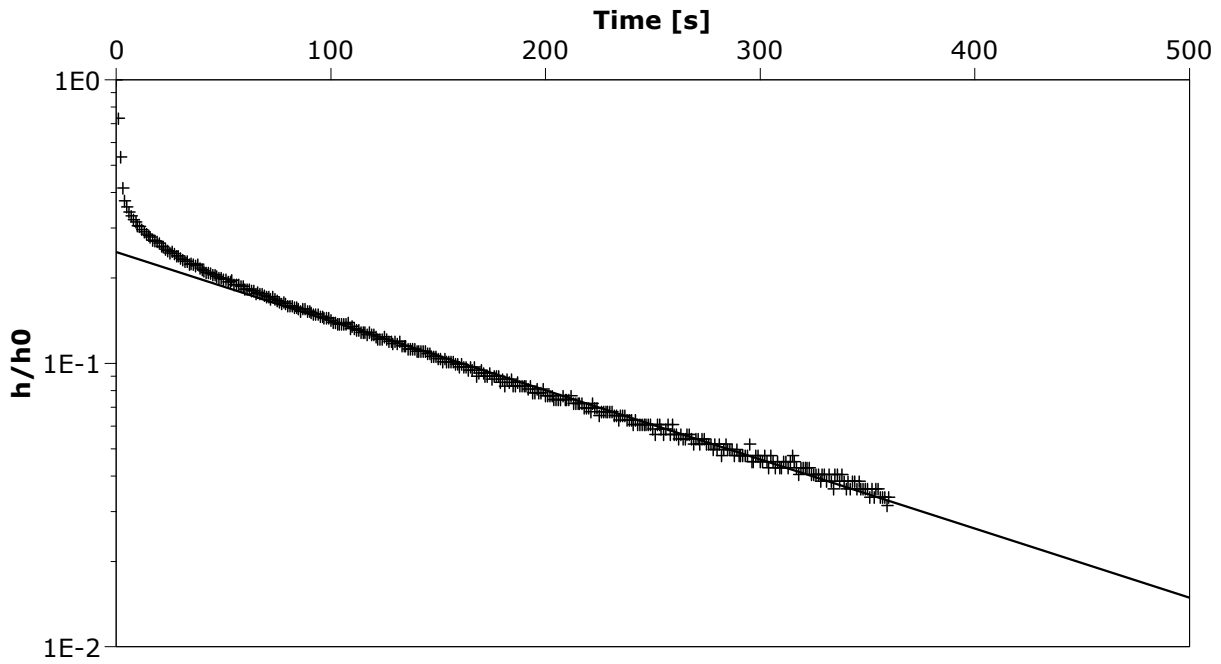
Test date: 9/09/2008

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

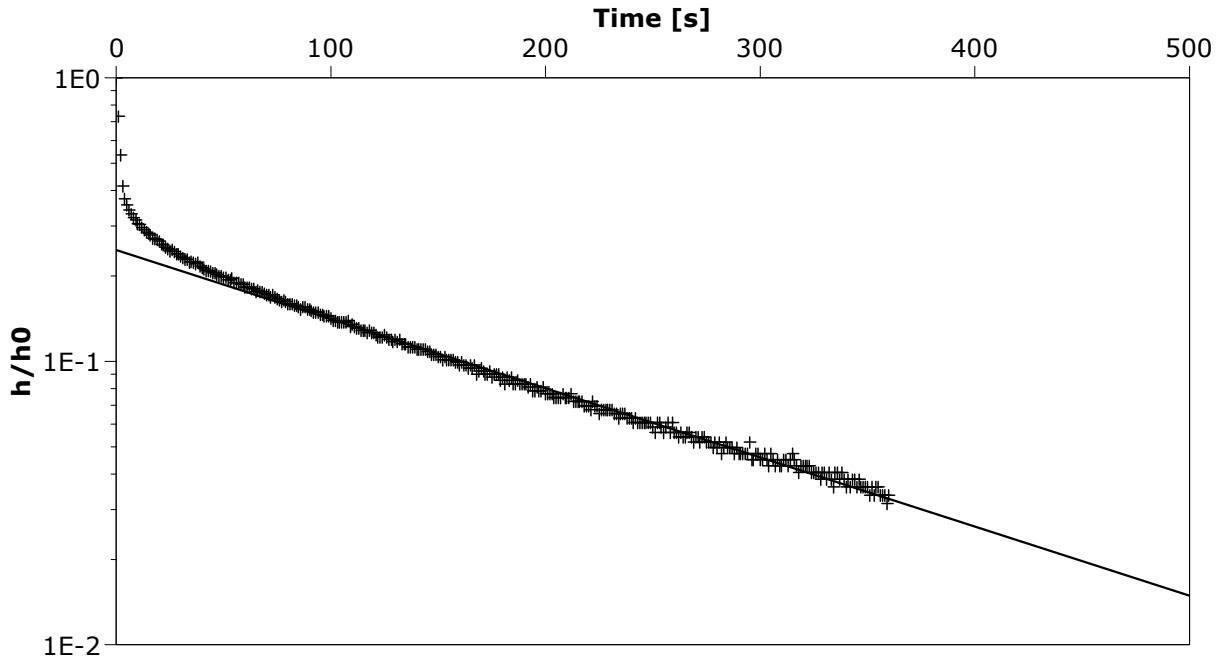
Test date: 9/09/2008

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

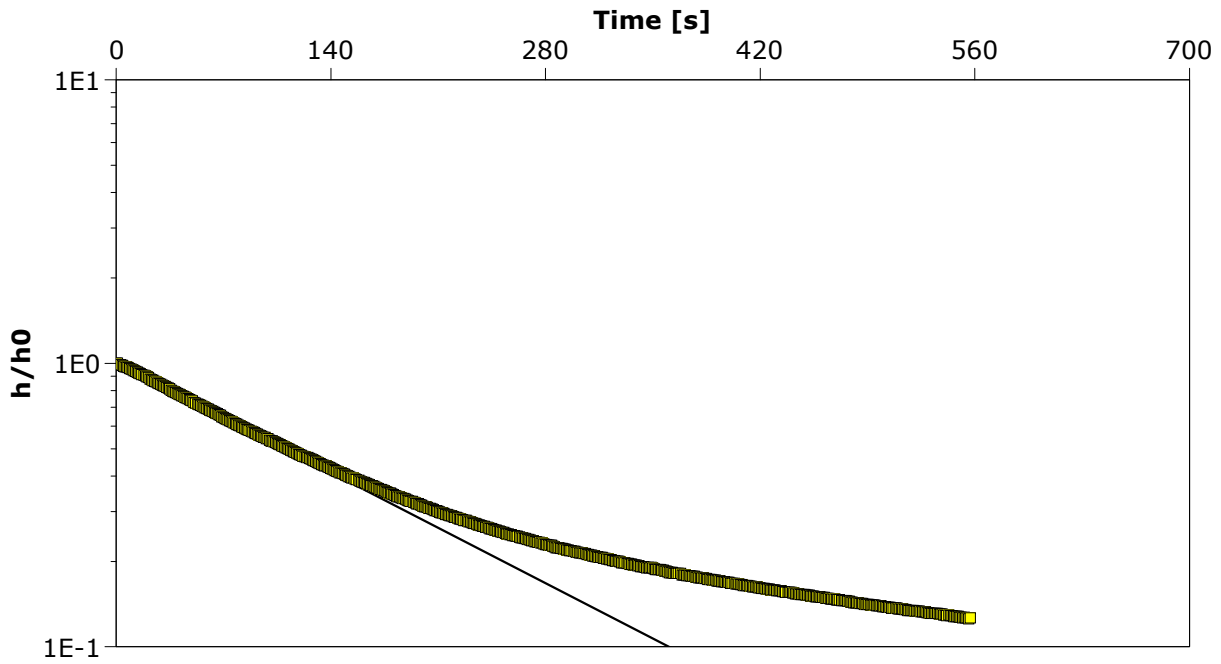
Test date: 6/06/2008

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

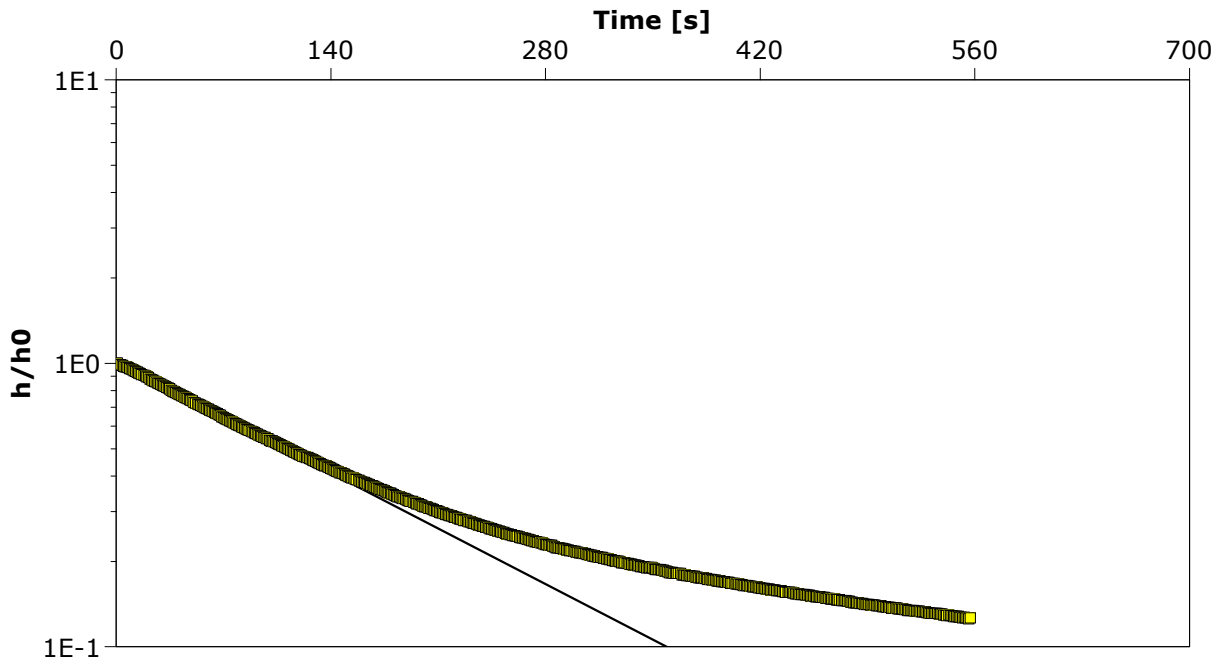
Test date: 6/06/2008

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

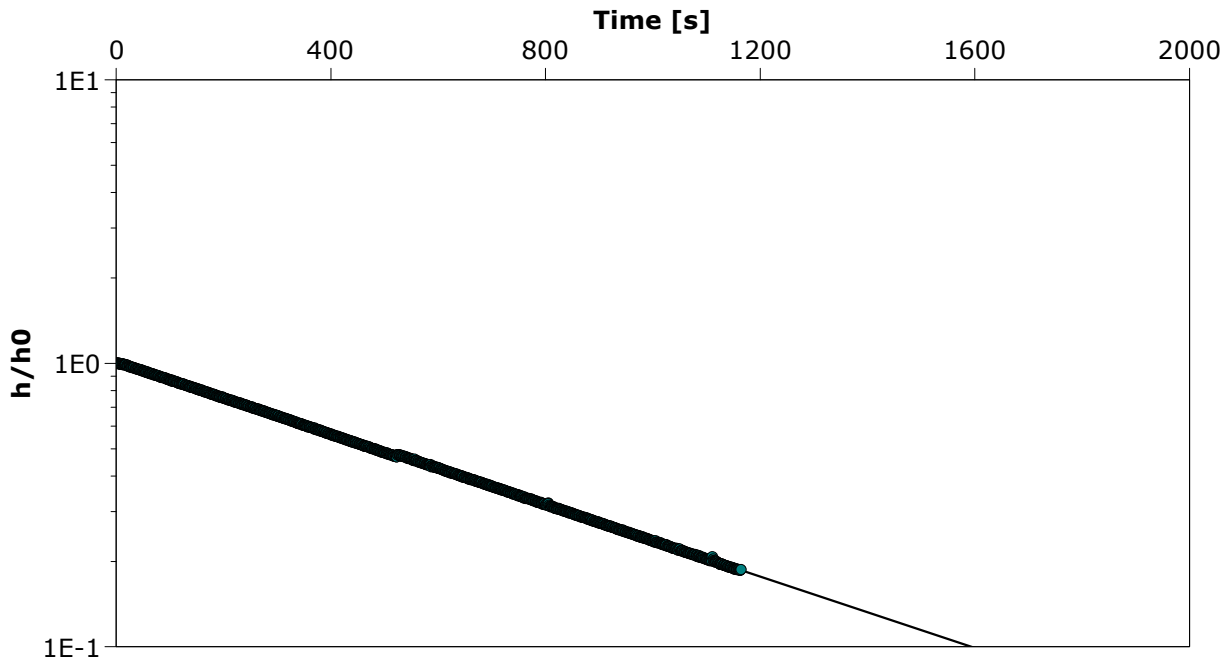
Test date: 6/06/2008

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

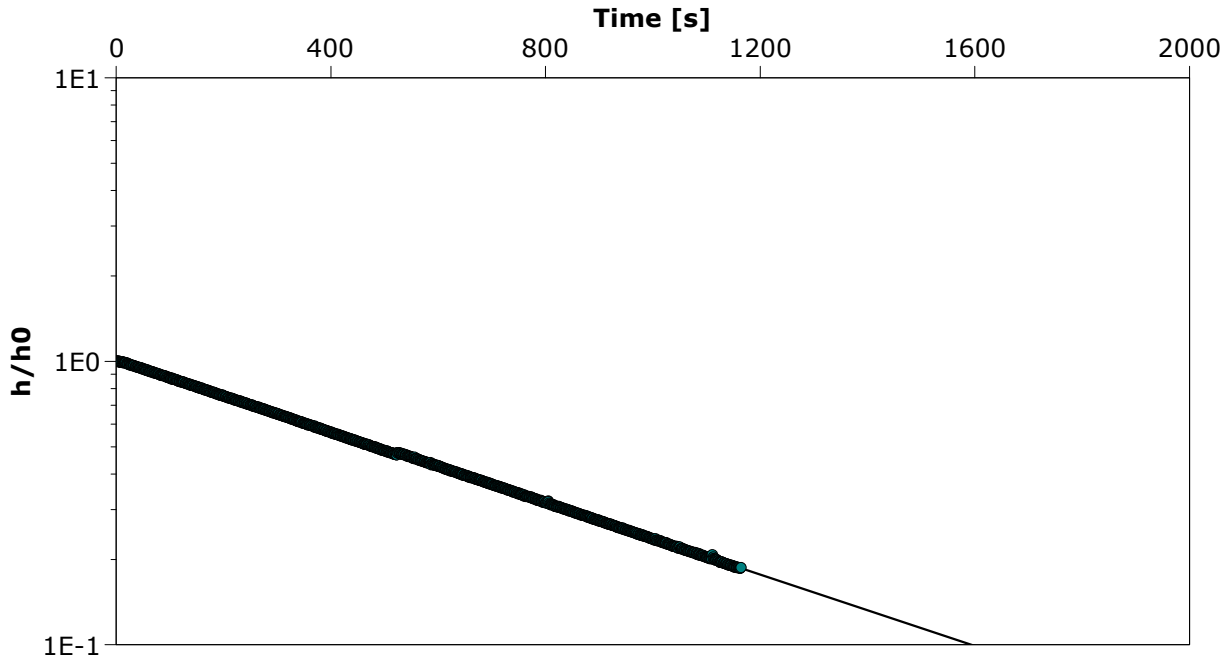
Test date: 6/06/2008

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} |



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: Pz11-D

Test Well: Pz11-D

Test conducted by: AW

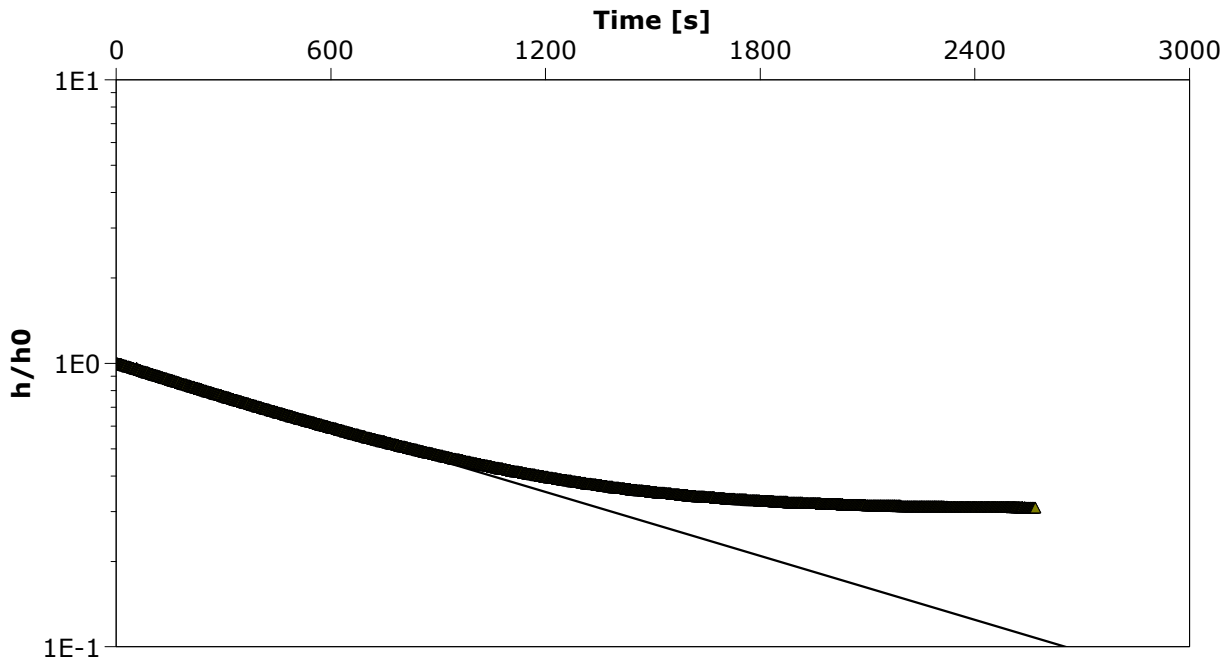
Test date: 6/06/2008

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

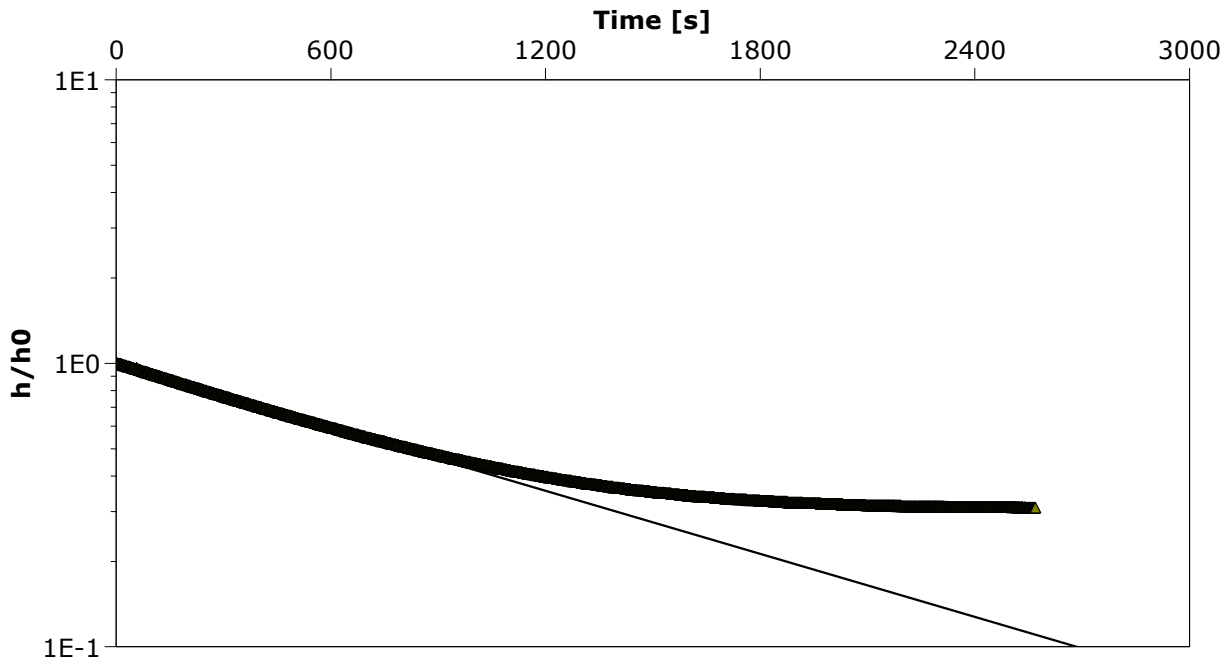
Test date: 6/06/2008

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: 05/06/08 Done by: AW+BS

Development Method _____

Time Started _____

Time Stopped _____

Comments _____

SWL (start) 67.62 (TOL)
SWL (end) _____

Volume Removed _____

Discharge Rate _____

Bore Depth (start) 90m (TOL)

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 (TOL)*

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 | | |
| | | |
| | | |

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: ~~PZ-06-D~~ ^{06-D}

QLO1-10am

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 | | |
| | | |
| | | |

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: ~~206-D~~ **206-D**

Project No 42626162 Project Name BMA Caval Ridge Groundwater

~~06/14/08~~ me
~~7.5/11/08~~ AN

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 (11.6) Bore Volume _____ Bore Depth (start) ~120m (tape m. only)
 Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
 Comments _____ NAPL Present _____
 (If yes thickness) _____

Field Analyses Purging

P-902D

| Time | Vol Removed (L) | EC (uS/cm) | pH | T (C) | Redox (mV) | Dissolved Oxygen (%) | Dissolved Oxygen (mg/L) | Comments (Color, turbidity) |
|----------|-----------------|------------|------|-------|------------|----------------------|-------------------------|--|
| 9.15 am | | 1424 | 6.89 | -0.7 | -306 | | 1.82 | light grey - turbid - sulphur |
| 9.26 am | pumping | 1468 | 6.98 | 7.8 | -300 | | 0.67 | " " - " - " |
| 9.41 am | " | 1577 | 7.34 | 4.7 | -314 | | 1.05 | light grey - slightly turbid/clear - sulphur |
| 9.58 am | " | 2263 | 7.06 | 6.5 | | | 0.70 | " " - cloudy/clear - sulphur |
| 10.17 am | " | 1691 | 6.81 | 22.5 | | | 0.42 | light grey - cloudy/turbid. |

Sampling Date: probe out of sample Done by: AW/BS 301

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

Groundwater Disposal Record

| Date | Litres | Disposal method |
|------|--------|-----------------|
| | | |
| | | |
| | | |

devmt
purging

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 (Tol) Bore Volume _____ Bore Depth (start) 29.055 (Tol)
 Time Stopped _____ SWL (end) 26.25 (Tol) Volume Removed _____ Bore Depth (end) 26.25 (Tol)
 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) |
|---------------|-----------------|----------------------|-------------|------------------|-------------|----------------------|-------------------------|-----------------------------|
| <u>9:36am</u> | <u>6L</u> | <u>Ranging cond.</u> | <u>7.68</u> | <u>3.3</u> | <u>-192</u> | <u>-</u> | <u>7.71</u> | <u>grey & turbid -</u> |
| <u>9:50</u> | <u>13L</u> | <u>Ranging</u> | <u>7.74</u> | <u>25.5</u> | <u>-143</u> | <u>-</u> | <u>6.48</u> | <u>grey brown, turbid</u> |
| <u>10:09</u> | <u>18L</u> | <u>11.5</u> | <u>7.73</u> | <u>27.9/17.9</u> | <u>-161</u> | <u>-</u> | <u>7.73</u> | <u>grey/brown, turbid.</u> |

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

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) 14.14b (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 | — | 3.24 | dark grey, turbid |
| 15:32 | " | — | 7.04 | — | -228 | — | 0.88 | " " " |
| 15:41 | " | — | 6.96 | — | -211 | — | 0.59 | lighter grey - less turbid, sulphur |
| 15:47 | 4 | — | 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

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

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: R208-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 at 10:00/08

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

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

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: 208-5

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: 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) |
|-------------|-----------------|------------|-------------|----------|------------|----------------------|-------------------------|----------------------------------|
| <u>6:54</u> | <u>3L</u> | <u>-</u> | <u>6.45</u> | <u>-</u> | <u>-91</u> | <u>-</u> | <u>3.64</u> | <u>pale redish brown, turbid</u> |
| <u>7:06</u> | <u>6L</u> | <u>-</u> | <u>6.54</u> | <u>-</u> | <u>-78</u> | <u>-</u> | <u>5.30</u> | <u>11</u> |
| <u>7:14</u> | <u>9L</u> | <u>-</u> | <u>6.49</u> | <u>-</u> | <u>-92</u> | <u>-</u> | <u>7.16</u> | |
| | | | | | | | | |
| | | | | | | | | |

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 | | |
| | | |
| | | |

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P2610

Project No 42626162

Project Name BMA Caval Ridge Groundwater

613691 mE
7548096 mN

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) |
|--------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|-----------------------------|
| <u>11:28</u> | <u>purging</u> | <u>1878</u> | <u>7.29</u> | <u>26.6</u> | <u>-178</u> | <u>-</u> | <u>1.96</u> | <u>light brown</u> |
| <u>11:33</u> | <u>"</u> | <u>1728</u> | <u>7.36</u> | <u>24.5</u> | <u>-199</u> | <u>-</u> | <u>1.86</u> | <u>clear yellowish</u> |
| <u>11:35</u> | <u>"</u> | <u>1699</u> | <u>7.36</u> | <u>23.4</u> | <u>-196</u> | <u>-</u> | <u>1.45</u> | <u>" "</u> |
| <u>11:41</u> | <u>"</u> | <u>1770</u> | <u>7.30</u> | <u>24.7</u> | <u>-210</u> | <u>-</u> | <u>1.05</u> | <u>" "</u> |
| <u>11:44</u> | <u>"</u> | <u>1718</u> | <u>7.40</u> | <u>23.9</u> | <u>-200</u> | <u>-</u> | <u>1.91</u> | <u>" "</u> |

clear to slightly 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

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P209

Project No 42626162 Project Name BMA Caval Ridge Groundwater

*LO QCO4
for P209 & QCO4
filter from P210
N/A USED.*

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) |
|--------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|--|
| <u>13:03</u> | <u>ump</u> | <u>1622</u> | <u>7.47</u> | <u>27.6</u> | <u>-170</u> | <u>—</u> | <u>1.48</u> | <u>light brown, cloudy</u> |
| <u>13:10</u> | <u>Pump</u> | <u>1664</u> | <u>7.51</u> | <u>26.7</u> | <u>-209</u> | <u>—</u> | <u>0.34</u> | <u>light brown, clear to slightly turbid</u> |
| <u>13:15</u> | <u>Pump</u> | <u>1661</u> | <u>7.62</u> | <u>26.6</u> | <u>-214</u> | <u>—</u> | <u>0.19</u> | <u>light brown, clear to slightly turbid</u> |
| <u>13:20</u> | <u>"</u> | <u>1663</u> | <u>7.70</u> | <u>26.6</u> | <u>-216</u> | <u>—</u> | <u>0.18</u> | <u>" " " " " "</u> |
| <u>13:25</u> | <u>"</u> | <u>1689</u> | <u>7.67</u> | <u>26.6</u> | <u>-214</u> | <u>—</u> | <u>0.12</u> | <u>" " " " " "</u> |

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 _____

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ-12-5

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
| | | | | | | | | |
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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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
| | | | | | | | | |
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| | | | | | | | | |

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 | | |
| | | |
| | | |

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: PZ11-1

Project No 42626162

Project Name BMA Caval Ridge Groundwater

filter used @
PZ10 & 9

0614329m E

7548821m N

Development Date: _____ Done by: _____

Development Method _____

Time Started _____

Time Stopped _____

Comments _____

SWL (start) _____

SWL (end) _____

Volume Removed _____

Discharge Rate _____

Bore Depth (start) _____

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
| | | | | | | | | |
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Purging Date: 06/06/08 Done by: AW/BS

Purge Method _____

Time Started _____

Time Stopped _____

Comments _____

Purge Depth _____

SWL (start) 11.782 (TOC)

SWL (end) 24.27m TOC

Bore Volume _____

Volume Removed _____

Bore Depth (start) 59.1 (TOC)

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) |
|--------------|-----------------|-------------|-------------|-------------|------------|----------------------|-------------------------|------------------------------|
| <u>15:52</u> | <u>pump</u> | <u>4.48</u> | <u>7.07</u> | <u>26.6</u> | <u>-31</u> | <u>2</u> | <u>2.44</u> | <u>clear slightly turbid</u> |
| <u>15:35</u> | <u>"</u> | <u>3.49</u> | <u>7.24</u> | <u>26.9</u> | <u>-49</u> | <u>-</u> | <u>0.80</u> | <u>" "</u> |
| <u>15:39</u> | <u>"</u> | <u>3.74</u> | <u>7.52</u> | <u>25.8</u> | <u>-84</u> | <u>-</u> | <u>0.39</u> | <u>" "</u> |
| <u>15:44</u> | <u>"</u> | <u>3.33</u> | <u>7.52</u> | <u>25.7</u> | <u>-98</u> | <u>-</u> | <u>0.26</u> | <u>" "</u> |

Sampling Date: _____ Done by: AW/BS

Sampling Method _____

Time Started _____

Time Stopped _____

Comments _____

Sampling Depth _____

SWL (start) _____

SWL (end) _____

Groundwater Disposal Record

devmt purging

| Date | Litres | Disposal method |
|------|--------|-----------------|
| | | |
| | | |
| | | |
| | | |

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P203-5

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |

Purging Date: _____ Done by: AW/BS

Purge Method _____ Purge Depth _____
 Time Started _____ SWL (start) 25.492m 70C Bore Volume 3.75L Bore Depth (start) 27.23m 70C
 Time Stopped _____ SWL (end) 25.55m 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) |
|--------------|-----------------|--------------|-------------|-------------|-------------|----------------------|-------------------------|-----------------------------|
| <u>13:53</u> | <u>3.75L</u> | <u>14.06</u> | <u>7.04</u> | <u>25.5</u> | <u>-13</u> | <u>-</u> | <u>2.15</u> | <u>light brown, turbid</u> |
| <u>15:01</u> | <u>7.5L</u> | <u>14.07</u> | <u>6.83</u> | <u>25.4</u> | <u>-21</u> | <u>-</u> | <u>2.71</u> | <u>" "</u> |
| <u>15:09</u> | <u>11.25L</u> | <u>13.64</u> | <u>6.80</u> | <u>25.3</u> | <u>-120</u> | <u>-</u> | <u>3.01</u> | <u>" "</u> |
| <u>15:16</u> | <u>14L</u> | <u>13.52</u> | <u>6.78</u> | <u>25.3</u> | <u>130</u> | <u>-</u> | <u>3.31</u> | <u>" "</u> |

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 |
|------|--------|-----------------|
| | | |
| | | |
| | | |

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
| | | | | | | | | |
| | | | | | | | | |
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| | | | | | | | | |

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) 31.79m 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) |
|--------------|-----------------|--------------|-------------|-------------|-------------|----------------------|-------------------------|--|
| <u>14:33</u> | <u>MS</u> | <u>18.72</u> | <u>6.75</u> | <u>26.2</u> | <u>-135</u> | <u>-</u> | <u>1.72</u> | <u>light grey brown, turbid, sulphur</u> |
| <u>14:36</u> | <u>"</u> | <u>19.35</u> | <u>7.14</u> | <u>25.9</u> | <u>-172</u> | <u>-</u> | <u>0.42</u> | <u>" " " " no sulphur</u> |
| <u>14:39</u> | <u>"</u> | <u>19.71</u> | <u>7.15</u> | <u>25.9</u> | <u>-168</u> | <u>-</u> | <u>0.27</u> | <u>" " " "</u> |
| <u>14:42</u> | <u>"</u> | <u>20.02</u> | <u>6.91</u> | <u>25.8</u> | <u>-166</u> | <u>-</u> | <u>0.21</u> | <u>" " " "</u> |
| <u>14:45</u> | <u>"</u> | <u>19.97</u> | <u>7.10</u> | <u>25.8</u> | <u>-165</u> | <u>-</u> | <u>0.19</u> | <u>" " " "</u> |

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 |
|------|--------|-----------------|
| | | |
| | | |
| | | |

QC07 = P203-D

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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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

| Time | Vol Removed (L) | EC (uS/cm) ^{ms} | pH | T (C) ^{bat?} | Redox (mV) | Dissolved Oxygen (%) | Dissolved Oxygen (mg/L) | Comments (Color, turbidity) |
|--------------|-----------------|--------------------------|-------------|-----------------------|-------------|----------------------|-------------------------|---|
| <u>16:55</u> | <u>ump</u> | <u>2.58</u> | <u>7.58</u> | <u>24.2</u> | <u>-173</u> | <u>-</u> | <u>1.39</u> | <u>light grey, clear to slightly turbid</u> |
| <u>16:58</u> | <u>"</u> | <u>ranging</u> | <u>7.56</u> | <u>24.2</u> | <u>-175</u> | <u>-</u> | <u>0.40</u> | <u>" " " "</u> |
| <u>17:01</u> | <u>"</u> | <u>"</u> | <u>7.82</u> | <u>24.2</u> | <u>-147</u> | <u>-</u> | <u>0.27</u> | <u>" " " "</u> |
| <u>17:04</u> | <u>"</u> | <u>"</u> | <u>7.54</u> | <u>24.1</u> | <u>-122</u> | <u>-</u> | <u>0.51</u> | <u>" " " "</u> |
| <u>17:06</u> | <u>"</u> | <u>"</u> | <u>7.94</u> | <u>24.1</u> | <u>-111</u> | <u>-</u> | <u>0.68</u> | <u>" " " "</u> |

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 |
|------|--------|-----------------|
| | | |
| | | |
| | | |

25.73
~~23.67~~
25.30

Checked By:.....

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P204

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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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) |
|-------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|-----------------------------|
| <u>7:21</u> | <u>0.75L</u> | <u>1447</u> | <u>7.00</u> | <u>24.2</u> | <u>-202</u> | <u>-</u> | <u>3.26</u> | <u>clear, sulphur</u> |
| <u>7:27</u> | <u>2L</u> | <u>1529</u> | <u>6.74</u> | <u>25.7</u> | <u>-195</u> | <u>-</u> | <u>2.21</u> | <u>" "</u> |
| | | | | | | | | |
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| | | | | | | | | |

Grab Sample

odors, milky, light grey

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 |
|------|--------|-----------------|
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| | | |

devmt purging

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
| | | | | | | | | |
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| | | | | | | | | |

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 | = | 0.16 | " was above" |

*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

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: R25

filter used @ PZ01 + deep @ 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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |

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

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

8/6/08 37.69 m TOC

36355

Field Analyses

Purging

8/6/08

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

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

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P204

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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| | | | | | | | | |

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) |
|-------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|--|
| <u>7:29</u> | <u>1</u> | <u>1107</u> | <u>5.09</u> | <u>24.1</u> | <u>-209</u> | | <u>1.24</u> | <u>Dark grey, clear to slightly turbid, dark particles</u> |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

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

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) 8.395m Bore Volume _____ Bore Depth (start) AS6m
 Time Stopped 18:44 SWL (end) 12.66m 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) |
|--------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|-----------------------------|
| <u>18:16</u> | <u>1</u> | <u>5790</u> | <u>5.74</u> | <u>27.0</u> | <u>-301</u> | | <u>1.06</u> | <u>Clear, Sulphur odour</u> |
| <u>18:27</u> | <u>20</u> | <u>7360</u> | <u>5.51</u> | <u>27.6</u> | <u>-324</u> | | <u>0.08</u> | <u>" "</u> |
| <u>18:36</u> | <u>30</u> | <u>7340</u> | <u>5.54</u> | <u>27.9</u> | <u>-325</u> | | <u>0.05</u> | <u>" "</u> |
| <u>18:44</u> | <u>40</u> | <u>7330</u> | <u>5.53</u> | <u>27.9</u> | <u>-322</u> | | <u>0.05</u> | <u>" "</u> |

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 |
|------|--------|-----------------|
| | | |
| | | |
| | | |

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) |
|--------------|-----------------|--------------|-------------|-------------|-------------|----------------------|-------------------------|-----------------------------|
| <u>16:36</u> | <u>1</u> | <u>591</u> | <u>4.02</u> | <u>26.9</u> | <u>-258</u> | | <u>1.43</u> | <u>clear. Sulfur odor.</u> |
| <u>16:53</u> | <u>22</u> | <u>21410</u> | <u>5.42</u> | <u>26.4</u> | <u>-204</u> | | <u>0.46</u> | <u>" "</u> |
| <u>17:02</u> | <u>32</u> | <u>21430</u> | <u>5.82</u> | <u>26.5</u> | <u>-201</u> | | <u>0.22</u> | <u>" "</u> |
| <u>17:10</u> | <u>40</u> | <u>21450</u> | <u>5.58</u> | <u>26.5</u> | <u>-197</u> | | <u>0.16</u> | <u>" "</u> |

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 |
|------|--------|-----------------|
| | | |
| | | |
| | | |

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P203-5

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
| | | | | | | | | |
| | | | | | | | | |
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| | | | | | | | | |

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

Purge Method _____ Purge Depth _____
 Time Started _____ SWL (start) 23.525m Bore Volume ~~100~~ 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) |
|--------------|-----------------|--------------|-------------|-------------|-------------|----------------------|-------------------------|---|
| <u>16:50</u> | <u>4</u> | <u>11260</u> | <u>5.33</u> | <u>25.9</u> | <u>-129</u> | | <u>2.54</u> | <u>light brown/gray, turbid, HC odour</u> |
| <u>17:00</u> | <u>8</u> | <u>12470</u> | <u>5.46</u> | <u>25.7</u> | <u>-100</u> | | <u>2.65</u> | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

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 | | |
| | | |
| | | |

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) 25.643 m Bore Volume _____ Bore Depth (start) 35.11 m
 Time Stopped _____ SWL (end) _____ Volume Removed _____ Bore Depth (end) _____
 Comments _____ NAPL Present _____
 (If yes thickness) _____

Field Analyses

Purging

Scanner Broken

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

Sampling Date: _____ Done by: AW/DG

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

Groundwater Disposal Record

| Date | Litres | Disposal method |
|------|--------|-----------------|
| | | |
| | | |
| | | |

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
| | | | | | | | | |
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| | | | | | | | | |

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 | 4.69 | 25.8 | 89 | | 1.22 | Clear, subtle odor |
| 10:10 | 20 | 1434 | 4.56 | 26.1 | 86 | | 0.37 | " " |
| 10:25 | 40 | 1947 | 4.78 | 26.4 | 82 | | 0.85 | " " |
| 11:12 | 80 | 2005 | 4.43 | 26.8 | -198 | | 0.26 | " " |
| 11:28 | 100 | 1993 | 4.37 | 26.6 | -194 | | 0.39 | " " |
| 11:41 | 145 | 1481 | 4.74 | 26.9 | -192 | | 0.28 | light grey, slightly turbid |

Sampling Date: _____ Done by: AW/DG

Sampling Method AP2 pump Sampling Depth 85m

Time Started _____ SWL (start) _____

Time Stopped _____ SWL (end) _____

Comments _____

Groundwater Disposal Record

| Date | Litres | Disposal method |
|------|--------|-----------------|
| | | |
| | | |
| | | |
| | | |

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P206-5

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
| | | | | | | | | |
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| | | | | | | | | |

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

Purge Method Bailer 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) |
|--------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|-----------------------------|
| <u>11:17</u> | <u>5.8</u> | <u>1563</u> | <u>4.42</u> | <u>25.3</u> | <u>-202</u> | | <u>1.71</u> | <u>Dark grey, turbid</u> |
| <u>11:26</u> | <u>11.6</u> | <u>1798</u> | <u>4.41</u> | <u>25.3</u> | <u>-204</u> | | <u>1.99</u> | |
| <u>12:02</u> | <u>17.4</u> | <u>1639</u> | <u>4.35</u> | <u>26.1</u> | <u>-128</u> | | <u>2.81</u> | |
| | | | | | | | | |
| | | | | | | | | |

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 |
|------|--------|-----------------|
| | | |
| | | |
| | | |

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |

Purging Date: _____ Done by: AW/DG

Purge Method _____ Purge Depth _____

Time Started _____ SWL (start) 25.615 m 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) |
|--------------|-----------------|--------------|-------------|-------------|-------------|----------------------|-------------------------|-----------------------------|
| <u>17:16</u> | <u>2</u> | <u>1084</u> | <u>4.87</u> | <u>27.8</u> | <u>23</u> | | <u>0.98</u> | <u>clear, no odor.</u> |
| <u>17:40</u> | <u>40</u> | <u>5690</u> | <u>4.93</u> | <u>28.3</u> | <u>-330</u> | | <u>0.13</u> | <u>clear - strong</u> |
| <u>18:01</u> | <u>63</u> | <u>12400</u> | <u>5.06</u> | <u>28.6</u> | <u>-229</u> | | <u>0.12</u> | <u>clear - V strong</u> |
| <u>18:13</u> | <u>70</u> | <u>12490</u> | <u>5.06</u> | <u>28.6</u> | <u>-213</u> | | <u>0.14</u> | <u> </u> |
| <u>18:20</u> | <u>80</u> | <u>12510</u> | <u>5.03</u> | <u>28.8</u> | <u>-206</u> | | <u>0.12</u> | <u> </u> |

*single odor.
strong odor*

Sampling Date: _____ Done by: AW/DG

Sampling Method APZ Pump Sampling Depth 39.5 *top of purg.*

Time Started 18:25 SWL (start) _____ *off ox.*

Time Stopped _____ SWL (end) _____

Comments _____ devmt purging

Groundwater Disposal Record

| Date | Litres | Disposal method |
|------|--------|-----------------|
| | | |
| | | |
| | | |
| | | |

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P208-5

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: _____ 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) 13.205 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) |
|-------|-----------------|------------|------|-------|------------|----------------------|-------------------------|-----------------------------|
| 17:30 | 5 | 1817 | 4.79 | 26.7 | -16 | | 3.24 | Brown, murky |
| 17:36 | 4.5 | 1839 | 4.72 | 27.1 | -158 | | 2.72 | " " |
| 17:45 | 4.5 | 1861 | 5.01 | 25.9 | -151 | | 3.94 | " " |
| | | | | | | | | |
| | | | | | | | | |

no odor.
 only odor
 only odor

Sampling Date: _____ Done by: AW/DG

Sampling Method Boiler Sampling Depth 13.205
 Time Started 17:50 SWL (start) _____
 Time Stopped _____ SWL (end) _____
 Comments _____

Groundwater Disposal Record

| Date | Litres | Disposal method |
|------|--------|-----------------|
| | | |
| | | |
| | | |

devmt
 purging

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P2 09D

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
| | | | | | | | | |
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| | | | | | | | | |

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) |
|--------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|--|
| <u>14:54</u> | <u>1</u> | <u>1026</u> | <u>6.00</u> | <u>26.9</u> | <u>-208</u> | | <u>0.71</u> | <u>clear, non turbid, slight sulfur odour.</u> |
| <u>15:10</u> | <u>40</u> | <u>3410</u> | <u>5.19</u> | <u>26.6</u> | <u>-273</u> | | <u>0.24</u> | |
| <u>15:23</u> | <u>60</u> | <u>3820</u> | <u>5.04</u> | <u>26.7</u> | <u>-260</u> | | <u>0.18</u> | |
| <u>15:33</u> | <u>80</u> | <u>3870</u> | <u>4.87</u> | <u>26.8</u> | <u>-247</u> | | <u>0.12</u> | |
| <u>15:44</u> | <u>100</u> | <u>3890</u> | <u>4.81</u> | <u>26.8</u> | <u>-249</u> | | <u>0.22</u> | |

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

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P2 075

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) |
|--------------|-----------------|------------|-------------|-------------|-------------|----------------------|-------------------------|-----------------------------|
| <u>15:10</u> | <u>2.7</u> | <u>346</u> | <u>5.15</u> | <u>26.0</u> | <u>-151</u> | | <u>1.36</u> | <u>Dark grey brown</u> |
| <u>15:15</u> | <u>5.9</u> | <u>345</u> | <u>4.87</u> | <u>25.7</u> | <u>-152</u> | | <u>1.22</u> | <u> </u> |
| <u>15:20</u> | <u>7.5</u> | <u>359</u> | <u>4.76</u> | <u>25.6</u> | <u>-149</u> | | <u>0.9</u> | <u> </u> |
| | | | | | | | | |
| | | | | | | | | |

some turbidity, no colour.

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

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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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) |
|--------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|-----------------------------|
| <u>11:01</u> | <u>1</u> | <u>1109</u> | <u>7.14</u> | <u>26.4</u> | <u>-247</u> | | <u>1.01</u> | <u>Clear, black and</u> |
| <u>12:00</u> | <u>40</u> | <u>1064</u> | <u>7.17</u> | <u>27.0</u> | <u>-268</u> | | <u>0.63</u> | <u>" "</u> |
| <u>12:36</u> | <u>60</u> | <u>1078</u> | <u>7.16</u> | <u>26.7</u> | <u>-268</u> | | <u>0.47</u> | <u>" "</u> |
| <u>13:08</u> | <u>80</u> | <u>1075</u> | <u>7.18</u> | <u>27.1</u> | <u>-268</u> | | <u>0.05</u> | <u>" "</u> |

sparkling particles, strong sulfur odour

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 |
|------|--------|-----------------|
| | | |
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| | | |
| | | |

devmt purging

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 (%) (mg/L) | | Comments (Color, turbidity) |
|------|-----------------|------------|----|-------|------------|-----------------------------|--|-----------------------------|
| | | | | | | | | |
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| | | | | | | | | |

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

Purge Method APZ 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 (%) (mg/L) | | Comments (Color, turbidity) |
|--------------|-----------------|--------------|-------------|-------------|-------------|-----------------------------|-------------|-----------------------------------|
| <u>16:40</u> | <u>2</u> | <u>1013</u> | <u>7.60</u> | <u>27.5</u> | <u>-308</u> | | <u>0.67</u> | <u>Clear, Strong Sulfur odour</u> |
| <u>17:02</u> | <u>40</u> | <u>7640</u> | <u>7.28</u> | <u>27.2</u> | <u>-280</u> | | <u>0.49</u> | <u>" "</u> |
| <u>17:27</u> | <u>80</u> | <u>12420</u> | <u>7.39</u> | <u>27.8</u> | <u>-229</u> | | <u>0.24</u> | <u>" "</u> |
| <u>17:32</u> | <u>90</u> | <u>12480</u> | <u>7.26</u> | <u>27.8</u> | <u>-228</u> | | <u>0.27</u> | <u>" "</u> |
| <u>17:38</u> | <u>100</u> | <u>12510</u> | <u>7.15</u> | <u>27.8</u> | <u>-234</u> | | <u>0.16</u> | <u>" "</u> |

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 |
|------|--------|-----------------|
| | | |
| | | |
| | | |

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P211-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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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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) |
|--------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|---|
| <u>14:24</u> | <u>0.5</u> | <u>3120</u> | <u>7.28</u> | <u>27.2</u> | <u>-298</u> | | <u>0.71</u> | <u>clear, sulfur odour</u> |
| <u>14:34</u> | <u>20</u> | <u>3760</u> | <u>7.35</u> | <u>27.0</u> | <u>-307</u> | | <u>0.17</u> | <u>clear, " "</u> |
| <u>14:43</u> | <u>40</u> | <u>3200</u> | <u>7.54</u> | <u>27.1</u> | <u>-314</u> | | <u>0.06</u> | <u>no odour</u> |
| <u>15:14</u> | <u>80</u> | <u>7040</u> | <u>7.56</u> | <u>27.3</u> | <u>-309</u> | | <u>0.08</u> | <u>clear, sulfur odour, bubbles on probes</u> |
| <u>15:31</u> | <u>100</u> | <u>8650</u> | <u>7.62</u> | <u>27.5</u> | <u>-261</u> | | <u>0.01</u> | <u>" "</u> |

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

Sampling Method _____ Sampling Depth _____

Time Started 15:31 SWL (start) 28.60m

Time Stopped 15:35 SWL (end) 28.640m

Comments _____

Groundwater Disposal Record

| Date | Litres | Disposal method |
|------|--------|-----------------|
| | | |
| | | |
| | | |

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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Purging Date: 8/9/08 Done by: AW/DG

Purge Method _____ Purge Depth _____
 Time Started _____ SWL (start) Dry Bore Volume _____ Bore Depth (start) 8.940 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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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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

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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Purging Date: 8/1/08 Done by: AW/DG

Purge Method AP2 pump Purge Depth _____
 Time Started 11:42 SWL (start) 41.858 Bore Volume None 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) |
|--------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|---|
| <u>12:00</u> | <u>10</u> | <u>986</u> | <u>7.45</u> | <u>29.0</u> | <u>-246</u> | | <u>0.52</u> | <u>Clear, black particles, sulfur odour</u> |
| <u>12:19</u> | <u>20</u> | <u>1013</u> | <u>7.44</u> | <u>28.7</u> | <u>-249</u> | | <u>0.29</u> | <u>" "</u> |
| <u>12:32</u> | <u>30</u> | <u>8030</u> | <u>7.22</u> | <u>28.9</u> | <u>-238</u> | | <u>0.30</u> | <u>" "</u> |
| <u>12:47</u> | <u>40</u> | <u>9190</u> | <u>7.23</u> | <u>28.8</u> | <u>-232</u> | | <u>0.27</u> | <u>" "</u> |
| <u>13:03</u> | <u>50</u> | <u>9090</u> | <u>7.24</u> | <u>28.7</u> | <u>-233</u> | | <u>0.24</u> | <u>" "</u> |

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 |
|------|--------|-----------------|
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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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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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) 30.51m 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) |
|--------------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|---|
| <u>17:16:39-50</u> | <u>3035</u> | <u>1900</u> | <u>6.67</u> | <u>27.0</u> | <u>-182</u> | | <u>0.55</u> | <u>CLEAR SLIGHT TURBID - SULPHIDE</u> |
| <u>17:33</u> | <u>60</u> | <u>1871</u> | <u>6.84</u> | <u>26.8</u> | <u>-149</u> | | <u>0.27</u> | <u>CLEAR SLIGHTLY TURBID - SULPHIDE</u> |
| <u>17:56</u> | <u>90</u> | <u>1842</u> | <u>6.94</u> | <u>26.3</u> | <u>-140</u> | | <u>0.45</u> | <u>" " " " " "</u> |
| <u>18:22:14</u> | <u>123</u> | <u>1813</u> | <u>6.89</u> | <u>25.9</u> | <u>-113</u> | | <u>0.30</u> | <u>CLEAR LESS TURBID " "</u> |

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 |
|------|--------|-----------------|
| | | |
| | | |
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BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P206-5

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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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) ~ 29.40 m
 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) |
|--------------|-----------------|-------------|-------------|-------------|------------|----------------------|-------------------------|---|
| <u>17:47</u> | <u>6.1</u> | <u>1703</u> | <u>7.61</u> | <u>25.3</u> | <u>-84</u> | | <u>2.55</u> | <u>Light grey, light brown, slight HC color</u> |
| <u>18:08</u> | <u>12.2</u> | <u>1790</u> | <u>7.60</u> | <u>25.2</u> | <u>-51</u> | | <u>4.03</u> | <u> </u> |
| <u>18:19</u> | <u>18.3</u> | <u>1688</u> | <u>7.67</u> | <u>25.1</u> | <u>-33</u> | | <u>4.39</u> | <u> </u> |
| | | | | | | | | |
| | | | | | | | | |

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 |
|------|--------|-----------------|
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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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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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) | 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 | | 0.58 | 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 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 |
|------|--------|-----------------|
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BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P208-5

Project No 42626162 Project Name BMA Caval Ridge Groundwater

Development Date: _____ Done by: _____

Development Method _____

Time Started _____

Time Stopped _____

Comments _____

SWL (start) _____

SWL (end) _____

Volume Removed _____

Discharge Rate _____

Bore Depth (start) _____

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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Purging Date: 28/2/09 Done by: AW/SS

Purge Method Boiler
 Time Started 9:01
 Time Stopped 9:45
 Comments _____

Purge Depth
 SWL (start) 13.270 m
 SWL (end) 13.33 m

Bore Volume 4.5 L
 Volume Removed _____

Bore Depth (start) 15.532 m
 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) |
|-------------|-----------------|-------------|-------------|-------------|------------|----------------------|-------------------------|--|
| <u>9:11</u> | <u>4.5</u> | <u>2191</u> | <u>6.97</u> | <u>27.0</u> | <u>-9</u> | | <u>2.97</u> | <u>Orange-brown, highly turbid, organic colour</u> |
| <u>9:33</u> | <u>9</u> | <u>2177</u> | <u>7.03</u> | <u>27.1</u> | <u>13</u> | | <u>3.59</u> | |
| <u>9:45</u> | <u>13.5</u> | <u>2129</u> | <u>6.99</u> | <u>27.3</u> | <u>48</u> | | <u>3.06</u> | |
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Sampling Date: _____ Done by: AW/SS

Sampling Method _____
 Time Started 9:50
 Time Stopped 10:03
 Comments _____

Sampling Depth
 SWL (start) _____
 SWL (end) _____

Groundwater Disposal Record

| Date | Litres | Disposal method |
|------|--------|-----------------|
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| | | |

devmt
purging

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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Purging Date: 28/2/09 Done by: AW/SS

Purge Method AP2 PUMP Purge Depth _____
 Time Started 12:10 SWL (start) 14.270m Bore Volume _____ Bore Depth (start) 44.55m
 Time Stopped 13:24 SWL (end) 14.412m 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) |
|-------|-----------------|------------|------|-------|------------|----------------------|-------------------------|-----------------------------|
| 12:34 | 30 L | 4.04 | 7.08 | 26.4 | -105 | | 0.76 | CLEAR, SLIGHT ORGANIC ODOUR |
| 12:49 | 60 L | 3.81 | 7.15 | 28.8 | -127 | | 0.64 | CLEAR, SLIGHT SULPHUR ODOUR |
| 13:04 | 90 L | 3.96 | 7.15 | 28.8 | -140 | | 0.48 | CLEAR, SLIGHT SULPHUR ODOUR |
| 13:24 | 105 L | 3.96 | 7.15 | 28.8 | -143 | | 0.15 | CLEAR, SLIGHT SULPHUR ODOUR |

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 |
|------|--------|-----------------|
| | | |
| | | |
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BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: 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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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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) |
|--------------|-----------------|------------|-------------|-------------|------------|----------------------|-------------------------|---------------------------------|
| <u>13:11</u> | <u>3.5</u> | <u>422</u> | <u>6.67</u> | <u>26.3</u> | <u>-79</u> | | <u>0.78</u> | <u>black</u> |
| <u>13:17</u> | <u>7</u> | <u>436</u> | <u>6.53</u> | <u>26.5</u> | <u>-86</u> | | <u>0.34</u> | <u>Dark gray, highly turbid</u> |
| <u>13:23</u> | <u>10.5</u> | <u>443</u> | <u>6.51</u> | <u>26.5</u> | <u>-77</u> | | <u>0.61</u> | <u>" " "</u> |
| | | | | | | | | |
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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 |
|------|--------|-----------------|
| | | |
| | | |
| | | |

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 _____

Time Stopped _____

Comments _____

SWL (start) _____

SWL (end) _____

Volume Removed _____

Discharge Rate _____

Bore Depth (start) _____

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
| | | | | | | | | |
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Purging Date: 28/2/09 Done by: AW/SS

Purge Method AP2 Pump

Time Started 16:32

Time Stopped _____

Comments _____

Purge Depth _____

SWL (start) 37.688m

SWL (end) 59.875m

Bore Volume _____

Volume Removed _____

Bore Depth (start) > 100 m

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) |
|-------|-----------------|------------|------|-------|------------|----------------------|-------------------------|---------------------------------|
| 17:03 | 30 | 1461 us | 7.52 | 29.2 | -187 | 0.45 | 0.43 | CLEAR SLIGHTLY TURBID, ABUNDANT |
| 17:35 | 60 | 2364 us | 7.47 | 27.1 | -215 | 0.60 | 0.60 | CLEAR, NO INSECT MATTER |
| 18:14 | 90 | 7100 us | 7.33 | 26.4 | -212 | 0.26 | 0.26 | " " " " |
| 18:19 | 93 | 11260 us | 7.21 | 25.9 | -221 | 0.37 | 0.37 | CLEAR, NO MATTER, SULPHUR |
| 18:25 | 95 | 13200 us | 7.19 | 26.0 | -232 | 0.01 | 0.01 | " " " " |

SULPHUR ODOUR,
SUSPENDED ORGANIC SLUDGE, ENCLOSED INSECTS
BUBBLES IN FLOW CELL, PRESSURE OR ORGANIC SLUDGE, SULPHUR ODOUR
NO BUBBLES

AFTER SAMPLING -

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

18:33

Sampling Method AP2 PUMP

Time Started 18:28

Time Stopped 18:31

Comments _____

Sampling Depth _____

SWL (start) _____

SWL (end) _____

devmt _____

purging _____

Groundwater Disposal Record

| Date | Litres | Disposal method |
|------|--------|-----------------|
| | | |
| | | |
| | | |
| | | |

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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Purging Date: 2/3/09 Done by: AW/SS

Purge Method AP2 Pump Purge Depth _____
 Time Started 12:50 SWL (start) 19.872 m Bore Volume _____ Bore Depth (start) 78.10 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) |
|--------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|---|
| <u>13:21</u> | <u>30</u> | <u>9590</u> | <u>7.26</u> | <u>31.7</u> | <u>-144</u> | | <u>0.38</u> | <u>Clear, bubbles on probes, slight sulfur</u> |
| <u>13:49</u> | <u>60</u> | <u>9660</u> | <u>7.25</u> | <u>31.5</u> | <u>-138</u> | | <u>0.55</u> | <u>Clear, NO BUBBLES, SLIGHT SULPHUR ODOUR.</u> |
| <u>14:18</u> | <u>90</u> | <u>9770</u> | <u>7.23</u> | <u>31.2</u> | <u>-135</u> | | <u>0.46</u> | <u>Clear, NO BUBBLES, SLIGHT SULPHUR ODOUR.</u> |
| <u>14:46</u> | <u>120</u> | <u>9810</u> | <u>7.24</u> | <u>31.2</u> | <u>-137</u> | | <u>0.36</u> | <u>Clear, NO BUBBLES, SLIGHT SULPHUR ODOUR.</u> |
| <u>14:52</u> | <u>124</u> | <u>9790</u> | <u>7.26</u> | <u>31.3</u> | <u>-141</u> | | <u>0.13</u> | <u>" " " "</u> |

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

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

P209 = OC-01

Groundwater Disposal Record

| Date | Litres | Disposal method |
|------|--------|-----------------|
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devmt purging

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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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 | | | |
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| | | | |

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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Purging Date: 2/3/09 Done by: AW/SS

Purge Method AP2 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) |
|--------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|---|
| <u>16:55</u> | <u>30</u> | <u>7180</u> | <u>7.38</u> | <u>28.9</u> | <u>-168</u> | | <u>0.94</u> | <u>MEDIUM GREY, EXTREMELY TURBID, HIGH SULPHUR ODOUR</u> |
| <u>17:14</u> | <u>60</u> | <u>7190</u> | <u>7.42</u> | <u>28.7</u> | <u>-161</u> | | <u>0.31</u> | <u>MEDIUM GREY, " " " " " "</u> |
| <u>17:34</u> | <u>90</u> | <u>7230</u> | <u>7.46</u> | <u>28.0</u> | <u>-143</u> | | <u>0.64</u> | <u>LIGHT " MEDIUM → SLIGHT TURBIDITY,</u> |
| <u>17:54</u> | <u>120</u> | <u>7220</u> | <u>7.47</u> | <u>27.6</u> | <u>-141</u> | | <u>0.28</u> | <u>VERY LIGHT GREY, V. SLIGHT TURBIDITY, SLIGHT SULPHUR</u> |

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

| devmt purging | Date | Litres | Disposal method |
|---------------|------|--------|-----------------|
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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 _____

Time Stopped _____

Comments _____

SWL (start) _____

SWL (end) _____

Volume Removed _____

Discharge Rate _____

Bore Depth (start) _____

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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Purging Date: 3/3/09 Done by: AW/SS

Purge Method AP2 Pump

Time Started 8:40

Time Stopped _____

Comments _____

Purge Depth _____

SWL (start) 8.207 m

SWL (end) 9.94 m

Bore Volume _____

Volume Removed _____

Bore Depth (start) 86.50 m

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) |
|--------------|-----------------|--------------|-------------|-------------|-------------|----------------------|-------------------------|---------------------------------|
| <u>9:24</u> | <u>30 L</u> | <u>12490</u> | <u>6.85</u> | <u>30.1</u> | <u>-100</u> | | <u>1.20</u> | <u>CLEAR, SMALL AIR BUBBLES</u> |
| <u>10:13</u> | <u>75 L</u> | <u>15260</u> | <u>6.85</u> | <u>28.9</u> | <u>-124</u> | | <u>0.43</u> | <u>VERY CLEAR, SMALL BLACK</u> |
| <u>10:41</u> | <u>105 L</u> | <u>15690</u> | <u>6.87</u> | <u>29.1</u> | <u>-96</u> | | <u>0.60</u> | <u>VERY CLEAR, " "</u> |
| <u>11:16</u> | <u>135 L</u> | <u>15610</u> | <u>6.87</u> | <u>29.5</u> | <u>-89</u> | | <u>0.64</u> | <u>" " " "</u> |

*OLD SIDE OF FLOW CELL
LOW SULPHUR SMELL
PARTICLES, SULPHUR OXIDE
SIGNIFICANT*

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

Sampling Method AP2 PUMP

Time Started _____

Time Stopped _____

Comments _____

Sampling Depth _____

SWL (start) _____

SWL (end) _____

Groundwater Disposal Record

| Date | Litres | Disposal method |
|------|--------|-----------------|
| | | |
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| | | |

devmt
purging

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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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 | 28.6 28.2 | -108 | | 0.30 | CLEAR, SLIGHT TURBIDITY, MODERATE SULPHUR ODOUR |
| 13:28 | 64 | 15950 | 6.81 | 28.2 | -93 | | 0.24 | CLEAR, V. LOW TURBIDITY, MODERATE SULPHUR ODOUR |
| 13:49 | 96 | 15890 | 6.78 | 28.4 | -97 | | 0.22 | " " " " " " " " |
| 14:09 | 128 | 16570 | 6.72 | 28.4 | -82 | | 1.31 | CLEAR, MODERATE SULPHUR ODOUR |

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

Sampling Method AP2 Pump Sampling Depth _____
 Time Started 14:10 SWL (start) _____
 Time Stopped 14:24 SWL (end) _____
 Comments _____

P2-03-D = AC 04

Groundwater Disposal Record

| Date | Litres | Disposal method |
|---------------|--------|-----------------|
| devmt purging | | |
| | | |
| | | |

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) |
|------|-----------------|------------|----|-------|------------|----------------------|-------------------------|-----------------------------|
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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) |
|--------------|-----------------|--------------|-------------|-------------|------------|----------------------|-------------------------|--------------------------------|
| <u>13:03</u> | <u>3.1</u> | <u>9460</u> | <u>6.98</u> | <u>30.0</u> | <u>-16</u> | | <u>2.04</u> | <u>light brown-gray turbid</u> |
| <u>13:26</u> | <u>6.2</u> | <u>11040</u> | <u>6.92</u> | <u>26.8</u> | <u>-8</u> | | <u>2.23</u> | <u>" "</u> |
| <u>13:39</u> | <u>9.3</u> | <u>10930</u> | <u>6.96</u> | <u>27.3</u> | <u>14</u> | | <u>2.88</u> | <u>" "</u> |
| | | | | | | | | |
| | | | | | | | | |

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 |
|------|--------|-----------------|
| | | |
| | | |
| | | |

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: 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) |
|--------------|-----------------|-------------|-------------|-------------|-------------|----------------------|-------------------------|---|
| <u>16:05</u> | <u>30</u> | <u>1509</u> | <u>7.54</u> | <u>27.5</u> | <u>157</u> | | <u>0.43</u> | <u>Clear - slightly turbid, HC odor</u> |
| <u>16:25</u> | <u>60</u> | <u>1497</u> | <u>7.84</u> | <u>27.3</u> | <u>-165</u> | | <u>0.35</u> | <u>" " " "</u> |
| <u>17:44</u> | <u>Recover</u> | <u>2180</u> | <u>7.87</u> | <u>27.5</u> | <u>-166</u> | | <u>2.42</u> | <u>" " " "</u> |
| | | | | | | | | |
| | | | | | | | | |

Bailer →

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

| devmt | Date | Litres | Disposal method |
|---------|------|--------|-----------------|
| purging | | | |
| | | | |
| | | | |
| | | | |

BORE DEVELOPMENT, PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: P204

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) |
|--------------|-----------------|------------|-------------|-------------|-------------|----------------------|-------------------------|---------------------------------------|
| <u>18.49</u> | <u>1L</u> | <u>111</u> | <u>6.66</u> | <u>27.9</u> | <u>-151</u> | | <u>0.62</u> | <u>CLEAR, SULPHUR ODOUR - STRONG.</u> |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

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

Sampling Method BAUER - 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 | | | |
| | | | |
| | | | |

**Groundwater Analytical Laboratory
Documentation**

Appendix F

CHAIN OF CUSTODY FORM

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|---|---|---|--------------|---|-------------------------------|---|---|---|---|--|--|------|--|--|--|--|--|--|--|--|--|--|--|-------|--|--|--|--|--|--|--|--|--|--|--|-------------------|--|--|--|--|--|--|--|--|--|--|--|----------|-----|-----|-----|----|-----------|--|--|--|--|--|--|
| THIS COLUMN FOR LAB USE ONLY | 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 | Container Size, Type, Preservative and Analysis Container Identification | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Job Code: | | | | <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:5%;">Size</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>Type*</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>Preservative Code</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>Analytes</td> <td style="text-align: center;">NT1</td> <td style="text-align: center;">NT2</td> <td style="text-align: center;">NT3</td> <td style="text-align: center;">W3</td> <td style="text-align: center;">pH and EC</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table> | | | | | | | | | | Size | | | | | | | | | | | | Type* | | | | | | | | | | | | Preservative Code | | | | | | | | | | | | Analytes | NT1 | NT2 | NT3 | W3 | pH and EC | | | | | | |
| Size | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Type* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Preservative Code | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Analytes | NT1 | NT2 | NT3 | W3 | pH and EC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Due Date: | Project No: 42826162 Project Manager: Stephen Denner Agreement No: | Sampler(s): AW/BS Signature(s): Checked: | Environmental Division Brisbane DE Work Order EB0807578 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Custody seal intact? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO | Released for URS by: <i>AW</i> Date: <i>8/6/08</i> Time: <i>B.00</i> | |  Telephone : +61-7-3243 7222 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sample cold? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lab Identification | Date | Time | Matrix | Sample Number | | | Tick required analytes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | 5/6/08 | AM | Water | P206-D | P | 2 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | 5/6/08 | AM | | P206-S | P | 2 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 5/6/08 | PM | | P207-D | P | 2 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | 5/6/08 | PM | | P207-S | P | 2 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | 6/6/08 | AM | | P208-D | P | 2 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | 6/6/08 | AM | | P208-S | P | 2 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | 6/6/08 | AM | | P210 | P | 2 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 6/6/08 | PM | | P209 | P | 2 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | 6/6/08 | PM | | P211-D | P | 2 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | 7/6/08 | PM | | P203-D | P | 2 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23 | 7/6/08 | PM | | P203-S | P | 2 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 | 7/6/08 | PM | ✓ | P202 | P | 2 | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Remarks: | | | | | TOTAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| * 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: <i>052 788 98</i> | Specify Turnaround Time: | | | | | NOTE: SAMPLES MAY CONTAIN DANGEROUS AND HAZARDOUS SUBSTANCES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

CHAIN OF CUSTODY FORM

| | | | | | | | | | | | | |
|--|--|---|-------------------------------------|--------------------------|---|---|--|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--|
| THIS COLUMN FOR LAB USE ONLY | FROM: URS (AUSTRALIA) Level 14, 240 Queen Street BRISBANE QLD 4000 PO Box 302, BBN QLD 4001 | | DATE: | | TO: ALS 32 Shand St Stafford QLD 4053 | | Container Size, Type, Preservative and Analysis | | | | | |
| | Job Code: | Ph: 07 3243 2111 | | Fax: 07 3243 2199 | | Container Identification | | | | | | |
| | Due Date: | Project No: 42626162 | | Sampler(s): AW/BS | | Size | | | | | | |
| | | Project Manager: Stephen Denner | | Signature(s): | | Type* | | | | | | |
| | Agreement No: | | Checked: | | Preservative Code | | | | | | | |
| Custody seal intact? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO | Released for URS by: <i>AW</i> | | Received for Laboratory by: | | Analytes | | | | | | | |
| Sample cold? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO | Date: <i>8/6/08</i> Time: <i>13:00</i> | | Date: _____ Time: _____ | | | NT1 | NT2 | NT3 | W3 | pH and EC | | |
| Lab Identification | Date | Time | Matrix | Sample Number | Comments | Total no | Tick required analytes | | | | | |
| 1 | 8/6/08 | AM | Water | P204 | P | 2 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 2 | 8/6/08 | AM | | P201 | P | 2 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 3 | 8/6/08 | AM | | P205 | P | 2 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 4 | 5/6/08 | AM | | QC01 | P | 2 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 5 | 5/6/08 | PM | | QC02 | P | 1 | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 6 | 5/6/08 | PM | | QC03 | P | 1 | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 7 | 6/6/08 | AM | | QC04 | P | 2 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 8 | 6/6/08 | PM | | QC05 | P | 1 | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 9 | 6/6/08 | PM | | QC06 | P | 1 | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 10 | 7/6/08 | AM | | QC07 | P | 2 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 11 | 7/6/08 | AM | | QC08 | P | 1 | | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 12 | 8/6/08 | AM | <input checked="" type="checkbox"/> | QC10 | P | 2 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Remarks: | | | | | | TOTAL | | | | | | |
| * 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: <i>05278898</i> | | Specify Turnaround Time: | | | | NOTE: SAMPLES MAY CONTAIN DANGEROUS AND HAZARDOUS SUBSTANCES | | | | | | |



Environmental Division

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 | : ES2008URS QLD0041 (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 |
| Security 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 necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package. 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

| Laboratory sample ID | Client sampling date / time | Client sample ID | WATER - EA005: pH | WATER - EA010P Conductivity (PC) | WATER - NT-01 Major Cations (Ca, Mg, Na, K) | WATER - NT-02 (EB/PC) Major Anions (Cl, SO ₄ , 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 | : ---- | Date Samples Received | : 10-JUN-2008 |
| C-O-C number | : ---- | Issue Date | : 17-JUN-2008 |
| Sampler | : AW/BS | No. of samples received | : 24 |
| Site | : ---- | No. of samples analysed | : 24 |
| Quote number | : EN/001/08 | | |

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.

| <i>Signatories</i> | <i>Position</i> | <i>Accreditation Category</i> |
|--------------------|------------------------------|-------------------------------|
| Kim McCabe | Senior Inorganic Chemist | Inorganics |
| Phillip Kennedy | 2IC Environmental Laboratory | Inorganics |

Environmental Division Brisbane

Part of the **ALS Laboratory Group**

32 Shand Street Stafford QLD Australia 4053
Tel. +61-7-3243 7222 Fax. +61-7-3243 7218 www.alsglobal.com

A Campbell Brothers Limited Company



General Comments

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

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

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

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

When 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

Client sample ID
 Client sampling date / time

| Compound | CAS Number | LOR | Unit | PZ04 | PZ01 | PZ05 | QC01 | QC02 |
|--|-------------|--------|---------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 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

Client sample ID

Client sampling date / time

| Compound | CAS Number | LOR | Unit | PZ04 | PZ01 | PZ05 | QC01 | QC02 |
|--|------------|--------|------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 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

Client sample ID
 Client sampling date / time

| Compound | CAS Number | LOR | Unit | QC03 | QC04 | QC05 | QC06 | QC07 |
|--|-------------|--------|---------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 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

Client sample ID

Client sampling date / time

| Compound | CAS Number | LOR | Unit | QC03 | QC04 | QC05 | QC06 | QC07 |
|--|------------|--------|------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 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

| | | | | Client sample ID | | | | |
|--|-------------|--------|---------|-----------------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | QC08 | QC10 | PZ06-D | PZ06-S | PZ07-D |
| | | | | 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 |
| Compound | CAS Number | LOR | Unit | Client sampling date / time | | | | |
| 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

Client sample ID

Client sampling date / time

| | | | | QC08 | QC10 | PZ06-D | PZ06-S | PZ07-D |
|--|------------|-------|------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 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 |
| Compound | CAS Number | LOR | Unit | 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

| | | | | Client sample ID | | | | |
|--|-------------|--------|---------|-----------------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | Client sampling date / time | | | | |
| | | | | PZ07-S | PZ08-D | PZ08-S | PZ10 | PZ09 |
| | | | | 05-JUN-2008 15:00 | 06-JUN-2008 11:00 | 06-JUN-2008 11:00 | 06-JUN-2008 11:00 | 06-JUN-2008 15:00 |
| Compound | CAS Number | LOR | Unit | EB0807578-016 | EB0807578-017 | EB0807578-018 | EB0807578-019 | 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

Client sample ID

Client sampling date / time

| | | | | PZ07-S | PZ08-D | PZ08-S | PZ10 | PZ09 |
|--|------------|-------|------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 05-JUN-2008 15:00 | 06-JUN-2008 11:00 | 06-JUN-2008 11:00 | 06-JUN-2008 11:00 | 06-JUN-2008 15:00 |
| Compound | CAS Number | LOR | Unit | EB0807578-016 | EB0807578-017 | EB0807578-018 | EB0807578-019 | 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

| | | | | Client sample ID | | | | |
|--|-------------|--------|---------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------|
| | | | | PZ11-D | PZ03-D | PZ03-S | PZ02 | ---- |
| | | | | 06-JUN-2008 15:00 | 07-JUN-2008 15:00 | 07-JUN-2008 15:00 | 07-JUN-2008 15:00 | ---- |
| | | | | Client sampling date / time | Client sampling date / time | Client sampling date / time | Client sampling date / time | ---- |
| Compound | CAS Number | LOR | Unit | 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 | : ---- | Date Samples Received | : 10-JUN-2008 |
| C-O-C number | : ---- | Issue Date | : 17-JUN-2008 |
| Sampler | : AW/BS | No. of samples received | : 24 |
| Order number | : ---- | No. of samples analysed | : 24 |
| Quote number | : EN/001/08 | | |

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

| <i>Signatories</i> | <i>Position</i> | <i>Accreditation Category</i> |
|--------------------|------------------------------|-------------------------------|
| Kim McCabe | Senior Inorganic Chemist | Inorganics |
| Phillip Kennedy | 2IC Environmental Laboratory | Inorganics |

Environmental Division Brisbane

Part of the **ALS Laboratory Group**

32 Shand Street Stafford QLD Australia 4053
Tel. +61-7-3243 7222 Fax. +61-7-3243 7218 www.alsglobal.com

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General Comments

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

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

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

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

Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = 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 |
| 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 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: 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 |
| 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 | | |

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 Work Order : EB0807578
 Client : URS AUSTRALIA PTY LTD (QLD)
 Project : 42626162



| 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: 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 Result | Laboratory Control Spike (LCS) Report | | | |
|--|------------|--------|---------|---------------------------------------|---------------------------------------|---------------------------|---------------------|------|
| | | | | | Spike Concentration | Spike Recovery (%) LCS | Recovery Limits (%) | |
| Method: Compound | CAS Number | LOR | Unit | 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 | | | | |
|---|------------|--------|------|--------------------------|---------------------------------------|--------------------|------|---------------------|--|
| | | | | Result | Spike Concentration | Spike Recovery (%) | | Recovery Limits (%) | |
| | | | | | | 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 | | | |
|--|------------|--------|------|-----------------------------|---------------------------------------|--------------------|---------------------|------|
| | | | | Result | Spike Concentration | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | 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 | | | |
|---|------------------|---------------------|------------|--------------------------|---------------------|-----------|-----------|
| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | Spike | Recovery Limits (%) | | |
| | | | | 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 |

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 Work Order : EB0807578
 Client : URS AUSTRALIA PTY LTD (QLD)
 Project : 42626162



Sub-Matrix: WATER

| | | | | Matrix Spike (MS) Report | | | |
|---|------------------|--|------------|--------------------------|--------------------|---------------------|-----------|
| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | Spike | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | Concentration | MS | Low | High |
| 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 | : ---- | | |
| Quote number | : EN/001/08 | No. of samples received | : 24 |
| | | 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

Environmental Division Brisbane

Part of the **ALS Laboratory Group**

32 Shand Street Stafford QLD Australia 4053
Tel. +61-7-3243 7222 Fax. +61-7-3243 7218 www.alsglobal.com

A Campbell Brothers Limited Company



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-S, PZ07-S | PZ06-D, PZ07-D, | 05-JUN-2008 | ---- | ---- | ---- | 10-JUN-2008 | 05-JUN-2008 | * |
| Clear Plastic Bottle - Natural QC04, PZ08-S, PZ09, | PZ08-D, PZ10, PZ11-D | 06-JUN-2008 | ---- | ---- | ---- | 10-JUN-2008 | 06-JUN-2008 | * |
| Clear Plastic Bottle - Natural QC07, PZ03-S, | PZ03-D, PZ02 | 07-JUN-2008 | ---- | ---- | ---- | 10-JUN-2008 | 07-JUN-2008 | * |
| Clear Plastic Bottle - Natural PZ04, PZ05, | PZ01, QC10 | 08-JUN-2008 | ---- | ---- | ---- | 10-JUN-2008 | 08-JUN-2008 | * |
| EA010P: Conductivity by PC Titrator | | | | | | | | |
| Clear Plastic Bottle - Natural QC01, PZ06-S, PZ07-S | PZ06-D, PZ07-D, | 05-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 03-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural QC04, PZ08-S, PZ09, | PZ08-D, PZ10, PZ11-D | 06-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 04-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural QC07, PZ03-S, | PZ03-D, PZ02 | 07-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 05-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ04, PZ05, | PZ01, 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-S, PZ07-S | PZ06-D, PZ07-D, | 05-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 19-JUN-2008 | ✓ |
| Clear Plastic Bottle - Natural QC04, PZ08-S, PZ09, | PZ08-D, PZ10, PZ11-D | 06-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 20-JUN-2008 | ✓ |
| Clear Plastic Bottle - Natural QC07, PZ03-S, | PZ03-D, PZ02 | 07-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 21-JUN-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ04, PZ05, | PZ01, QC10 | 08-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 22-JUN-2008 | ✓ |
| ED040F: Dissolved Major Anions | | | | | | | | |
| Clear Plastic Bottle - Natural QC01, PZ06-S, PZ07-S | PZ06-D, PZ07-D, | 05-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 03-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural QC04, PZ08-S, PZ09, | PZ08-D, PZ10, PZ11-D | 06-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 04-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural QC07, PZ03-S, | PZ03-D, PZ02 | 07-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 05-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ04, PZ05, | PZ01, 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-S, PZ07-S | PZ06-D, PZ07-D, | 05-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 03-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural QC04, PZ08-S, PZ09, | PZ08-D, PZ10, PZ11-D | 06-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 04-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural QC07, PZ03-S, | PZ03-D, PZ02 | 07-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 05-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ04, PZ05, | PZ01, QC10 | 08-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 06-JUL-2008 | ✓ |
| ED093F: Dissolved Major Cations | | | | | | | | |
| Clear Plastic Bottle - Natural QC01, PZ06-S, PZ07-S | PZ06-D, PZ07-D, | 05-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 03-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural QC04, PZ08-S, PZ09, | PZ08-D, PZ10, PZ11-D | 06-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 04-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural QC07, PZ03-S, | PZ03-D, PZ02 | 07-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 05-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ04, PZ05, | PZ01, 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-S | PZ06-D, | 05-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 02-DEC-2008 | ✓ |
| Clear Plastic Bottle - Filtered; Lab-acidified QC04, PZ08-S, PZ09, | PZ08-D, PZ10, PZ11-D | 06-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 03-DEC-2008 | ✓ |
| Clear Plastic Bottle - Filtered; Lab-acidified QC07, PZ03-S | PZ03-D, | 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, QC10 | PZ05, | 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-S, PZ07-S | PZ06-D, PZ07-D, | 05-JUN-2008 | ---- | ---- | ---- | 16-JUN-2008 | 03-JUL-2008 | ✓ |
| Clear Plastic Bottle - Filtered; Lab-acidified QC04, PZ08-S, PZ09, | PZ08-D, PZ10, PZ11-D | 06-JUN-2008 | ---- | ---- | ---- | 16-JUN-2008 | 04-JUL-2008 | ✓ |
| Clear Plastic Bottle - Filtered; Lab-acidified QC07, PZ03-D, PZ02 | QC08, PZ03-S, | 07-JUN-2008 | ---- | ---- | ---- | 16-JUN-2008 | 05-JUL-2008 | ✓ |
| Clear Plastic Bottle - Filtered; Lab-acidified PZ04, PZ05, | PZ01, 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-S, PZ07-S PZ06-D, PZ07-D, | 05-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 03-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural QC04, PZ08-S, PZ09, PZ08-D, PZ10, PZ11-D | 06-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 04-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural QC07, PZ03-S, PZ03-D, PZ02 | 07-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 05-JUL-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ04, PZ05, PZ01, QC10 | 08-JUN-2008 | --- | --- | ---- | 13-JUN-2008 | 06-JUL-2008 | ✓ |
| EK057: Nitrite as N | | | | | | | |
| Clear Plastic Bottle - Natural QC01, PZ06-S, PZ07-S PZ06-D, PZ07-D, | 05-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 07-JUN-2008 | ✗ |
| Clear Plastic Bottle - Natural QC04, PZ08-S, PZ09, PZ08-D, PZ10, PZ11-D | 06-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 08-JUN-2008 | ✗ |
| Clear Plastic Bottle - Natural QC07, PZ03-S, PZ03-D, PZ02 | 07-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 09-JUN-2008 | ✗ |
| Clear Plastic Bottle - Natural PZ04, PZ05, PZ01, 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-S, PZ07-S | PZ06-D, PZ07-D, | 05-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 07-JUN-2008 | * |
| Clear Plastic Bottle - Natural QC04, PZ08-S, PZ09, | PZ08-D, PZ10, PZ11-D | 06-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 08-JUN-2008 | * |
| Clear Plastic Bottle - Natural QC07, PZ03-S, | PZ03-D, PZ02 | 07-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 09-JUN-2008 | * |
| Clear Plastic Bottle - Natural PZ04, PZ05, | PZ01, QC10 | 08-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 10-JUN-2008 | * |
| EK071: Reactive Phosphorus as P (Dissolved) | | | | | | | | |
| Clear Plastic Bottle - Natural QC01, PZ06-S, PZ07-S | PZ06-D, PZ07-D, | 05-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 07-JUN-2008 | * |
| Clear Plastic Bottle - Natural QC04, PZ08-S, PZ09, | PZ08-D, PZ10, PZ11-D | 06-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 08-JUN-2008 | * |
| Clear Plastic Bottle - Natural QC07, PZ03-S, | PZ03-D, PZ02 | 07-JUN-2008 | --- | --- | ---- | 11-JUN-2008 | 09-JUN-2008 | * |
| Clear Plastic Bottle - Natural PZ04, PZ05, | PZ01, 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 | Method | Count | | Rate (%) | | | Quality Control Specification |
|---|----------|-------|---------|----------|----------|------------|--|
| | | QC | Reaular | Actual | Expected | Evaluation | |
| Analytical Methods | | | | | | | |
| 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 | Method | Count | | Rate (%) | | | Quality Control Specification |
|---------------------------------------|----------|-------|---------|----------|----------|------------|--|
| | | QC | Reaular | Actual | Expected | Evaluation | |
| Analytical Methods | | | | | | | |
| 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 Silicon 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 (SnCl ₂)(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 SnCl ₂ 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 (SnCl ₂)(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 SnCl ₂ 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 NO ₃ - I. Nitrite is determined by direct colourimetry by FIA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) |



| <i>Analytical Methods</i> | <i>Method</i> | <i>Matrix</i> | <i>Method Descriptions</i> |
|---|---------------|---------------|--|
| Nitrate as N | EK058 | WATER | APHA 21st ed., 4500 NO ₃ --I Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by FIA. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) |
| Nitrite and Nitrate as N (NO _x) | EK059 | WATER | APHA 21st ed., 4500 NO ₃ - I. Combined oxidised Nitrogen (NO ₂ +NO ₃) 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 orthophosphate 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) |
| <i>Preparation Methods</i> | <i>Method</i> | <i>Matrix</i> | <i>Method Descriptions</i> |
| 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-S, PZ07-S PZ06-D, PZ07-D | ---- | ---- | ---- | 11-JUN-2008 | 07-JUN-2008 | 4 |
| Clear Plastic Bottle - Natural QC04, PZ08-S, PZ09 PZ08-D, PZ10, PZ11-D | ---- | ---- | ---- | 11-JUN-2008 | 08-JUN-2008 | 3 |
| Clear Plastic Bottle - Natural QC07, PZ03-S PZ03-D, PZ02 | ---- | ---- | ---- | 11-JUN-2008 | 09-JUN-2008 | 2 |
| Clear Plastic Bottle - Natural PZ04, PZ05 PZ01, QC10 | ---- | ---- | ---- | 11-JUN-2008 | 10-JUN-2008 | 1 |
| EK059: Nitrite plus Nitrate as N (NOx) | | | | | | |
| Clear Plastic Bottle - Natural QC01, PZ06-S, PZ07-S PZ06-D, PZ07-D | ---- | ---- | ---- | 11-JUN-2008 | 07-JUN-2008 | 4 |
| Clear Plastic Bottle - Natural QC04, PZ08-S, PZ09 PZ08-D, PZ10, PZ11-D | ---- | ---- | ---- | 11-JUN-2008 | 08-JUN-2008 | 3 |
| Clear Plastic Bottle - Natural QC07, PZ03-S PZ03-D, PZ02 | ---- | ---- | ---- | 11-JUN-2008 | 09-JUN-2008 | 2 |
| Clear Plastic Bottle - Natural PZ04, PZ05 PZ01, QC10 | ---- | ---- | ---- | 11-JUN-2008 | 10-JUN-2008 | 1 |
| EK071: Reactive Phosphorus as P (Dissolved) | | | | | | |
| Clear Plastic Bottle - Natural QC01, PZ06-S, PZ07-S PZ06-D, PZ07-D | ---- | ---- | ---- | 11-JUN-2008 | 07-JUN-2008 | 4 |
| Clear Plastic Bottle - Natural QC04, PZ08-S, PZ09 PZ08-D, PZ10, PZ11-D | ---- | ---- | ---- | 11-JUN-2008 | 08-JUN-2008 | 3 |
| Clear Plastic Bottle - Natural QC07, PZ03-S PZ03-D, 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, PZ05, PZ01, 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
 ADDRESS / OFFICE:
 PROJECT MANAGER (PM): Stephen Denner
 PROJECT ID: 42626162

SAMPLER: Andrew Wilson / Dale Gould
 MOBILE: 0448 853 004 / 0437 338 439
 PHONE 3243 2146 / 3243 2128
 EMAIL REPORT TO: stephen_denner@urscorp.cc (underscore between stephen and denner)

SITE: Caval Ridge P.O. NO.:
 RESULTS REQUIRED (Date): QUOTE NO.:

EMAIL INVOICE TO: (if different to report)
 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 DISPOSAL:

| 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) |
|-----|-----|-----|----|----------------------------------|-----------------------------------|------------------------------|-------------------------------|
|-----|-----|-----|----|----------------------------------|-----------------------------------|------------------------------|-------------------------------|

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

| ALS ID | SAMPLE ID | MATRIX | DATE | Time | Type / Code | Total bottles |
|--------|-----------|--------|------|------|-------------|---------------|
| | P210 | Water | 8/9 | AM | P, SP | 3 |
| | P211-D | | 8/9 | PM | | |
| | P209 | | 8/9 | PM | | |
| | P205 | | 9/9 | PM | | |
| | P207-S | | 9/9 | PM | | |
| | P207-D | | 9/9 | PM | | |
| | P208-S | | 9/9 | PM | | |
| | P208-D | | 9/9 | PM | | |
| | P206-S | | 10/9 | AM | | |
| | P206-D | | 10/9 | AM | | |
| | P203-S | | 10/9 | PM | | |
| | P203-D | ✓ | 10/9 | PM | ✓ | ✓ |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | | | |

All green plastics
 frozen as soon
 as practicable

Environmental Division
 Brisbane
 Work Order
EB0812573

 Telephone: +61-7-3243 7222

RELINQUISHED BY:
 Name: Andrew Wilson
 Of: URS
 Date: 11/9/08
 Time:

RECEIVED BY:
 Name: C. Creagh
 Of: ACS Brisbane
 Date: 12/9/08
 Time: 0748

METHOD OF SHIPMENT
 Con' Note No:
 Transport Co:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;
 V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulphuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulphuric 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.



Environmental Division

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 | : ES2008URS QLD0041 (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 |
| Security 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 necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

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 | : ---- | Date Samples Received | : 12-SEP-2008 |
| C-O-C number | : ---- | Issue Date | : 23-SEP-2008 |
| Sampler | : A. Wilson, D. Gould | No. of samples received | : 19 |
| Site | : Caval Ridge | No. of samples analysed | : 19 |
| Quote number | : EN/001/08 | | |

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 |

Environmental Division Brisbane

Part of the **ALS Laboratory Group**

32 Shand Street Stafford QLD Australia 4053
Tel. +61-7-3243 7222 Fax. +61-7-3243 7218 www.alsglobal.com

A Campbell Brothers Limited Company



General Comments

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

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

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

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

When 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

Client sample ID
 Client sampling date / time

| Compound | CAS Number | LOR | Unit | PZ10 | PZ11-D | PZ09 | PZ05 | PZ07-S |
|---|-------------|--------|------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 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
 Client sampling date / time

| Compound | CAS Number | LOR | Unit | PZ10 | PZ11-D | PZ09 | PZ05 | PZ07-S |
|---|------------|--------|-------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 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 |
| 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

Client sample ID
 Client sampling date / time

| Compound | CAS Number | LOR | Unit | PZ07-D | PZ08-S | PZ08-D | PZ06-S | PZ06-D |
|---|-------------|--------|------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 09-SEP-2008 15:00 | 09-SEP-2008 15:00 | 09-SEP-2008 15:00 | 10-SEP-2008 15:00 | 10-SEP-2008 15:00 |
| | | | | EB0812573-006 | EB0812573-007 | EB0812573-008 | EB0812573-009 | 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

Client sample ID

Client sampling date / time

| Compound | CAS Number | LOR | Unit | PZ07-D | PZ08-S | PZ08-D | PZ06-S | PZ06-D |
|---|------------|--------|-------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 09-SEP-2008 15:00 | 09-SEP-2008 15:00 | 09-SEP-2008 15:00 | 10-SEP-2008 15:00 | 10-SEP-2008 15:00 |
| | | | | EB0812573-006 | EB0812573-007 | EB0812573-008 | EB0812573-009 | 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

Client sample ID
 Client sampling date / time

| Compound | CAS Number | LOR | Unit | PZ03-S | PZ03-D | PZ02 | PZ01 | PZ04 |
|---|-------------|--------|------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 10-SEP-2008 15:00 | 10-SEP-2008 15:00 | 10-SEP-2008 15:00 | 10-SEP-2008 15:00 | 11-SEP-2008 15:00 |
| | | | | EB0812573-011 | EB0812573-012 | EB0812573-013 | EB0812573-014 | 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

Client sample ID

Client sampling date / time

| Compound | CAS Number | LOR | Unit | PZ03-S | PZ03-D | PZ02 | PZ01 | PZ04 |
|---|------------|--------|-------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 10-SEP-2008 15:00 | 10-SEP-2008 15:00 | 10-SEP-2008 15:00 | 10-SEP-2008 15:00 | 11-SEP-2008 15:00 |
| | | | | EB0812573-011 | EB0812573-012 | EB0812573-013 | EB0812573-014 | 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

| | | | | Client sample ID | | | | |
|---|-------------|--------|------|-----------------------------|-------------------|-------------------|-------------------|------|
| | | | | QC01 | QC02 | QC03 | QC04 | ---- |
| | | | | 08-SEP-2008 15:00 | 09-SEP-2008 15:00 | 10-SEP-2008 15:00 | 10-SEP-2008 15:00 | ---- |
| | | | | Client sampling date / time | | | | |
| Compound | CAS Number | LOR | Unit | 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

Client sample ID

Client sampling date / time

| Compound | CAS Number | LOR | Unit | QC01 | QC02 | QC03 | QC04 | --- | |
|---|------------|--------|-------|-------------------|-------------------|-------------------|-------------------|-----|--|
| | | | | 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 | Date Samples Received | : 12-SEP-2008 |
| C-O-C number | : ---- | Issue Date | : 23-SEP-2008 |
| Sampler | : A. Wilson, D. Gould | No. of samples received | : 19 |
| Order number | : ---- | No. of samples analysed | : 19 |
| Quote number | : EN/001/08 | | |

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

| <i>Signatories</i> | <i>Position</i> | <i>Accreditation Category</i> |
|--------------------|--------------------------|-------------------------------|
| Kim McCabe | Senior Inorganic Chemist | Inorganics |
| Stephen Hislop | Senior Inorganic Chemist | Inorganics |

Environmental Division Brisbane

Part of the **ALS Laboratory Group**

32 Shand Street Stafford QLD Australia 4053
Tel. +61-7-3243 7222 Fax. +61-7-3243 7218 www.alsglobal.com

A Campbell Brothers Limited Company



General Comments

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

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

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

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

Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = 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 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: 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 |

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 Work Order : EB0812573
 Client : URS AUSTRALIA PTY LTD (QLD)
 Project : 42626162



| 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: 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% |

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 Work Order : EB0812573
 Client : URS AUSTRALIA PTY LTD (QLD)
 Project : 42626162



| 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 Result | Laboratory Control Spike (LCS) Report | | | |
|---|------------|--------|------|---------------------------------------|---------------------------------------|---------------------------|---------------------|------|
| | | | | | Spike Concentration | Spike Recovery (%) LCS | Recovery Limits (%) | |
| Method: Compound | CAS Number | LOR | Unit | 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 Blank (MB) Report | Laboratory Control Spike (LCS) Report | | | | |
|---|------------|--------|------|-----------------------------|---------------------------------------|--------|--------------------|------|---------------------|
| Method: Compound | CAS Number | LOR | Unit | | Result | Spike | Spike Recovery (%) | | Recovery Limits (%) |
| | | | | Concentration | | LCS | Low | High | |
| EG020F: Dissolved Metals by ICP-MS (QCLot: 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 | | | |
|---|------------|------|------|--------------------------|---------------------------------------|--------------------|---------------------|------|
| | | | | Result | Spike Concentration | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | | | 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 | | | |
|--|------------------|--------------------------------|------------|--------------------------|--------------------|---------------------|-----------|
| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | Spike | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | 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 |

Page : 12 of 12
 Work Order : EB0812573
 Client : URS AUSTRALIA PTY LTD (QLD)
 Project : 42626162



Sub-Matrix: WATER

| | | | | Matrix Spike (MS) Report | | | |
|---|------------------|--------------------------------------|------------|--------------------------|--------------------|---------------------|-----------|
| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | Spike | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | Concentration | MS | Low | High |
| 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 | Date Samples Received | : 12-SEP-2008 |
| C-O-C number | : ---- | Issue Date | : 23-SEP-2008 |
| Sampler | : A. Wilson, D. Gould | No. of samples received | : 19 |
| Order number | : ---- | No. of samples analysed | : 19 |
| Quote number | : EN/001/08 | | |

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

Environmental Division Brisbane

Part of the **ALS Laboratory Group**

32 Shand Street Stafford QLD Australia 4053
Tel. +61-7-3243 7222 Fax. +61-7-3243 7218 www.alsglobal.com

A Campbell Brothers Limited Company



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, PZ09 | PZ11-D, | 08-SEP-2008 | --- | --- | ---- | 18-SEP-2008 | 22-SEP-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ05, PZ07-D, PZ08-D | PZ07-S, PZ08-S, | 09-SEP-2008 | --- | --- | ---- | 19-SEP-2008 | 23-SEP-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ06-S, PZ03-S, PZ02, QC04 | PZ06-D, PZ03-D, PZ01, | 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, PZ09 | PZ11-D, | 08-SEP-2008 | --- | --- | ---- | 17-SEP-2008 | 06-OCT-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ05, PZ07-D, PZ08-D | PZ07-S, PZ08-S, | 09-SEP-2008 | --- | --- | ---- | 17-SEP-2008 | 07-OCT-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ06-S, PZ03-S, PZ02, QC04 | PZ06-D, PZ03-D, PZ01, | 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, PZ09 | PZ11-D, | 08-SEP-2008 | --- | --- | ---- | 18-SEP-2008 | 06-OCT-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ05, PZ07-D, PZ08-D | PZ07-S, PZ08-S, | 09-SEP-2008 | --- | --- | ---- | 19-SEP-2008 | 07-OCT-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ06-S, PZ03-S, PZ02, QC04 | PZ06-D, PZ03-D, PZ01, | 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, PZ09 | PZ11-D, | 08-SEP-2008 | --- | --- | ---- | 17-SEP-2008 | 06-OCT-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ05, PZ07-D, PZ08-D | PZ07-S, PZ08-S, | 09-SEP-2008 | --- | --- | ---- | 17-SEP-2008 | 07-OCT-2008 | ✓ |
| Clear Plastic Bottle - Natural PZ06-S, PZ03-S, PZ02, QC04 | PZ06-D, PZ03-D, PZ01, | 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, PZ09 | PZ11-D, | 08-SEP-2008 | --- | --- | ---- | 17-SEP-2008 | 07-MAR-2009 | ✓ |
| Clear Plastic Bottle - Filtered; Lab-acidified PZ05, PZ07-D, | PZ07-S, PZ08-S | 09-SEP-2008 | --- | --- | ---- | 17-SEP-2008 | 08-MAR-2009 | ✓ |
| Clear Plastic Bottle - Filtered; Lab-acidified PZ03-S, PZ02, | PZ03-D, 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, PZ01 | PZ06-D, | 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, PZ09 | PZ11-D, | 08-SEP-2008 | ---- | ---- | ---- | 22-SEP-2008 | 06-OCT-2008 | ✓ |
| Clear Plastic Bottle - Filtered; Lab-acidified PZ05, PZ07-D, | PZ07-S, PZ08-S | 09-SEP-2008 | ---- | ---- | ---- | 22-SEP-2008 | 07-OCT-2008 | ✓ |
| Clear Plastic Bottle - Filtered; Lab-acidified PZ03-S, PZ02, | PZ03-D, 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, PZ01 | PZ06-D, | 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, PZ09 | PZ11-D, | 08-SEP-2008 | ---- | ---- | ---- | 18-SEP-2008 | 06-OCT-2008 | ✓ |
| Clear Plastic Bottle - Sulphuric Acid PZ05, PZ07-D, PZ08-D | PZ07-S, PZ08-S, | 09-SEP-2008 | ---- | ---- | ---- | 18-SEP-2008 | 07-OCT-2008 | ✓ |
| Clear Plastic Bottle - Sulphuric Acid PZ06-S, PZ03-S, PZ02, QC04 | PZ06-D, PZ03-D, PZ01, | 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, PZ09 | PZ11-D, | 08-SEP-2008 | ---- | ---- | ---- | 17-SEP-2008 | 10-SEP-2008 | ✗ |
| Clear Plastic Bottle - Natural PZ05, PZ07-D, PZ08-D | PZ07-S, PZ08-S, | 09-SEP-2008 | ---- | ---- | ---- | 17-SEP-2008 | 11-SEP-2008 | ✗ |
| Clear Plastic Bottle - Natural PZ06-S, PZ03-S, PZ02, QC04 | PZ06-D, PZ03-D, PZ01, | 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, PZ09 | PZ11-D, | 08-SEP-2008 | ---- | ---- | ---- | 18-SEP-2008 | 06-OCT-2008 | ✓ |
| Clear Plastic Bottle - Sulphuric Acid PZ05, PZ07-D, PZ08-D | PZ07-S, PZ08-S, | 09-SEP-2008 | ---- | ---- | ---- | 18-SEP-2008 | 07-OCT-2008 | ✓ |
| Clear Plastic Bottle - Sulphuric Acid PZ06-S, PZ03-S, PZ02, QC04 | PZ06-D, PZ03-D, PZ01, | 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, PZ09 | PZ11-D, | 08-SEP-2008 | 17-SEP-2008 | 06-OCT-2008 | ✓ | 17-SEP-2008 | 06-OCT-2008 | ✓ |
| Clear Plastic Bottle - Sulphuric Acid PZ05, PZ07-D, PZ08-D | PZ07-S, PZ08-S, | 09-SEP-2008 | 17-SEP-2008 | 07-OCT-2008 | ✓ | 17-SEP-2008 | 07-OCT-2008 | ✓ |
| Clear Plastic Bottle - Sulphuric Acid PZ06-S, PZ03-S, PZ02, QC04 | PZ06-D, PZ03-D, PZ01, | 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, PZ09 | PZ11-D, | 08-SEP-2008 | 17-SEP-2008 | 06-OCT-2008 | ✓ | 17-SEP-2008 | 06-OCT-2008 | ✓ |
| Clear Plastic Bottle - Sulphuric Acid PZ05, PZ07-D, PZ08-D | PZ07-S, PZ08-S, | 09-SEP-2008 | 17-SEP-2008 | 07-OCT-2008 | ✓ | 17-SEP-2008 | 07-OCT-2008 | ✓ |
| Clear Plastic Bottle - Sulphuric Acid PZ06-S, PZ03-S, PZ02, QC04 | PZ06-D, PZ03-D, PZ01, | 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 | Method | Count | | Rate (%) | | | Quality Control Specification |
|---|----------|-------|--------|----------|----------|------------|--|
| | | QC | Reular | 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 | Method | Count | | Rate (%) | | | Quality Control Specification |
|---|----------|-------|---------|----------|----------|------------|--|
| | | QC | Regular | Actual | Expected | Evaluation | |
| Analytical Methods | | | | | | | |
| 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 Silicon 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 (SnCl ₂)(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 SnCl ₂ 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 NH ₃ +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 NO ₃ - 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 NO ₃ --F. Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) |
| Nitrite and Nitrate as N (NO _x) by Discrete Analyser | EK059G | WATER | APHA 21st ed., 4500 NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) 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 + No _x) By Discrete Analyser | EK062G | WATER | APHA 21st ed., 4500 N org / NO ₃ . 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 | | | Analysis | | | |
|--|-------------------------------------|-----------------------------|--------------------|--------------|---------------|------------------|--------------|----------|
| | | Date extracted | Due for extraction | Days overdue | Date analysed | Due for analysis | Days overdue | |
| EK057G: Nitrite as N by Discrete Analyser | | | | | | | | |
| Clear Plastic Bottle - Natural | PZ10, PZ09 | PZ11-D, | ---- | ---- | ---- | 17-SEP-2008 | 10-SEP-2008 | 7 |
| Clear Plastic Bottle - Natural | PZ05, PZ07-D, PZ08-D | PZ07-S, PZ08-S, | ---- | ---- | ---- | 17-SEP-2008 | 11-SEP-2008 | 6 |
| Clear Plastic Bottle - Natural | PZ06-S, PZ03-S, PZ02, QC04 | PZ06-D, PZ03-D, PZ01, | ---- | ---- | ---- | 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.**

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

| 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) | | | | | |
|--------|-----------|--------|------|------|-------------|---------------|-----|-----|-----|----|-----------------------------------|-----------------------------------|-------------------------------|-------------------------------|--|--|--|--|--|
| 13 | P202 | Water | 3/3 | PM | P, SPN | 3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | Purple bottles frozen |
| 14 | P204 | | 3/3 | PM | P, SPN | 3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | as soon as |
| 15 | QC01 | | 2/3 | PM | P, SPN | 3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | practicable |
| 16 | QC02 | | 2/3 | PM | N | 1 | | | | | | | ✓ | ✓ | | | | | |
| 17 | QC03 | | 2/3 | PM | N | 1 | | | | | | | ✓ | ✓ | | | | | |
| 18 | QC04 | | 3/3 | PM | P, SPN | 3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | |
| 19 | QC05 | | 3/3 | PM | N | 1 | | | | | | | ✓ | ✓ | | | | | TOM Dissolved Metals on per Andrew Wilson 9-3-09 @ 946 bottles not filtered |
| 20 | QC06 | | 3/3 | PM | N | 1 | | | | | | | ✓ | ✓ | | | | | |

RELINQUISHED BY:
 Name: Andrew Wilson
 Of: URS
 Date: 4/3/09
 Time: 11:30

RECEIVED BY:
 Name: [Signature]
 Of: [Signature]
 Date:
 Time:

METHOD OF SHIPMENT
 Con' Note No:
 Transport Co:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved 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.



Environmental Division

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 | : ES2008URS QLD0041 (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 |
| Security 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 +/- 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 conversation 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 necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

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 | : ---- | Date Samples Received | : 05-MAR-2009 |
| C-O-C number | : ---- | Issue Date | : 17-MAR-2009 |
| Sampler | : A.Wilson, S.Stevens | No. of samples received | : 20 |
| Site | : Caval Ridge | No. of samples analysed | : 20 |
| Quote number | : EN/001/08 | | |

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 |

Environmental Division Brisbane

Part of the **ALS Laboratory Group**

32 Shand Street Stafford QLD Australia 4053
Tel. +61-7-3243 7222 Fax. +61-7-3243 7218 www.alsglobal.com

A Campbell Brothers Limited Company



General Comments

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

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

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

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

When 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

Client sample ID
 Client sampling date / time

| Compound | CAS Number | LOR | Unit | PZ06-S | PZ06-D | PZ08-S | PZ08-D | PZ07-S |
|---|-------------|--------|------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 27-FEB-2009 15:00 | 27-FEB-2009 15:00 | 28-FEB-2009 15:00 | 28-FEB-2009 15:00 | 28-FEB-2009 15:00 |
| | | | | EB0903756-001 | EB0903756-002 | EB0903756-003 | EB0903756-004 | 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

Client sample ID
 Client sampling date / time

| | | | | PZ06-S | PZ06-D | PZ08-S | PZ08-D | PZ07-S |
|---|------------|--------|-------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 27-FEB-2009 15:00 | 27-FEB-2009 15:00 | 28-FEB-2009 15:00 | 28-FEB-2009 15:00 | 28-FEB-2009 15:00 |
| Compound | CAS Number | LOR | Unit | EB0903756-001 | EB0903756-002 | EB0903756-003 | EB0903756-004 | 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

| | | | | Client sample ID | | | | |
|---|-------------|--------|------|-----------------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | PZ07-D | PZ05 | PZ09 | PZ11-D | PZ01 |
| | | | | 28-FEB-2009 15:00 | 28-FEB-2009 15:00 | 02-MAR-2009 15:00 | 02-MAR-2009 15:00 | 03-MAR-2009 15:00 |
| | | | | Client sampling date / time | | | | |
| Compound | CAS Number | LOR | Unit | EB0903756-006 | EB0903756-007 | EB0903756-008 | EB0903756-009 | 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

Client sample ID
 Client sampling date / time

| | | | | PZ07-D | PZ05 | PZ09 | PZ11-D | PZ01 |
|---|------------|--------|-------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 28-FEB-2009 15:00 | 28-FEB-2009 15:00 | 02-MAR-2009 15:00 | 02-MAR-2009 15:00 | 03-MAR-2009 15:00 |
| Compound | CAS Number | LOR | Unit | EB0903756-006 | EB0903756-007 | EB0903756-008 | EB0903756-009 | 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

Client sample ID
 Client sampling date / time

| Compound | CAS Number | LOR | Unit | PZ03-S | PZ03-D | PZ02 | PZ04 | QC01 |
|---|-------------|--------|------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 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 |
| | | | | EB0903756-011 | EB0903756-012 | EB0903756-013 | EB0903756-014 | 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
 Client sampling date / time

| Compound | CAS Number | LOR | Unit | PZ03-S | PZ03-D | PZ02 | PZ04 | QC01 |
|---|------------|--------|-------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 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 |
| | | | | 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

| | | | | 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 |
| Compound | CAS Number | LOR | Unit | 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

Client sample ID

Client sampling date / time

| Compound | CAS Number | LOR | Unit | QC02 | QC03 | QC04 | QC05 | QC06 |
|---|------------|--------|-------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | 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 | Date Samples Received | : 05-MAR-2009 |
| C-O-C number | : ---- | Issue Date | : 17-MAR-2009 |
| Sampler | : A.Wilson, S.Stevens | No. of samples received | : 20 |
| Order number | : ---- | No. of samples analysed | : 20 |
| Quote number | : EN/001/08 | | |

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

This Quality Control Report contains the following information:

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



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

| <i>Signatories</i> | <i>Position</i> | <i>Accreditation Category</i> |
|--------------------|--------------------------|-------------------------------|
| Kim McCabe | Senior Inorganic Chemist | Inorganics |

Environmental Division Brisbane

Part of the **ALS Laboratory Group**

32 Shand Street Stafford QLD Australia 4053
Tel. +61-7-3243 7222 Fax. +61-7-3243 7218 www.alsglobal.com

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General Comments

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

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

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

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

Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC



Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|--|------------------|--|-------------|-----------------------------------|------|-----------------|------------------|-----------|---------------------|
| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | LOR | Unit | Original Result | Duplicate Result | RPD (%) | Recovery Limits (%) |
| 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 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: 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 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: 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 |

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 Work Order : EB0903756
 Client : URS AUSTRALIA PTY LTD (QLD)
 Project : 42626162



| 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 Result | Laboratory Control Spike (LCS) Report | | | | |
|---|------------|--------|------|---------------------------------------|---------------------------------------|--------------------|------|---------------------|------|
| | | | | | Spike Concentration | Spike Recovery (%) | | Recovery Limits (%) | |
| Method: Compound | CAS Number | LOR | Unit | | | | 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 | | | | |
|---|------------|--------|------|-----------------------------|---------------------------------------|--------------------|------|---------------------|--|
| | | | | Result | Spike | Spike Recovery (%) | | Recovery Limits (%) | |
| | | | | | 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 Result | Laboratory Control Spike (LCS) Report | | | | |
|---|------------|--------|------|---------------------------------|---------------------------------------|--------------------|------|---------------------|--|
| | | | | | Spike Concentration | Spike Recovery (%) | | Recovery Limits (%) | |
| | | | | | | 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 | | | |
|---|------------------|----------------------|------------|--------------------------|--------------------|---------------------|-----------|
| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | Spike | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | 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 |

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 Work Order : EB0903756
 Client : URS AUSTRALIA PTY LTD (QLD)
 Project : 42626162



Sub-Matrix: WATER

| | | | | Matrix Spike (MS) Report | | | |
|---|------------------|--------------------------------------|------------|--------------------------|--------------------|---------------------|-----------|
| Laboratory sample ID | Client sample ID | Method: Compound | CAS Number | Spike | Spike Recovery (%) | Recovery Limits (%) | |
| | | | | Concentration | MS | Low | High |
| 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 | Date Samples Received | : 05-MAR-2009 |
| C-O-C number | : ---- | Issue Date | : 17-MAR-2009 |
| Sampler | : A.Wilson, S.Stevens | No. of samples received | : 20 |
| Order number | : ---- | No. of samples analysed | : 20 |
| Quote number | : EN/001/08 | | |

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

Environmental Division Brisbane

Part of the **ALS Laboratory Group**

32 Shand Street Stafford QLD Australia 4053
Tel. +61-7-3243 7222 Fax. +61-7-3243 7218 www.alsglobal.com

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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 | Sample Date | Extraction / Preparation | | | Analysis | | | |
|--|--------------------------|---------------------------------|----------------|--------------------|------------|---------------|------------------|------------|
| | | Container / Client Sample ID(s) | 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-D, PZ04, | PZ03-S, PZ02, QC04 | 03-MAR-2009 | --- | --- | ---- | 13-MAR-2009 | 17-MAR-2009 | ✓ |
| Clear Plastic Bottle - Natural PZ06-S, | PZ06-D | 27-FEB-2009 | --- | --- | ---- | 13-MAR-2009 | 13-MAR-2009 | ✓ |
| Clear Plastic Bottle - Natural PZ08-S, PZ07-S, PZ05 | PZ08-D, PZ07-D, | 28-FEB-2009 | --- | --- | ---- | 13-MAR-2009 | 14-MAR-2009 | ✓ |
| 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-D, PZ04, | PZ03-S, PZ02, 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, PZ07-S, PZ05 | PZ08-D, PZ07-D, | 28-FEB-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 |
| 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-D, PZ04, PZ03-S, PZ02, 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, PZ07-S, PZ05, PZ08-D, PZ07-D | 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-D, PZ04, PZ03-S, PZ02, 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, PZ07-S, PZ05, PZ08-D, PZ07-D | 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, QC01, PZ11-D | 02-MAR-2009 | --- | --- | ---- | 09-MAR-2009 | 29-AUG-2009 | ✓ |
| Clear Plastic Bottle - Nitric Acid; Filtered PZ01, PZ03-D, PZ04, PZ03-S, PZ02, 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, PZ07-S, PZ05, PZ08-D, PZ07-D | 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, QC01 | PZ11-D, | 02-MAR-2009 | ---- | ---- | ---- | 13-MAR-2009 | 30-MAR-2009 | ✓ |
| Clear Plastic Bottle - Nitric Acid; Filtered PZ01, PZ03-D, PZ04, | PZ03-S, PZ02, QC04 | 03-MAR-2009 | ---- | ---- | ---- | 13-MAR-2009 | 31-MAR-2009 | ✓ |
| 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, PZ07-S, PZ05 | PZ08-D, PZ07-D, | 28-FEB-2009 | ---- | ---- | ---- | 13-MAR-2009 | 28-MAR-2009 | ✓ |
| EK055G: Ammonia as N by Discrete Analyser | | | | | | | | |
| Clear Plastic Bottle - Sulphuric Acid PZ09, QC01 | PZ11-D, | 02-MAR-2009 | ---- | ---- | ---- | 09-MAR-2009 | 30-MAR-2009 | ✓ |
| Clear Plastic Bottle - Sulphuric Acid PZ01, PZ03-D, PZ04, | PZ03-S, PZ02, QC04 | 03-MAR-2009 | ---- | ---- | ---- | 09-MAR-2009 | 31-MAR-2009 | ✓ |
| 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, PZ07-S, PZ05 | PZ08-D, PZ07-D, | 28-FEB-2009 | ---- | ---- | ---- | 09-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 | |
| EK059G: NOX as N by Discrete Analyser | | | | | | | | |
| Clear Plastic Bottle - Sulphuric Acid PZ09, QC01 | PZ11-D, | 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-D, PZ04, | PZ03-S, PZ02, 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, PZ07-S, PZ05 | PZ08-D, PZ07-D, | 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-D, PZ04, | PZ03-S, PZ02, 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, PZ07-S, PZ05 | PZ08-D, PZ07-D, | 28-FEB-2009 | 10-MAR-2009 | 28-MAR-2009 | ✓ | 10-MAR-2009 | 28-MAR-2009 | ✓ |

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 Work Order : EB0903756
 Client : URS AUSTRALIA PTY LTD (QLD)
 Project : 42626162



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, QC01 | PZ11-D, | 02-MAR-2009 | 10-MAR-2009 | 30-MAR-2009 | ✓ | 10-MAR-2009 | 30-MAR-2009 | ✓ |
| Clear Plastic Bottle - Sulphuric Acid PZ01, PZ03-D, PZ04, | PZ03-S, PZ02, 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, PZ07-S, PZ05 | PZ08-D, PZ07-D, | 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 | Method | Count | | Rate (%) | | | Quality Control Specification |
|---|----------|-------|---------|----------|----------|------------|--|
| | | QC | Reaular | 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 | Method | Count | | Rate (%) | | | Quality Control Specification |
|---|----------|-------|---------|----------|----------|------------|--|
| | | QC | Regular | Actual | Expected | Evaluation | |
| Analytical Methods | | | | | | | |
| 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 Silicon 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 (SnCl ₂)(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 SnCl ₂ 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 NH ₃ + -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 NO ₂ - 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 NO ₃ --F. Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) |
| Nitrite and Nitrate as N (NO _x) by Discrete Analyser | EK059G | WATER | APHA 21st ed., 4500 NO ₃ - F. Combined oxidised Nitrogen (NO ₂ +NO ₃) 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 + No _x) By Discrete Analyser | EK062G | WATER | APHA 21st ed., 4500 N org / NO ₃ . 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 |
|-------------------------------------|----------------------|------------------|----------|------------|----------------|--------|---|
| 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.

URS Australia Pty Ltd
ABN 46 000 691 690
Level 16, 240 Queen Street
Brisbane, QLD 4000 Australia
GPO Box 302, Queensland 4001
Tel: 61 7 3243 2111 • Fax: 61 7 3243 2199