# Appendix J Groundwater Impact Assessment

# REPORT

Caval Ridge Groundwater Impact Assessment





Prepared for

### **BM Alliance Coal Operations Pty Ltd**

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20 March 2009 42626158



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20 March 2009

Final

Caval Ridge\_GW Technical\_R001v4.doc

Date: Reference:

Status:

Prepared for BM Alliance Coal Operations Pty Ltd, 20 March 2009 J:\Jobs\42626158\8000 - Deliverables\8002 - Final\Detailed Review-copy eRoom a\23\_Appendices\J Groundwater\Caval Ridge\_GW Technical\_R001v4.doc



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# Introduction Section 1

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

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

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

### 1.1 Scope of Work

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

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

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

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

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

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

This section should include reference to:

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

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## 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;

### Introduction

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

### **1.2 Description of Environmental Values**

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

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

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

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



# Section 2 Review of Information

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

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

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

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

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

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)

Monitoring Well	Easting (m)ª	Northing (m) <sup>a</sup>	Top of Casing Elevation (mAHD) <sup>a</sup>	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

#### Table 3-1 Summary of Monitoring Well Construction Details

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

TBD - To be determined after the bores have been surveyed.



# Section 3 Extent of Field Investigations

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

- 1) A 165 mm diameter hole was drilled to the desired depth using the rotary air method.
- 2) Class 9 or class 12 uPVC slotted screen and class 9 or class 12 uPVC casing (class dependent on depth of installation) was installed to the desired depth in the hole.
- 3) The annulus between the bore and the casing/screen was gravel packed from the base to the desired height above the screen. A 1 m bentonite seal was installed above the gravel pack and then the bore was backfill to approximately 6 m below surface elevation. The bore was then grouted above the backfill to surface.
- 4) A lockable steel standpipe was cemented in place over the top of the bore.
- 5) Each newly constructed monitoring well was developed at the time of installation by jetting water to the bottom of the bore and air lifting. Development was not possible on Pz02, Pz03-S, Pz06-S, Pz07-S, Pz08-S and Pz11-S as these bores were dry when installed.

### 3.2 Falling/Rising Head Tests

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

- 1) An electronic data logging pressure transducer was set to take water level measurements at 1 second intervals;
- 2) The transducer was installed inside the monitoring well below the water level;
- 3) The standing water level was measured using the electronic water level tape;
- 4) A slug of water was inserted (falling) or removed (rising) from the monitoring well to produce an instantaneous change in head;
- 5) The bore was allowed to recover to at least 80% of the initial standing water level;
- 6) The transducer was retrieved and the data was downloaded; and
- 7) The data was analysed graphically using the methods of Hvorslev (1951) and Bouwer and Rice (1989) to determine estimates of the aquifer hydraulic conductivity.

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



# **Extent of Field Investigations**

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

#### Table 3-2 Summar

#### Summary of Falling Head Tests

### 3.3 Groundwater Sampling

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



# Section 3 Extent of Field Investigations

#### Table 3-3

#### Groundwater Level Monitoring and Sampling Procedure Summary

Activity/Item	Details
Groundwater Level Monitoring	The groundwater levels in all monitoring wells were measured using a depth to water interface probe. The total depth of the bore was also checked using this probe, with the exception of Pz05 which was 118 m deep and beyond the limit of the tape.
Monitoring Bore Purging and Sampling	A low flow air operated purging/sampling pump was used to purge monitoring wells with air supplied from a compressor. Groundwater physico-chemical parameters including Electrical Conductivity (EC), pH, Temperature, Redox (Eh), and Dissolved Oxygen (DO) were measured and recorded at regular intervals during purging. The monitoring wells were considered purged when the groundwater physico-chemical parameters had stabilised. The following monitoring wells were purged using the pump: Pz01, Pz02, Pz03-D, Pz05, Pz06-D, Pz07-D, Pz08-D, Pz09, Pz10 and Pz11-D. Dedicated disposable plastic bailers were used to purge shallow monitoring wells with low water levels, where the pump was not suitable. A minimum of
	three bore volumes were removed and the groundwater physico-chemical parameters were measured after each bore volume to check for stabilisation. The monitoring wells were considered purged when the groundwater physico-chemical parameters had stabilised.
	The following monitoring wells were purged using bailers: Pz03-S, Pz06-S, Pz07-S and Pz08-S.
	One monitoring well, Pz04, was not purged as the static water level was at the limit of the pump and the large bore volume (approximately 52 L) would make purging three bore volumes with a bailer an unacceptable manual handling risk. A grab sample was collected from the unpurged bore.
	Immediately following purging, a groundwater sample was collected from each monitoring well using the same method as used to purge the bore.
	It is considered that monitoring wells PZ01, Pz05, Pz09, Pz10 and Pz11-D may not have been adequately purged prior to sampling during the June 2008 monitoring event and monitoring wells Pz01 and Pz05 during the September 2008 monitoring event as the water quality from these wells was considerably poorer from the February-March 2009 monitoring event.
Sample Preservation	Samples were placed in laboratory-supplied bottles containing appropriate preservatives. Samples were stored at $\pm 4^{\circ}$ 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 $\mu$ m 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 physicochemical parameters at the end of the purging are discussed in **Section 4.4**.



## **Extent of Field Investigations**

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



# Section 4 Existing Groundwater Environment

### 4.1 Geology and Groundwater Occurrence

### 4.1.1 Geology

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

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

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

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

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

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 intergranular 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 gravely sections of the sediment pile, and represents an unconfined to confined aquifer depending on location. Most of the clean sand and gravel lenses are permeable but are of limited lateral and vertical extent. Groundwater movement within the Tertiary sediment is predominantly via inter-granular flow.

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

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

#### Tertiary Basalt Aquifers

An aeromagnetic geophysical survey has been undertaken over the proposed Caval Ridge Mine site. The aeromagnetics show that Tertiary basalt extends from north of the project area, along the ridge adjacent to Horse Creek in a north-south direction as shown in **Figure 3**. The interpretation of the aeromagnetic geophysical survey indicated that there is approximately 81.5 Mm<sup>3</sup> of basalt in the area of Horse Creek. The areal extent of the basalt is approximately 7.2 Mm<sup>2</sup>, 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  $\pm 4$  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  $5.18 \times 10^{-3}$  to  $1.91 \times 10^{-1}$  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.

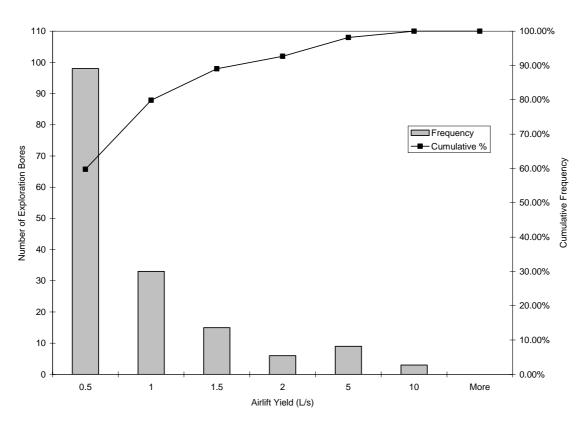
Interpreted hydraulic conductivity values determined during investigations as part of this study are presented in **Section 3.2**. The testing indicates that the cleats and joints in the coal are less open with depth, with a corresponding decrease in permeability.

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**.









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 (mAHD) <sup>a</sup>		
			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**.

Bore ID	Aquifer Type		EC (µS/c	m)	рН			
		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 <sup>1</sup> Upper limits Some reluctance to drink No adverse affects			7,500 – 15,0 6,000 – 7,5 0 – 6,000	00				

#### Table 4-3 Groundwater Physico-Chemical Parameters

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 [ $\mu$ S/cm] = 1.5 × TDS [mg/L]).

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

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



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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  $\pm$  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:

### **Potential Impacts and Mitigation Measures**

• Zone 1 – the upper weathered overburden which based on drilling results is assumed to act as an aquitard;

- Zone 2 the interburden sandstone and siltstone which has a permeability an order of magnitude lower than the coal seams and is estimated to be up to 150 m thick; and
- Zone 3 the coal seams with a coalesced thickness of up to 30 m.

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

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

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

where

 $Q = inflow (m^3/day),$ 

*k* = hydraulic conductivity (m/day)

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

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

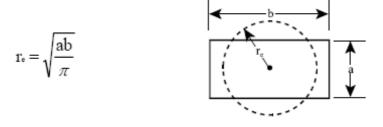
R = radius of "influence" or distance to negligible drawdown (m)

 $r_e$  = radius of "well" (m)

For the aquifer R can be estimated as

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

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



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.

Zone	Saturated thickness	K (m/s)	K (m/day)	R (m)	Re (m)	Ingress (m³/day)
Interburden (expected)	150	3 × 10 <sup>-7</sup>	0.03	265	2257	19100
Interburden (low case)	150	3 × 10 <sup>-8</sup>	0.003	84	2257	5800
Interburden (high case)	150	3 × 10 <sup>-6</sup>	0.3	839	2257	67100
Coal Seams (expected)	30	2 × 10 <sup>-6</sup>	0.17	126	2257	8800
Coal Seams (low case)	30	2 × 10 <sup>-7</sup>	0.017	40	2257	2700
Coal Seams (high case)	30	2 × 10 <sup>-5</sup>	1.7	399	2257	29500

#### Table 5-1 Groundwater Ingress Data for Horse Pit

#### Table 5-2 Groundwater Ingress Data for Heyford Pit

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



Prepared for BM Alliance Coal Operations Pty Ltd, 20 March 2009

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### **Potential Impacts and Mitigation Measures**

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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 m<sup>3</sup>/day (up to  $\pm$  96,600 m<sup>3</sup>/day) for the Horse Pit and  $\pm$  22,300 m<sup>3</sup>/day (up to  $\pm$  78,800 m<sup>3</sup>/day) for the Heyford Pit. These ingress rates equate to  $\pm$  2 m<sup>3</sup>/day (up to  $\pm$  7 m<sup>3</sup>/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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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  $\mu$ S/cm (median 679  $\mu$ S/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**

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

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

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

### 5.1.3 Other Impacts

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

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

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

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

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

### 5.2 Potential Impacts Post Mining

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

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

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



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### 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 premining 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.



# **Potential Impacts and Mitigation Measures**

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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, NOx, ammonia, phosphorous) and selected dissolved metals (boron, chromium, copper, iron, manganese, nickel, selenium and zinc); and
- Measurement of daily precipitation, evaporation and mine dewatering volumes.

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

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



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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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# **Potential Impacts and Mitigation Measures**

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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



	PZ	01		PZ02				PZC	13-D		
ampled	10/09/2008	3/03/2009	7/06/2008	10/09/2008	3/03/2009	7/06/2	2008	10/09	/2008	3/03/	2009
	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	Primary	Duplicate	Primary	Duplicate
	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample

Analyte	LOR	Units	ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems	ANZECC (2000) - Livestock Drinking Water - Beef Cattle												
Major lons		•														
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

]	PZC	01		PZ02				PZ0	3-D			
	10/09/2008	3/03/2009	7/06/2008	10/09/2008	3/03/2009	7/06/2	2008	10/09/	/2008	3/03/	/2009	
	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	Primary	Duplicate	Primary	Duplicate	
	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	

Analiza	1.05	Unite	ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems	ANZECC (2000) - Livestock Drinking Water - Beef Cattle	ADWG (2004) - Human Drinking Water											
Analyte Metals (Dissolved)	LOR	Units	LCOSystems											1		<del></del>
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	0.01	mg/L	ne	ne	0.003	<0.001	< 0.02	-	<0.001	< 0.02	-	-	<0.001	<0.001	< 0.02	< 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	0.007	0.077	0.001	0.001	0.069	0.000	0.004	0.003	0.042	0.041	0.042	0.045
Beryllium	0.001	mg/L	ne	ne	ne	<0.001	<0.000	< 0.000	< 0.003	< 0.000	0.001	0.001	< 0.042	<0.001	< 0.042	<0.043
Boron	0.05	mg/L	0.37	5	4	0.5	1.5	-0.001	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	0.001	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

ı		PZ03-S			PZ04		PZ05		PZ	206-D	
ampled	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	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	Primary	Primary
	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample

Analyte	LOR	Units	ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems	ANZECC (2000) - Livestock Drinking Water - Beef Cattle												
Major lons																
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

on	l T		PZ03-S			PZ04		PZ05		PZ	206-D	
Date Sampled		7/06/2008	10/09/2008	3/03/2009	8/06/2008	11/09/2008	3/03/2009	28/02/2009	5/06	2008	10/09/2008	27/02/2009
		Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	Primary	Primary
imple Type		Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	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

	Γ		PZ06-S			PZ07-D			PZ07-S		
e Sampled		5/06/2008	10/09/2008	27/02/2009	5/06/2008	9/09/2008	28/02/2009	5/06/2008	9/09/2008	28/02/2009	
		Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	
е Туре		Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	

			ANZECC (2000) and QWQG (2006) -	ANZECC (2000) - Livestock Drinking Water - Beef Cattle	Human Drinking									
Analyte	LOR	Units	Freshwater Ecosystems	Water - Deer Cattle	Water									
Major lons														
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

]	Γ		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
	Γ	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
		Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	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

Γ		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	2/03/2	2009	
	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate	
	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	

			ANZECC (2000)	ANZECC (2000) -	ADWG (2004) -									
			and QWQG (2006) - Freshwater	Livestock Drinking Water - Beef Cattle										
Analyte	LOR	Units	Ecosystems											
Major lons		•												
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

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

Location	PZ10	PZ	11-D
Date Sampled	8/09/2008	8/09/2008	2/03/2009
	Primary	Primary	Primary
Sample Type	Sample	Sample	Sample

Analyte	LOR	Units	ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems	ANZECC (2000) - Livestock Drinking Water - Beef Cattle	•			
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

Location	PZ10	PZ	11-D
Date Sampled	8/09/2008	8/09/2008	2/03/2009
	Primary	Primary	Primary
Sample Type	Sample	Sample	Sample

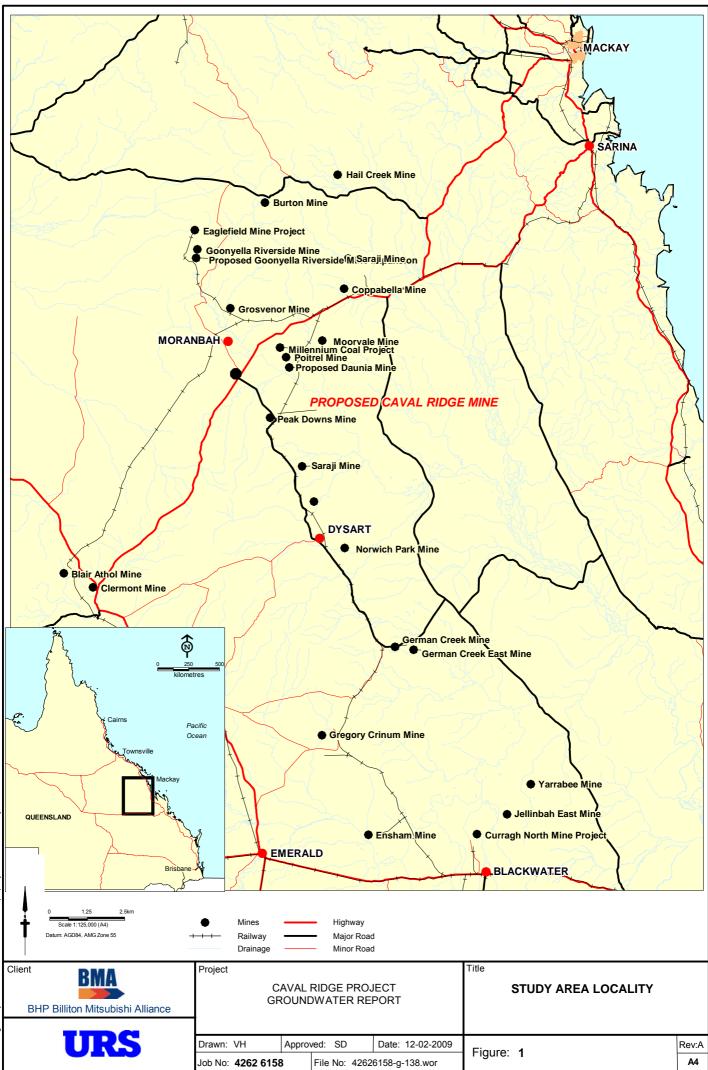
Analyte	LOR	Units	ANZECC (2000) and QWQG (2006) - Freshwater Ecosystems	ANZECC (2000) - Livestock Drinking Water - Beef Cattle	ADWG (2004) - Human Drinking Water			
Metals (Dissolved)								
Aluminium	0.01	mg/L	0.055	5	ne	<0.01	0.01	0.02
Antimony	0	mg/L	ne	ne	0.003	<0.001	<0.001	<0.001
Arsenic	0.001	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

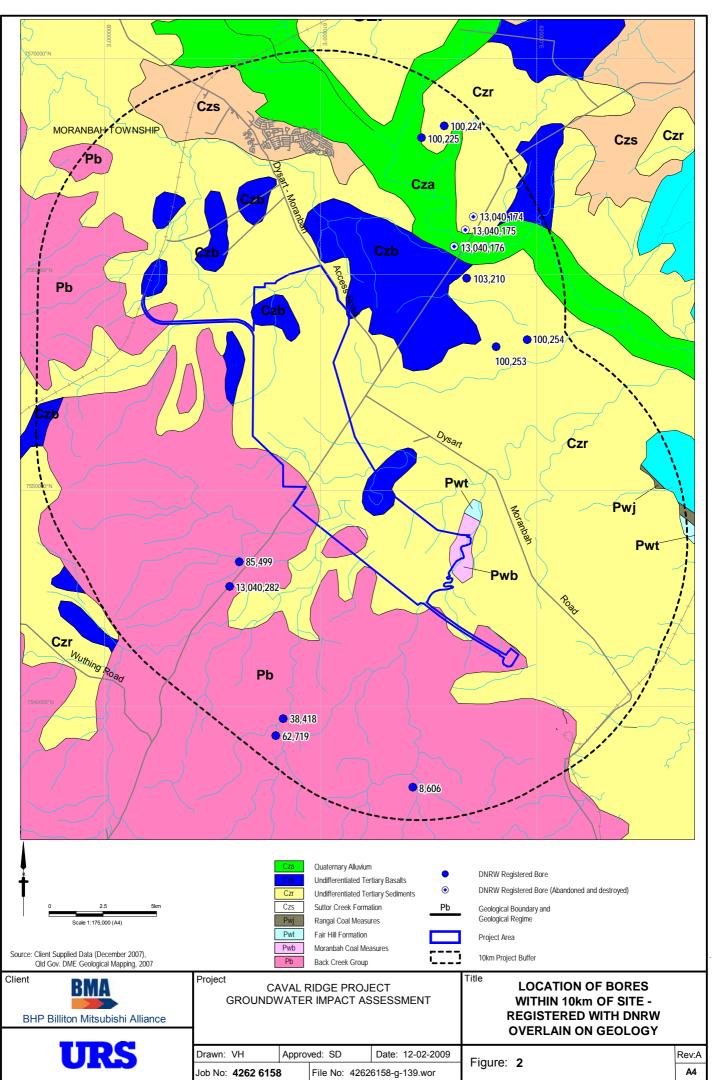
freshwater ecosystems

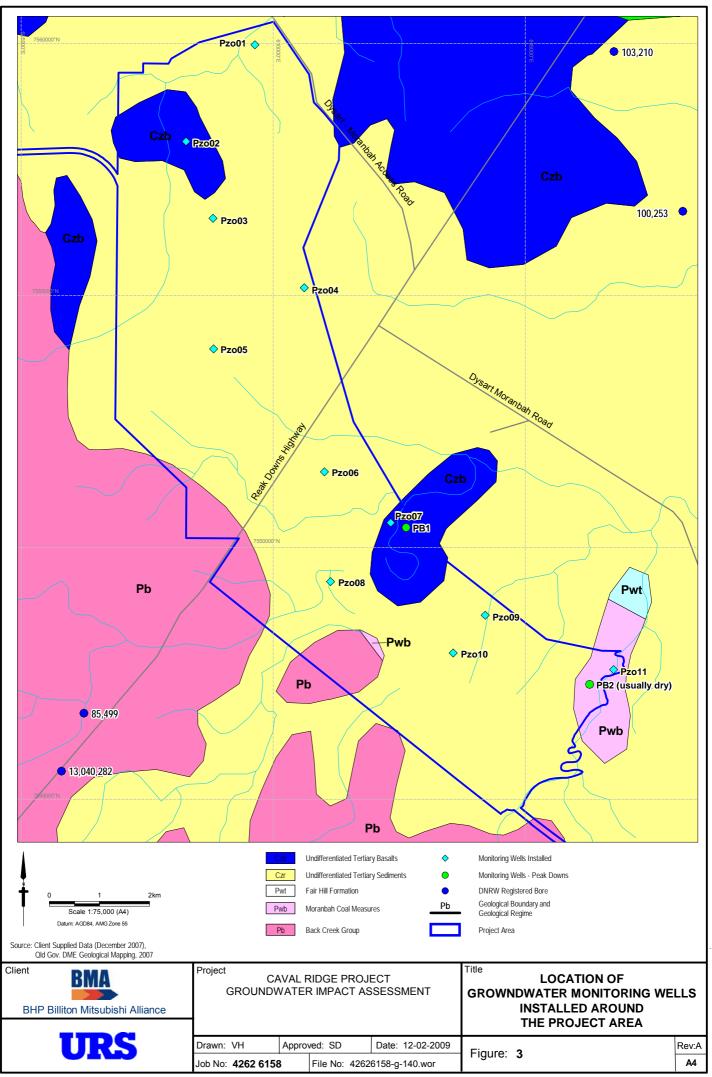
Exceeds the ANZECC/ARMCANZ (2000) guidelines for livestock watering of beef cattle

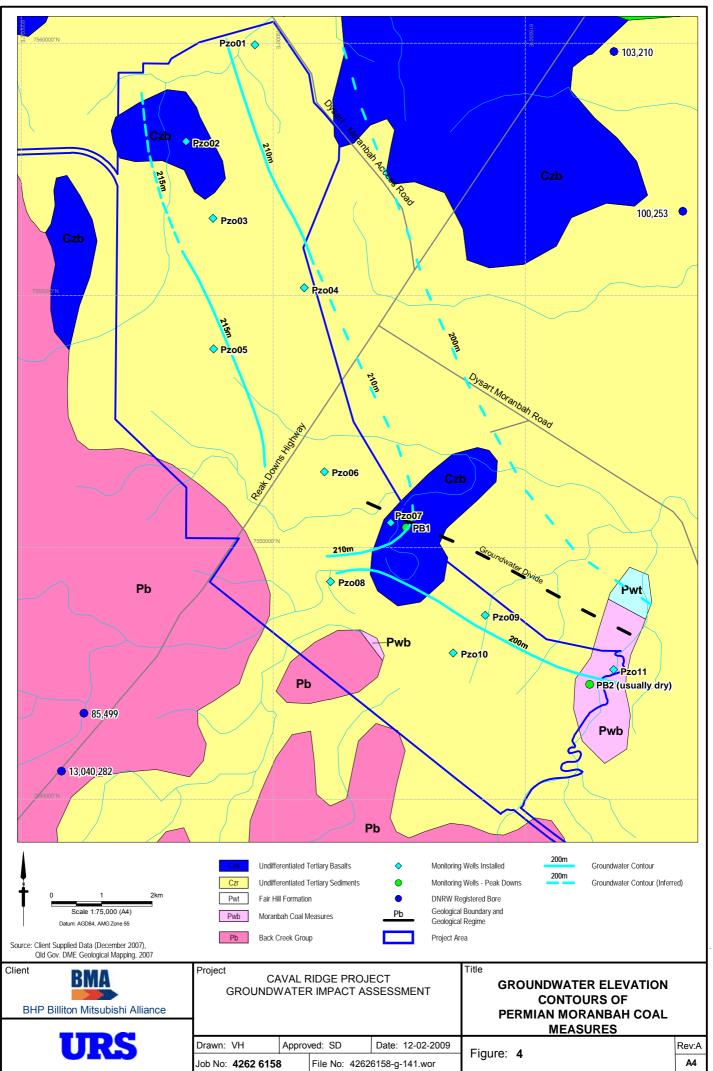












### **DNRW Database Search Results**

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	рΗ	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



UR	S		MON	ITORII	Sheet 1 of NG WELL Pz01	
URS Australia Pty Ltd Level 14, 240 Queen St, Bl Drilling Contractor: <b>(</b>	risbane QLD Capricorn Wes	Phone +61 7 3243 2111 Fax +61 7 3243 2199	Project Caval Ridge EIS Reference:	Client: Location:	BMA Coal Peak Downs QLD	
ogged By: AW Checked By: SD Date Started: 12-5-08 Date Finished: 13-5-08		Bore Size: 165 mm Total Depth: 85.50 m Casing Size: 50 mm	Project No.: 42626162 Relative Level: mRL Coordinates: mN mE Permit No:	Drill Type: Drill Model Drill Fluid:	Rotary Air	
Sample Interval PID (ppm) Samble	Legend	Type, plasticity /	TION OF STRATA particle size, colour, or components (e.g., "trace"), t, consistency / density, bservations	Moisture Depth (m)		
		Dark brown sandy C SILTSTONE Cream, light brown, I fractured SILTSTON Cream, light grey SIL Light brown, cream S Light brown, dark bro Light grey, light blue COAL Dark grey, light blue COAL Dark grey CARBON/ Dark grey SILTSTON Dark grey SILTSTON Dark grey SILTSTON Dark grey SILTSTON Dark grey, light blue Light grey, light blue Light grey, light blue Light grey fine to me Light grey very fine S Light grey very fine S Light grey very fine S	LAY and weathered ight grey weathered and E. TSTONE SILTSTONE SILTSTONE SILTSTONE SILTSTONE ACEOUS MUDSTONE RBONACEOUS MUDSTONE RBONACEOUS MUDSTONE IE ACEOUS MUDSTONE SILTSTONE SILTSTONE SILTSTONE SILTSTONE IE dium SANDSTONE dium SANDSTONE ANDSTONE ANDSTONE	0       1         2       3         4       5         6       7         8       9         10       11         12       13         14       15         16       17         18       19         20       21         22       23         24       25         26       27         28       29         30       31         32       33         34       35         36       37         38       39         40       41         42       43         44       45         46       47         48       49	Cement Grout	

MOD\_WELL CAVAL RIDGE BORE LOGS.GPJ WCC\_AUS.GDT 7/10/08



Sheet 2 of 2

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

MOD\_WELL CAVAL RIDGE BORE LOGS.GPJ WCC\_AUS.GDT 7/10/08

Phone +61 7 3243 2111	Project
Fax +61 7 3243 2199	No.:

42626162

Project Reference: Caval Ridge EIS

	nterval	(u			ation	DESCRIPTION OF STRATA		(L	WELL CONSTRUCTION DETAILS
	Sample Interval	PID (ppm)	Sample ID	Legend	Classification	Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)	
				= ] = ]		Dark grey, black CARBONACEOUS MUDSTONE		50 51	
						COAL		-52	
								53 54	
				= = = = = = = = = = = = = = = = = = =		Dark grey CARBONACEOUS MUDSTONE Dark grey SILTSTONE		55	
luduuduuduu				× × × × × × × × × ×				56 57 58	
				· · · · · · · · · · · · · ·		Light grey very fine SANDSTONE		50 59 60	
						Dark grey fine to medium SANDSTONE		61 62	
								63	
								64 65	
				::::				66	
								67	
								68 69	
								-70	
				<del>: : : :</del>   : : : :		Dark grey fine SANDSTONE		71	
						Lichtere de la configuration de la configuration		-72 -73	
						Light grey, dark grey fine to medium SANDSTONE		-74	
						Dark grey fine SANDSTONE		-75 -76	
				· · · · ·		Light grey fine to medium SANDSTONE Dark grey fine SANDSTONE		77	
huhuh				· · · · ·   · · · ·		Dark grey line SANDSTONE		-78	Bentonite Seal —
				· · · · · · · · · ·				-79 	
				× × × × × ×		Dark grey SILTSTONE		-81	Gravel Pack
				× × ·		Dark grey, light brown CARBONACEOUS		82 83	
						COAL		-84	50 mm uPVC Screen
						Dark grey, black CARBONACEOUS MUDSTONE	_	85	
								86 87	
								87 88	
								89 90	
								-91	
								-92	
								93 94	
								-95	
								96	
								97 98	
								-99	
								-100	
								-101 -102	
								-103	
								-104 -105	
								-106	
								-107	
								-108 -109	
								F	
_									

URS		MOI	ΝΙΤ	ORIN	Sheet 1 of 1
URS Australia Pty Ltd Level 14, 240 Queen St, Brisbane QLD Drilling Contractor: <b>Capricorn West</b>	Phone +61 7 3243 2111 Fax +61 7 3243 2199	Project Caval Ridge EIS Reference:		Client: Location:	BMA Coal Peak Downs QLD
Logged By: DG Checked By: SD Date Started: 20-5-08 Date Finished: 20-5-08	Bore Size: 165 mm Total Depth: 35.00 m Casing Size: 50 mm	Project No.: 42626162 Relative Level: mRL Coordinates: mN mE Permit No:		Drill Type: Drill Model: Drill Fluid:	Rotary Air UDR Air
	DESCRIPT	TION OF STRATA			WELL CONSTRUCTION DETAILS
PID (ppm) PID (ppm) Clocked Legend	🔏 📔 secondary / min	/ particle size, colour, or components (e.g., "trace"), t, consistency / density, bservations	Moisture	Depth (m)	
	gravel         Grey sandy, clayey 0         Grey sandy silty GR/         Yellow, grey silty GR         Yellow, grey silty CLAY         Yellow, grey sandy S         Yellow, grey sandy S         Yellow, grey sandy S         Yellow, grey sandy S         Yellow gravelly silty f	CLAY and BASALT ravelly CLAY ravelly CLAY rsandy CLAY with 10-50 mm GRAVEL AVEL AVEL RAVEL <20 mm GILT fine sand weathered/fractured silty BASALT AY ND eathered BASALT		0 1 2 3 4 5 6 7 8 9 10 11 12 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 31 4 4 5 6 7 8 9 10 11 12 23 24 25 26 7 8 9 10 11 12 23 24 25 26 31 32 24 25 26 31 32 24 25 26 31 32 33 34 4 5 6 7 8 9 10 11 12 23 24 25 26 31 32 33 34 4 5 6 7 8 9 10 11 12 23 24 25 26 31 32 33 34 4 4 4 4 4 4 4 4 4 4 4 4 4	Cement Grout

MOD\_WELL CAVAL RIDGE BORE LOGS.GPJ WCC\_AUS.GDT 7/10/08

RS Australia evel 14, 240 vrilling Contra ogged By: checked By: vate Started: vate Finished	Queen St, Brisban Ictor: Caprid AW SD 15-5-08		Bo To	Phone +61 7 3243 2111 Fax +61 7 3243 2199 Drilling pre Size: 165 mm tal Depth: 42.80 m asing Size: 50 mm	Project No.: 42626162 Relative Level: mRL Coordinates: mN mE Permit No:		rill Type: rill Model: rill Fluid:	BMA Coal Peak Downs QLD Rotary Air UDR Air	
Sample Interval PID (ppm)	Sample ID	Legend	Classification	Type, plasticity / secondary / mino	TON OF STRATA particle size, colour, or components (e.g., "trace"), t, consistency / density, pservations	Moisture	Depth (m)		TION DETAILS
				BASALT Grey slightly weather Beige, cream extremmel clasts of moderately v Grey slightly weather Beige, light grey clay BASALT Cream, light grey clay BASALT Grey fresh BASALT Dark yellow, orange of SILTSTONE Mauve, brown, light grey weathered SILTSTON Light grey moderately SILTSTONE Grey, green fracture BASALT Grey, green, fracture BASALT Grey, green moderately SILTSTONE Grey, green moderately Dark grey, green BASALT Dark grey, green BASALT Dark grey, green BASALT Dark grey, orange, light Dark grey, orange, light Dark grey, dark brow weathered CARBON Light grey very fine of SANDSTONE to SIL Light grey very fine of SANDSTONE to SIL Light brown, light grey Dark grey CARBONA Dark grey CARBONA COAL COAL	ely weathered BASALT y weathered BASALT with weathered BASALT ed BASALT ey extremely weathered yey extremely weathered extremely weathered grey moderately to extremely NE y to extremely weathered ely weathered BASALT SALT ght brown BASALT y extremely weathered weathered SILTSTONE n highly to extremely ACEOUS MUDSTONE weathered SILTSTONE weathered SILTSTONE weathered SILTSTONE		0 -1 1 2 3 4 5 6 7 8 9 10 11 12 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41	16.43 b	50 mm uPVC S
				COAL	IE		-42 -43 -44 -45 -46 -47 -48 -49	₩ <b>⊟</b>	•

Drilling Contractor: Logged By: Al Checked By: Si Date Started: 16	W	Fax +61 7 3243 Veston Drilling Bore Size: 165 mm Total Depth: 26.50 m Casing Size: 50 mm	Project No.: <b>42626162</b> Relative Level: <b>mRL</b>	Client: Location: Drill Type: Drill Model: Drill Fluid:	BMA Coal Peak Downs QLD Rotary Air UDR Air
Sample Interval PID (ppm) ueS	mple ID Fegend	Type, plas	CRIPTION OF STRATA ticity / particle size, colour, / minor components (e.g., "trace"), content, consistency / density, onal observations	Moisture Depth (m)	
		BASALT Grey slightly w Beige, cream ( Light brown ex clasts of mode Grey slightly w Beige, light gre BASALT Cream, light gre BASALT Grey fresh BA: Dark yellow, oi SILTSTONE Grey, green, fir BASALT Grey, green, fir BASALT Grey, green m Dark grey, gre Dark grey BAS	ange extremely weathered light grey highly to extremely TSTONE ly to extremely weathered actured moderately weathered oderately weathered BASALT en BASALT	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Cement Grout →

JRS Australia evel 14, 240 (	Pty Ltd Queen St, Brisbar	e QLD		Phone +61 7 3243 2111 Fax +61 7 3243 2199	Project Reference:	Caval Rid	lge EIS	Client:	BMA Coal	
Drilling Contra	ctor: Capri	corn We	eston	Drilling	Project No.:	12626162	2	Location:	Peak Downs QLD	
logged By:	AW		Bc	ore Size: 165 mm	Relative Level			Drill Type:	Rotary Air	
Checked By:	SD			tal Depth: 93.10 m	Coordinates:	mN		Drill Model:	UDR	
Date Started: Date Finished:	14-5-08 15-4-08		Ca	asing Size: 50 mm	Permit No:	mE		Drill Fluid:	Air	
Jale i misned.	13-4-00				r ennicitio.					
a ا										
Sample Interval PID (ppm)			Classification	DESCRIPT	ION OF ST	RATA			WELL CONSTRUC	TION DETAILS
Sample Int PID (ppm)	Sample ID	pd	sifica	Type, plasticity /	particle size,	colour,	Inte	Depth (m)		_
ID (		Legend	lass	secondary / min moisture conten	or component	s (e.a., "tra	Moisture	epth		
N T			0	and additional of	oservations	, <b>.</b>	2			
-		$\bigotimes$		Dark brown, light brok Light grey, white CLA				<u>+</u> 0 ⊢ <u>+</u> 1 ∣		
-		₩		Dark red IRONSTON	E			2	Comont Crast	
-				Light grey CLAYSTC				<b>3</b> 4	Cement Grout	8.1 4
-				Light grey, light blue Dark yellow, light gre				5		
-				Light yellow CLAYS				6		
-				Light grey CLAYSTC	NE			8		
								-9 -10		
-								11		
-				Light grey, purple CL	AYSTONE			12		
-				Light grey, white CLA	YSTONE			14		
-				Light groy, white OL				-15 -16		
-				Light grey, dark vella	w (limonite st	ainina)		17		
-				Light grey, dark yello CLAYSTONE	w (innonite st	annig)		18		
-				Light grey, light blue	CLAYSTONE			19 20		
-								21		
_				Dark grey CLAYSTC		oining)		22		
· -				Light grey, dark yello CLAYSTONE	w (iimonite st	aming)		24		
-				Light brown, dark gre	y CLAYSTO	NE		25 26		
-								-27		
				Light yellow, dark bro	wn CLAYST	ONE		-28 -29		
-				Light brown CLAYS	ONE					
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		×		Light brown, dark gre				34		
-		= = × ×		Dark grey CARBONA Light grey, light blue		SIONE		-36		
-								-37 -38		
-								-39		
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-								42	Cuttings)	
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		x x						-49		



Sheet 2 of 2

URS Australia Pty Ltd Level 14, 240 Queen St, Brisbane QLD Phone +61 7 3243 2111 Project Fax +61 7 3243 2199 No.:

roject **42626162** 

Project Reference: Caval Ridge EIS

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	× × × × × ×	Dark grey SILTSTONE COAL Dark grey, black CARBONACEOUS SILTSTONE COAL Light grey, light blue SILTSTONE	55 56 57 58 59 60 61 62 63 64	
	× × × × × ×	Dark grey SILTSTONE COAL Dark grey, black CARBONACEOUS SILTSTONE COAL Light grey, light blue SILTSTONE	56 57 59 60 61 62 63 64	
	× × × × × ×	COAL Dark grey, black CARBONACEOUS SILTSTONE COAL Light grey, light blue SILTSTONE	57 58 59 60 61 62 63 64	
	× × × ×	COAL Light grey, light blue SILTSTONE	58 59 60 61 62 63 64	
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	lê êl		-76 -77	
	I $\hat{\mathbf{x}}$		-78	
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	× ×		-82 -83	
	$\left  \begin{array}{c} \times & \times \\ \times & \times \end{array} \right $		-84	
	$\left  \begin{array}{c} \times & \times \\ \times & \times \end{array} \right $		-85	Bentonite Seal —> Gravel Pack —>
	× ×		-86	Gravel Pack —
	× × × ×		-87	
	× × × × × × × × × ×	 Dark grey SILTSTONE	88	
	××		-89 -90	50 mm uPVC S
		COAL	-91	
			-92	
		 \Dark grey CARBONACEOUS SILTSTONE	 93	
			-94 -95	
			-95 -96	
			97	
			-98	
			99	
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			-101 -102	
			102	
			-104	
			-105	
			106	
			107	
			-108 -109	
			- 103	

rilling Contractor: Capricorn Weston Drill			ston	Phone +61 7 3243 2111         Project         Caval Ridge EIS           Fax +61 7 3243 2199         Project No.:         42626162		Client: Location:	BMA Coal Peak Downs QLD	
gged By: necked By: nte Started: nte Finished	AW SD 16-5-08 t: 17-5-08		То	rre Size: 165 mm tal Depth: 118.00 m asing Size: 50 mm	Relative Level: mRL Coordinates: mN mE Permit No:	Drill Type: Drill Model: Drill Fluid:	iel: UDR	
Sample Interval PID (ppm)	Sample ID	Legend	Classification	Type, plasticity / secondary / min	TION OF STRATA particle size, colour, or components (e.g., "trace"), t, consistency / density, oservations	Depth (m)		
				Light brown highly to CLAYSTONE Cream, light grey hig CLAYSTONE Light brown, tan high CLAYSTONE Dark brown, light grey weathered CLAYSTO Cream, light grey hig CLAYSTONE Dark grey, purple CL	wwn CLAY, low plasticity extremely weathered hly to extremely weathered y highly to extremely weathered hly to extremely weathered AYSTONE n CARBONACEOUS NE NE ONE ONE VE CLAYSTONE with ial y CLAYSTONE CLAYSTONE	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 225 26 27 28 29 21 22 23 24 25 26 27 28 29 30 31	Cement Grout ->	
				Dark grey, light grey Light grey CLAYSTC Dark grey, light grey Dark grey CLAYSTO	CLAYSTONE  CLAYSTONE  CLAYSTONE  NE  RBONACEOUS SILTSTONE  IE  IE  IE	32 33 34 35 36 37 38 39 40 41 41 42 43 44 44 45 46 47 48 49		



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MOD\_WELL CAVAL RIDGE BORE LOGS.GPJ WCC\_AUS.GDT 7/10/08

Phone +61 7 3243 2111	Project	
Fax +61 7 3243 2199	No.:	4

roject **42626162** 

Project Reference: Caval Ridge EIS

Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)	WELL CONSTRUCTION DETAILS
		× × × × × ×		Light grey SILTSTONE		50 51	
						-52 -53	
		X X				-54	
				Light grey SILTSTONE and very fine SANDSTONE		55 56	
		÷.÷.		Light grey very fine to medium SANDSTONE		57 58	
						-50 -59	
		· · · · · × × × ×		Dark grey SILTSTONE		<b>60</b> 61	Backfill (Drill
				Light grey very fine to medium SANDSTONE		62	
						63 64	
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						66 67	
		::::				68	
						69 70	
						-71	
						<b>−72</b> −73	
						-74	
		· · · · · = = - = -		Dark grey CARBONACEOUS MUDSTONE and		<u>+</u> 75 - -76	
				Dark grey very fine to medium CARBONACEOUS		<b>77</b>	
		× × × ×		Light grey very fine to medium SANDSTONE		-78 -79	
				Light grey SILTSTONE		80	
		× × × × × ×				<b>−81</b> −82	
		IX XI				83	
		× × × × × ×		Dark grey slightly CARBONACEOUS		84	
		× × × ×		SILTSTONE		86	
		× × × × × ×		Dark grey SILTSTONE		-87	
		× ×		Light grey SILTSTONE		89	
		× × × ×				90 91	
		$\begin{vmatrix} x & x \\ x & x \\ x & x \end{vmatrix}$				92 93	
						94	
						95 96	
		** ** ** ** ** ** ** ** ** ** ** ** **		Light grey sandy SILTSTONE		97	
				Light grey SILTSTONE		98 99	
						-100	
				Dark grey fine CARBONACEOUS SANDSTONE		101 102	
		· · · · · · · · · · · · · · · · · · ·		and COAL		-103	
		× × × ×				-104 -105	
		× × × × × × × × × × × × × × × × × × ×		Light grey SILTSTONE Dark grey SILTSTONE		106	
		$\begin{array}{c} X & X \\ X & X \\ X & X \end{array}$		Light grey SILTSTONE		<b>107</b> <b>108</b>	
				Dark grey SILTSTONE Light grey SILTSTONE		100	



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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
Samp PID (p				bark grey, black CARBONACEOUS MUDSTONE Dark grey, black CARBONACEOUS MUDSTONE Dark grey, black CARBONACEOUS SILTSTONE COAL Dark grey, black CARBONACEOUS SILTSTONE and COAL Dark grey, black CARBONACEOUS SILTSTONE Bark grey, black CARBONACEOUS SILTSTONE	Moist	$ \begin{array}{c} \label{eq:product} \end{tabular} \\ \en$	Gravel Pack
						168 169	

exact Dit : 50 Evaluet : 19-5-08 Tota Dept::::::::::::::::::::::::::::::::::::	S Australia vel 14, 240 (	Pty Ltd Queen St, Brisban	e QLD		Phone +61 7 3243 2111 Fax +61 7 3243 2199	Project Caval Ridge EIS Reference:		Client:	BMA Coal
Some Dir B. 50 estate     Total Depti: M400 m     Coordinates: mN     Dirt Mode: UDR       Bitteriet     19-548     Total Depti: M400 m     Dirt Mode: UDR       Bitteriet     19-548     Dirt Mode: UDR       Bitteriet     19-548     Dirt Mode: UDR       Bitteriet	lling Contra	ctor: Caprie	corn We	ston	Drilling	Project No.: 42626162		Location:	Peak Downs QLD
e Standar 19-5-08 Casing Size: 20 mm mE Dell Model: UDR permit No: Dell Huid: Air	gged By:							Drill Type:	Rotary Air
e Finance: 19-5-08 Permit No: Dif Puid: Air  WELL CONSTRUCTION DETAILS  Togen plasticity / particle size. colour. Togen plasticity / maintor compared to consistency / density. and additional doservations  Dark forway staff CLAY, low plasticity  Dark forway staff CLAY, low plasticity  Dark forway staff and advected by weathered BASALT  Dark grees, light forwan moderately	-				•			Drill Model:	UDR
all of adduction observations     0       Dark brown stiff CLAY, low plasticity     0       Light Hown, light grey hight to extremely     0       Weithered BASALT     0       Light Hown, dark grey green, light brown moderately     0       Weithered BASALT     0       Light Hown, dark grey SILT with clasts of highly     0       Weithered BASALT     0       Light Hown, dark grey SILT with clasts of highly     0       Weithered BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey grey light red moderately weathered     0       BASALT     0       Dark grey grey grey light red moderately weathered     0       BASALT     0       Dark grey grey grey light provi moderately     0       Dark grey grey grey light provide kreen, dark gree     0	te Finished:							Drill Fluid:	Air
all of adduction observations     0       Dark brown stiff CLAY, low plasticity     0       Light Hown, light grey hight to extremely     0       Weithered BASALT     0       Light Hown, dark grey green, light brown moderately     0       Weithered BASALT     0       Light Hown, dark grey SILT with clasts of highly     0       Weithered BASALT     0       Light Hown, dark grey SILT with clasts of highly     0       Weithered BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey grey light red moderately weathered     0       BASALT     0       Dark grey grey grey light red moderately weathered     0       BASALT     0       Dark grey grey grey light provi moderately     0       Dark grey grey grey light provide kreen, dark gree     0	_								
all of adduction observations     0       Dark brown stiff CLAY, low plasticity     0       Light Hown, light grey hight to extremely     0       Weithered BASALT     0       Light Hown, dark grey green, light brown moderately     0       Weithered BASALT     0       Light Hown, dark grey SILT with clasts of highly     0       Weithered BASALT     0       Light Hown, dark grey SILT with clasts of highly     0       Weithered BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey grey light red moderately weathered     0       BASALT     0       Dark grey grey grey light red moderately weathered     0       BASALT     0       Dark grey grey grey light provi moderately     0       Dark grey grey grey light provide kreen, dark gree     0	) )			tion	DESCRIPT	TION OF STRATA			WELL CONSTRUCTION DETAILS
all of adduction observations     0       Dark brown stiff CLAY, low plasticity     0       Light Hown, light grey hight to extremely     0       Weithered BASALT     0       Light Hown, dark grey green, light brown moderately     0       Weithered BASALT     0       Light Hown, dark grey SILT with clasts of highly     0       Weithered BASALT     0       Light Hown, dark grey SILT with clasts of highly     0       Weithered BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey, light torwn moderately weathered     0       BASALT     0       Dark grey grey light red moderately weathered     0       BASALT     0       Dark grey grey grey light red moderately weathered     0       BASALT     0       Dark grey grey grey light provi moderately     0       Dark grey grey grey light provide kreen, dark gree     0	ple li (ppm	Sample ID	pu	sifica	Type, plasticity /	particle size, colour,	ture	m) (m	
Dark brown sliff CLAY, low plasticity     0       Light provn. light grey highly to extremely     Cement Grout       Weathered BASALT     6       Light grey, green, light brown moderately     6       Weathered BASALT     7       Light grey, light brown moderately     7       Weathered BASALT     7       Dark grey, green, light brown moderately     7       Weathered BASALT     7       Dark grey, light brown moderately     7       Weathered BASALT     7       Dark grey, light brown moderately weathered     7       BASALT     7       Dark grey, light brown moderately weathered     7       BASALT     7       Dark grey, grey, light brown moderately weathered     7       BASALT     7       Dark grey, grey, light red moderately weathered     7       BASALT     7       Dark grey grey green, light weathered     7       BASALT     7       Dark grey green, light drey weathered     7       BASALT     7       Dark grey green, light drey grey moderately     7       Bask form, grey green, light mown moderately     7       Bask form, grey green, light grey SILTSTONE     7       Dark green SILTSTONE     7       Dark green SILTSTONE     7       Dark green SILTS	PID (		Lege	Clas	moisture conten	or components (e.g., "trace"), t, consistency / density, bservations	Mois	Dept	
Light brown. light grey highly to extremely       2         Light grey, gight brown moderately weathered       6         Dark grey, green, light brown moderately       7         Weathered BASALT       7         Dark grey, green, light brown moderately       7         Weathered BASALT       11         Dark grey, green, light brown moderately weathered       13         Beige, light brown, green SiLT with clasts of highly       11         Purple, brown moderately beathered       13         BASALT       11         Dark grey, light brown moderately weathered       14         BASALT       11         Dark grey, light brown moderately weathered       14         BASALT       16         BASALT       16         BASALT       16         Dark grey, light brown moderately weathered       18         BASALT       16         Dark grey, green, light brown moderately weathered       22         Dark grey, green, light brown moderately weathered       23         Dark grey, green, light brown moderately weathered       22         Dark grey, green, light brown moderately weathered       23         Dark grey, green, light brown moderately       24         Dark grey, green, light brown moderately       23 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>									
Ueight grey, light Drown moderately weathered BASALT     Cement Grout       Dark grey, green, light brown moderately weathered BASALT     6       Dark grey, green, light brown moderately weathered BASALT     7       Beige, light brown, aren SILT with clasts of highty weathered BASALT     11       Dark grey, light prown, green SILT with clasts of highty weathered BASALT     13       Dark grey, light prown moderately weathered BASALT     14       Dark grey, light prown moderately weathered BASALT     14       Dark grey, light prown moderately weathered BASALT     16       Dark grey, light prown moderately weathered BASALT     16       Dark grey, light prown moderately weathered BASALT     16       Dark grey, light prown moderately weathered BASALT     17       Dark grey, light prown moderately weathered BASALT     18       Dark grey, grey, light prown moderately weathered BASALT     18       Dark grey, grey, light prown moderately weathered Dark grey BASALT     22       Dark grey, grey, BASALT     28       Dark grey BASALT     28       Dark grey SILTSTONE     30       Dark green SILTSTONE     43       Dark green SILTSTONE     44			K.A		Light brown light are	ev highly to extremely		2	
BÅSALT     F6       Dark grey, green, light brown moderately     F7       Uight brown, dark grey SLT with clasts of highly     F7       Beige, light brown, green SILT with clasts of highly     F7       Beige, light brown moderately weathered     F1       Dark grey, light red moderately weathered     F1       Dark grey, light red moderately weathered     F1       Dark grey, light red moderately weathered     F1       Dark grey, green, light red moderately weathered     F2       Dark grey green slight mean moderately     F2       Dark grey, green, light red moderately     F2       Dark green slight set mean basklit     F2       Dark green slight grey SLTSTONE     F2       Dark green, light grey SLTSTONE     F2       Dark green slight grey SLTSTONE     F2       Dark green SILTSTONE     F2       Dark green			K		weathered BASALT			E	Cement Grout
Dark grey, green, light brown moderately     7       Light brown, dark grey SILT with clasts of highy     9       Beige, light brown, green SILT with clasts of     11       Dark grey, light brown moderately weathered     13       Dark grey, light brown moderately weathered     14       Purple, John moderately weathered     16       Up the grey light brown moderately weathered     16       Up the grey light brown moderately weathered     16       Up the grey light brown moderately weathered     17       Dark grey, green, light brown moderately weathered     18       Weathered BASALT     11       Dark grey, light brown moderately weathered     18       BASALT     11       Up the brown light red moderately weathered     18       BASALT     10       Up the brown light red moderately weathered     12       Dark grey, grey, light brown moderately     22       Dark grey grey, light brown moderately     23       Dark grey grey, black CLAY and extremely weathered     23       Dark green, light grey SILTSTONE     33       Dark green, SILTSTONE     34       Dark green, light grey SILTSTONE     34       Dark green SILTSTONE     34								5	
Weathered BASALT     9       Light brown, dark grey SILT with clasts of highly     9       Normal State     10       Beige, light brown, green SILT with clasts of     11       Highly weathered BASALT     13       Dark grey, light brown moderately weathered     13       BASALT     15       Upth grey, light brown moderately weathered     16       Dark grey, light brown moderately weathered     16       Dark grey, light red moderately weathered     18       BASALT     16       Dark grey, light red moderately weathered     18       BASALT     18       Dark grey, light red moderately weathered     16       BASALT     22       Dark grey, light red moderately weathered     17       Dark grey green, light brown moderately     23       BASALT     23       Dark grey BASALT     24       Dark grey BASALT     26       Dark grey BASALT     26       Dark grey BASALT     28       Dark grey BASALT     28       Dark grey BASALT     28       Dark grey BASALT     28       Dark grey BASALT     29       Dark grey BASALT     28       Dark grey BASALT     29       Dark green SILTSTONE     33       Dark green SILTSTONE     34 <td></td> <td></td> <td></td> <td></td> <td>Dark grev green ligt</td> <td>ht brown moderately</td> <td></td> <td><b>—</b></td> <td></td>					Dark grev green ligt	ht brown moderately		<b>—</b>	
● IP       Beige, light brown, green SILT with clasts of highly weathered BASALT       12         □ Dark grey, light brown moderately weathered       13         □ Highly weathered BASALT       14         □ Upt grey, light brown moderately weathered       16         □ BASALT       16         □ Dark grey, light red moderately weathered       17         □ Dark grey, light red moderately weathered       18         □ Dark grey, light red moderately weathered       18         □ Dark grey, light red moderately weathered       20         □ Dark grey, light red moderately weathered       21         □ Dark grey, light red moderately weathered       22         □ Dark grey, light red moderately weathered       23         □ Dark grey, light fred moderately weathered       24         □ Dark grey BASALT       26         □ Dark grey BASALT       26         □ Dark grey BASALT       26         □ Dark grey BASALT       27         □ Dark grey BASALT       28         □ Dark grey BASALT       29         □ Dark grey SiLT and dark green, dark grey       28         □ Dark green SiLTSTONE       33         □ Dark green SILTSTONE       34         □ Dark green SILTSTONE       34         □ Dark green SILTSTONE<					weathered BASALT				
beige, gint Down, greet Str. 1 win Class of     12       bring weathered BASALT     13       Dark grey, light brown moderately weathered     14       Purple, brown moderately to highly weathered     16       BASALT     16       Dark grey, light red moderately weathered     17       Dark grey, light red moderately weathered     18       BASALT     19       Purple, brown moderately to highly weathered     18       BASALT     19       Dark grey, light red moderately weathered     20       Dark grey, light red moderately weathered     21       Light brown silty highly to extremely weathered     22       Dark grey, light red moderately weathered     22       Dark grey, light red moderately weathered     23       BASALT     24       Dark grey BASALT     26       Dark grey BASALT     26       Dark grey BASALT     27       Dark grey BASALT     26       Dark grey BASALT     27       Dark grey BASALT     28       Dark grey SILTSTONE     33       Dark green SILTSTONE     43								10	
BASALT     14       Purple, brown moderately to highly weathered     15       BASALT     16       Light grey, light rown moderately weathered     17       Dark grey, light red moderately weathered     20       BASALT     21       BASALT     22       Dark grey, light red moderately weathered     22       BASALT     23       Dark grey, green, light brown moderately     23       BASALT     24       Dark grey BASALT     26       Dark grey BASALT     26       Dark grey BASALT     26       Dark grey BASALT     28       Catary grey BASALT     28       Dark grey BASALT     28       Dark grey BASALT     29       Dark grey BASALT     20       Dark grey BASALT     20       Dark grey BASALT     20       Dark green SILTSTONE     33       Start green SILTSTONE     34       Start green SILTSTONE     44					highly weathered BA	SALT /		-12	
Purple, brown moderately weathered BASALT Upht grey, light brown moderately weathered BASALT Purple, brown moderately weathered BASALT Purple, brown moderately to highly weathered BASALT Upht brown silty highly to extremely weathered BASALT Dark grey, green, light prown moderately weathered BASALT Dark grey SASALT Dark grey BASALT Dark grey SILTSTONE Cuight grey SILTSTONE Dark green SILTSTONE State State S					BASALT				
BASALT     17       Dark grey, light red moderately weathered     18       BASALT     19       Purple, brown moderately to highly weathered     20       BASALT     21       Dark grey, light red moderately weathered     21       BASALT     22       Dark grey, green, light red moderately weathered     23       BASALT     24       Dark grey BASALT     24       Dark grey BASALT     26       Dark grey BASALT     26       Dark grey BASALT     27       Dark grey BASALT     28       Dark grey BASALT     29       Dark grey BASALT     30       Dark grey BASALT     30       Dark grey BASALT     30       Dark grey BASALT     33       Dark grey BASALT     30       Dark grey BASALT     33       Dark grey BASALT     30       Dark grey BASALT     33       Dark grey BASALT     33       Dark green SiLTSTONE     34       X     36       X     36       X     36       X     36       X			X		BASALT			15	
BASALT     19       Purple, brown moderately to highly weathered     20       BASALT     20       Light brown silty highly to extremely weathered     21       BASALT     22       Dark grey, green, light red moderately weathered     23       Dark grey, green, light brown moderately     24       Weathered BASALT     26       Dark grey grey green, light brown moderately     26       Dark grey BASALT     26       Dark grey BASALT     26       Dark grey BASALT     27       Dark grey BASALT     28       I ark grey BASALT     29       Dark grey BASALT     20       Dark grey BASALT     29       Dark grey BASALT     30       Dark green SILTSTONE     31       X     36       X     36       X     37       X     38       X     36       X     36       X     37       X     38       X     36       X     37			×4		HASALT			17	
Purple, brown moderately to highly weathered     20       BASALT     21       BASALT     23       Dark brown, light red moderately weathered     23       Dark grey, green, light brown moderately     24       Weathered BASALT     26       Dark grey green, light brown moderately     26       Dark grey green, light brown moderately     26       Dark grey BASALT     26       Dark grey BASALT     27       Dark grey BASALT     29       Dark grey BASALT     30       Dark grey SILTSTONE     31       X     36       X     36       X     36       X     37       X     38       X     33       <					BASALT			-	
Bark SALT     22       Dark brown, light red moderately weathered     23       BASALT     24       Dark grey, green, light brown moderately     24       weathered BASALT     26       Dark grey slightly weathered BASALT     26       Dark grey BASALT     27       Dark grey BASALT     27       Dark grey BASALT     28       Dark grey BASALT     29       Dark grey BASALT     29       Dark grey BASALT     29       Dark grey BASALT     29       Dark grey BASALT     30       Dark grey BASALT     31       Dark grey BASALT     33       Dark green SILTSTONE     33       X     36       X     36       X     37       X     38       S     38       S     38       A     38       S     38       Dark green SILTSTONE     43       Hight grey SILTSTONE     43       Dark green			×.		BASALT			20	
BASALT     24       Dark grey, green, light brown moderately     24       weathered BASALT     25       Dark grey slightly weathered BASALT     26       Dark grey BASALT     27       Dark grey BASALT     29       Dark grey, black CLAY and dark green, dark grey     28       Upper BASALT     29       Dark grey, black CLAY and extremely weathered     30       X     Uight grey, SILTSTONE     31       X ×     36     36       X ×     38     38       X ×     38     39       X ×     23     38       X ×     38     36       X ×     38     38       X ×     38     36       X ×     38     38       X ×     38     36       X ×     38     38       X ×     38     38       X ×     38     38       X ×     38     38       X ×     38     36       X ×     38     38       X ×     38 <td></td> <td></td> <td></td> <td></td> <td>BĂSALT</td> <td>· · · ·</td> <td></td> <td>22</td> <td></td>					BĂSALT	· · · ·		22	
Dark grey Sightly weathered BASALT     25       Dark grey BASALT     26       Dark grey BASALT     27       Dark grey BASALT     28       Clayey basalt, slightly moist     29       Dark grey BASALT     29       Dark grey Dark grey BASALT     29       Dark grey Dark grey BASALT     29       Dark grey BASALT     29       Dark grey Dark CLAY and extremely weathered     31       X     Uight grey SILTSTONE     32       X     Dark green SILTSTONE     33       X     36     36       X     37     38       X     Dark green SILTSTONE     41       X     Light grey SILTSTONE     42       X     Dark green SILTSTONE     43					BASALT	, 		-24	
Dark grey BASALT 27   Dark grey BASALT and dark green, dark grey 28   clayey basat, slightly moist 29   Dark grey, black CLAY and extremely weathered 30   X MUDSTONE   X Light grey SILTSTONE   X Dark green SILTSTONE   X 36   X 36   X 37   X 38   X 36   X 37   X 38   X 34   X 34   X 36   X 36   X 37   X 38   39 39   X Light grey SILTSTONE   X 40   X 36   X 37   X 34   X 36   X 37   X 34   X			$ \gamma\rangle$		weathered BASALT				
Image: Clayey basalt, slightly moist     29       Dark grey BASALT     30       Dark grey, black CLAY and extremely weathered     31       X ×     MUDSTONE       X ×     Light grey SILTSTONE       X ×     33       X ×     Dark green SILTSTONE       X ×     36       X ×     36       X ×     37       X ×     38       X ×     120 H grey SILTSTONE       X ×     120 H grey SILTS			<u>↓</u> √,∮		Dark grey BASALT			-27	
Dark grey, black CLAY and extremely weathered     30       X     MUDSTONE       X     Light grey SILTSTONE       X     Dark green SILTSTONE       X     33       X     34       X     35       X     36       X     36       X     36       X     36       X     36       X     37       X     38       X     39       X     40       X     41       Backfill (Drill +       Cuttings)     Cuttings)			V,Ť	_	\clayey basalt, slightly	y moist		-29	
X Light grey SILTSTONE   X Dark green SILTSTONE   33 34   34 35   36 37   X 36   X 37   X 38   X 39   X Light grey SILTSTONE   41 Cuttings)   X Dark green SILTSTONE   X 43			Į,		Dark grey, black CLA	AY and extremely weathered			
X X     Dark green SILTSTONE     43       X X     -44					Light grey SILTSTO			32	
X X     Dark green SILTSTONE     43       X X     -44								-34	
X X     Dark green SILTSTONE     43       X X     -44									
X X     Dark green SILTSTONE     43       X X     -44								-37	
X X     Dark green SILTSTONE     43       X X     -44								39	
X X     Dark green SILTSTONE     43       X X     -44								<b>—</b>	
									Cuttings)
X X         Light grey SILTSTONE         45           X X         46         46           X X         47         48					Dark green SILTSTC	UNE		-44	
					Light grey SILTSTON	NE		-46	
× ×     Light grey SILTSTONE					Light grey SILTSTON	NE			



### **MONITORING WELL Pz06-D**

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

MOD\_WELL CAVAL RIDGE BORE LOGS.GPJ WCC\_AUS.GDT 7/10/08

Phone +61 7 3243 2111 Project No.: Fax +61 7 3243 2199

42626162

Project Reference: Caval Ridge EIS

Image: Constraint of the secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations     Image: Constraint of the secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Well CONSTRUCTION DETAILS
0     L     J     O     and additional observations     A       1     A     Light grey fine SANDSTONE     Image: Control of the second s	2       □         50       50         52       53         56       56         57       58         58       56         60       61         62       66         66       66         66       66         66       66         66       66         67       68         68       69         77       73         77       73         77       77         78       Gravel Pack →         81       85         86       50 mm uPVC Sc         81       85         82       50 mm uPVC Sc         93       94         94       95         96       96         97       98         99       100         101       102         103       104         104       105         108       109

	RS			Phone +61 7 3243 2111	Project	Caval Ridge EIS			G WELL Pz	
URS Australia Pty Ltd Level 14, 240 Queen St, Brisbane QLD Drilling Contractor: Capricorn Weston Drilling					Reference:	Caval Riuge EIS		Client:	BMA Coal	
					Project No.:	42626162		Location:	Peak Downs QLD	)
ogged By:	AW			ore Size: 165 mm	Relative Leve			Drill Type:	Rotary Air	
Checked By: Date Started:	SD 19-5-08			ital Depth: <b>31.00 m</b> asing Size: <b>50 mm</b>	Coordinates:	mN mE		Drill Model:	UDR	
Date Finished:	19-5-08			C .	Permit No:			Drill Fluid:	Air	
		1 1		1				1 1		
Sample Interval PID (ppm)	Sample ID	pu	Classification	<b>DESCRIP</b> Type, plasticity /	particle size	. colour.	ure	(m) r	WELL CONSTR	UCTION DETAILS
Samp PID (		Legend	Class	secondary / min moisture conten and additional o	t. consistenc	its (e.g., "trace"), y / density,	Moisture	Depth (m)		
-				Dark brown stiff CLA	Y, low plasti	city		0 		
-				Light brown, light gre	y highly to e	ktremely		2	Cement Grout	
-				weathered BASALT Light grey, light brow	n moderately	weathered		4		
-				BĂSALT				-5 -6		
-				Dark grey, green, lig	nt brown moo	lerately		<b>7</b>		
				Dark grey, green, lig weathered BASALT Light brown, dark gre	ey SILT with	clasts of highly		8		
-				Light brown, dark gre weathered BASALT	,			10		
-				Beige, light brown, g highly weathered BA	SALT			11 12	Backfill (Drill	
				Dark grey, light brow BASALT		weathered		13		
-		X.		Purple, brown model BASALT	ately to high	y weathered		15		
-		×.		Light grey, light brow	n moderately	weathered		<u></u> 16 17		
-		, Xi		Dark grey, light red n	noderately w	eathered		18		
		×.		Purple, brown mode	ately to high	y weathered		19 20	Bentonite Seal	
-		×.		BASALT Light brown silty high BASALT	ly to extreme	ely weathered		-21	Gravel Pack —	
-		$\nabla$		Dark brown, light red	moderately	weathered				
-				Dark grey, green, lig	nt brown moo	lerately		24		
-		$\lfloor L \rfloor$		weathered BASALT Dark grey slightly we	athered BAS	ALT		25 26		50 mm uPVC S
-		$\mathbf{X}$		Dark grey BASALT Dark grey BASALT a	nd dark gree	n. dark grev		27		
-		V,T		clayey basalt, slightly Dark grey BASALT	moist			-29		
-				Dark grey, black CLA	Y and extrem	nely weathered	_			
-				MUDŠTÓNE		/	_	32		
-								-33 -34		
-								35		
-										
-								38		
-										
-								41		
-								-42 -43		
-								44		
-								45 46		
								47		
-								48 49		
<u> </u>				1				E		

U	RS				MON	NIT	ORIN	G WELL Pz0	Sheet 1 of 1	
URS Australia				Phone +61 7 3243 2111 Fax +61 7 3243 2199	Project Caval Ridge E	IS	Client:	BMA Coal		
Drilling Contract	ctor: Capric	Drilling	Project No.: 42626162		Location:	Peak Downs QLD				
Logged By:	AW			e Size: 165 mm	Relative Level: mRL		Drill Type:	Rotary Air		
Checked By: Date Started:	SD 18-5-08			al Depth: 44.00 m sing Size: 50 mm	Coordinates: mN mE		Drill Model:	UDR		
Date Finished:			Cas		Permit No:		Drill Fluid:	Air		
Sample Interval PID (ppm)			cation	DESCRIPT	ION OF STRATA	a	(m	WELL CONSTRUC	TION DETAILS	
Sample Int PID (ppm)	Sample ID	Legend	Classification	secondary / min	particle size, colour, or components (e.g., "trace"), t, consistency / density, oservations	Moisture	Depth (m)			
				Light brown, tan SILT			0 - 1			
				Light brown, light red	ts of chalcedony, basalt and	/	2		1/44   2019 144-1	
		KÍÍ		\ironstone, angular to	sub-round, up to 20 mm / silty CLAY, low plasticity,		3	Cement Grout		
				gravel clasts of chalo sub-angular to round	edony, basalt and ironstone,	<u> </u>	5			
				Beige, dark yellow SI			6			
			$\neg$	Light brown, beige S	LT	/──	8			
				Light brown, beige, v	ery fine to medium SAND y fine SAND	/				
				Light brown, beige, s	ilty very fine SAND	/	11			
				Cream, white, orange	e very fine to coarse quartz		12 13	Backfill (Drill →		
				round, well sorted		<b> </b>	13	Cuttings)		
				with minor gravel cla	um to coarse quartz SAND sts up to 10 mm,		15			
		X X X X			medium to coarse quartz		-16 -17			
		× ×		mm, sub-angular to i	arse gravel clasts up to 20 ound, well sorted, moist	1	18			
				Light grey, light brow sub-angular to round	n fine to coarse SAND, , well sorted, moist		19 20			
				Dark grey, black san weathered SILTSTO	dy clayey extremely		21			
		$ \times \times $		Light grey, highly we	athered CLAYSTONE		-22 -23			
		× × × × × × × ×		Dark grey, CARBON	ACEOUS CLAYSTONE		24			
				Dark grey, black CAF	RBONACEOUS MUDSTONE		25 26			
							-27			
		= = =					-28 29			
				Dark grey SILTSTON	NE .		-30	Bentonite Seal		
		× × × ×					-31 			
		× × × ×		Dark grey sandy SIL Light grey fine SAND			33			
		× × × ×		Light grey, light brow	n CARBONACEOUS					
		· · · · · · · · · · · · · · · · · · ·		SILTSTONE Light grey fine to me						
		<u>× × </u>		Light grey SILTSTON		+	37			
							39			
		· · · · · × × × ×		Dark grey SILTSTON			40 41			
		= = =		Dark grey, black CAF COAL	RBONACEOUS MUDSTONE		42	Gravel Pack →	50 mm uPVC Screen	
		x x		Dark grey SILTSTON			43 44		So min ur vo Screen	
				Durring of the for of			44 45			
							-46 -47			
							47			
							49			
I										
l										

MOD\_WELL CAVAL RIDGE BORE LOGS.GPJ WCC\_AUS.GDT 7/10/08

	RS		Phone +61 7 3243 211 <sup>2</sup>			G WELL Pz07-S
URS Australia Level 14, 240 (	Queen St, Brisban	e QLD	Fax +61 7 3243 2199		Client:	BMA Coal
Drilling Contra	ctor: Caprie	corn Wes	ton Drilling	Project No.: 42626162	Location:	Peak Downs QLD
Logged By: Checked By:	AW SD		Bore Size: 165 mm Total Depth: 16.00 m	Relative Level: <b>mRL</b> Coordinates: <b>mN</b>	Drill Type:	Rotary Air
Date Started:	3D 18-5-08		Total Depth:16.00 mCasing Size:50 mm	mE	Drill Model:	UDR
Date Finished:	18-5-08			Permit No:	Drill Fluid:	Air
Sample Interval PID (ppm)				TION OF STRATA		WELL CONSTRUCTION DETAILS
Sample Int PID (ppm)	Sample ID	pu	DESCRIF Type, plasticity secondary / mi moisture conte	/ particle size, colour,	Depth (m)	
Sam PID (		Legend	G secondary / mi moisture conte and additional	/ particle size, colour, or components (e.g., "trace"), nt, consistency / density, been/ations	Dept	
-		+	Light brown SILT		0 _	
-			Light brown, red silt	y CLAY AY, moderate plasticity,	<u> </u>	
· 			Light grey, beige Cl moist Light grey, beige C		<u> </u>	Cement Grout —
- 			Light brown silty CL		- 5	
-			Beige silty fine SAN	D		Bentonite Seal —
-			Light brown, orange	fine to medium SAND		
-			Light brown SILT Beige fine SAND			
-				fine to medium SAND ey fine to coarse SAND,		50 mm uPVC Sc
-			Angular to sub-rour Brown, orange, clay	ev fine to coarse SAND.		
-		0 77.7		d, well sorted, with minor	15 16	
			sub-angular to rour	ey fine to coarse SAND, d, well sorted with minor	17	
- -			Dark grey, black SA	NDY CLAY, moderate to high ret - weathered MUDSTONE	-19	
-			CARBONACEOUS	MUDSTONE	-20 -21	
-					22	
					24 25	
					26	
-					27 28 29 30	
					-29 -30	
					-31	
-					-32 -33 -34	
					34	
-					35	
-					-37 -38 -39	
-						
-					41	
-					43	
					44 45	
					46 47	
					48	
					49	

evel 14, 240 Queen St, Brisbane QLD Fax +61 7 3243 2199				Project Caval Ridge EIS Reference: Clien Project No.: 42626162			BMA Coal Peak Downs QLD
		То	ore Size: 165 mm otal Depth: 63.00 m asing Size: 50 mm	Relative Level: mRL Coordinates: mN mE Permit No:		Drill Type: Drill Model: Drill Fluid:	Rotary Air UDR Air
PID (ppm)	nple ID pueb ee -	Classification	Type, plasticity / secondary / min	TON OF STRATA particle size, colour, or components (e.g., "trace"), t, consistency / density, sservations	Moisture	Depth (m)	
			SAND Dark brown, light gre Dark grey CLAYSTO Dark grey SILTSTON Light grey SILTSTON Dark grey SILTSTON COAL Dark grey, black CAF Dark grey, black CAF Dark grey, black CAF Dark grey, black CAF Dark grey, black CAF Light grey SILTSTON Dark grey, black CAF Dark grey, black CAF	Fine SAND SILT ID IE SAND IIght grey fine to medium Y CLAYSTONE IE IE REONACEOUS SILTSTONE IE IE REONACEOUS SILTSTONE IE REONACEOUS SILTSTONE IE		0 1 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 7 8 9 10 11 2 3 4 5 6 7 7 8 9 10 11 2 3 4 5 6 7 7 8 9 10 11 2 3 4 5 6 7 7 8 9 10 11 2 3 4 5 6 7 7 8 9 10 11 2 3 4 5 6 7 7 8 9 10 11 2 3 4 5 6 7 7 8 9 10 11 2 3 4 5 6 7 7 8 9 10 11 2 3 3 4 5 6 7 7 8 9 10 11 2 3 3 4 5 6 7 7 8 9 10 11 2 3 3 4 5 6 7 7 8 9 10 11 2 3 3 4 5 6 6 7 7 8 9 10 11 2 3 3 4 5 6 6 7 7 8 9 10 11 2 2 2 2 2 7 2 8 9 30 1 3 2 3 3 4 5 5 6 7 7 8 9 0 1 2 2 7 7 8 9 0 3 1 2 2 3 3 4 5 3 6 6 7 7 8 9 0 1 2 2 3 3 4 5 5 6 6 7 7 8 9 0 1 2 2 7 8 9 0 1 2 2 3 3 4 5 5 6 6 7 7 8 9 0 1 2 2 3 3 4 5 5 6 6 7 7 8 9 0 1 2 2 3 3 4 5 5 6 6 7 7 8 9 0 1 2 2 3 3 4 5 5 6 6 7 7 8 9 9 0 1 2 2 3 1 2 3 3 4 5 5 6 6 7 7 8 9 0 1 2 2 3 3 4 5 5 6 7 7 8 9 9 0 1 2 2 3 1 2 3 3 4 5 5 6 7 7 8 9 9 0 1 2 2 3 3 7 8 9 0 7 7 8 9 0 1 2 2 7 7 8 9 0 1 2 2 3 3 1 2 3 3 7 7 8 9 0 1 2 2 1 2 2 2 2 2 7 7 8 9 0 1 2 8 9 10 1 7 8 9 1 8 9 1 1 2 8 9 1 8 9 1 8 9 1 8 9 1 8 9 1 8 9 1 8 9 1 8 9 1 8 9 1 1 2 8 9 1 8 1 8	Cement Grout
	× > > > > > > > > > > > > > > > > > > >		†∖and COAL	ACEOUS SILTSTONE			

MOD\_WELL CAVAL RIDGE BORE LOGS.GPJ WCC\_AUS.GDT 7/10/08



## **MONITORING WELL Pz08-D**

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

Phone +61 7 3243 2111 Project No.: Fax +61 7 3243 2199

42626162

Project Reference: Caval Ridge EIS

Sample Interval P ID (ppm)	Legend Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)	WELL CONSTRUCTION DETAILS
	× × × × × × × × × × × × × × × × × × × ×	Light grey SILTSTONE		50 51 52 53 54	
	× × × × × ×	Light grey very fine sandy SILTSTONE Light grey SANDSTONE		55 56 57	Bentonite Seal →
	· · · · · · · · · · · · ·	Dark grey, black CARBONACEOUS SILTSTONE		58 59 60	Gravel Pack
	× × × × × × × × × × × × × ×	Dark grey SILTSTONE, possibly fractured, water Dark grey SILTSTONE possibly fractured		61 62 63	50 mm uPVC Sc
				64 65 66 70 71 72 73 74 75 67 77 80 81 82 83 84 85 86 87 88 90 91 92 93 94 95 99 90 100 101 2 103 105 107 100 100 100 100 100 100 100 100 100	

URS		MONIT	ORIN	G WELL Pz08-S
URS Australia Pty Ltd Level 14, 240 Queen St, Brisbane QLD Drilling Contractor: <b>Capricorn Wes</b>	Phone +61 7 3243 2111 Fax +61 7 3243 2199	Project Caval Ridge EIS Reference:	Client: Location:	BMA Coal Peak Downs QLD
Logged By: AW Checked By: SD Date Started: 17-5-08 Date Finished: 17-5-08	Bore Size: 165 mm Total Depth: 16.00 m Casing Size: 50 mm	Project No.: 42626162 Relative Level: mRL Coordinates: mN mE Permit No:	Drill Type: Drill Model: Drill Fluid:	Rotary Air UDR Air
Image: state of the state	Type, plasticity / secondary / min         Secondary / min         moisture conten         and additional o         Light brown, orange         Brown SILT         Brown clayey SILT         Light brown, orange         Light brown SILT         Light brown fine SAN         Light brown, beige fin         Light grey fine to me         Beige fine to medium	fine silty SAND	(m) <sup>(m)</sup> <sup>(</sup>	WELL CONSTRUCTION DETAILS

				Project Caval Ridg Reference:	÷ EIQ	Client:	BMA Coal		
Drilling Contrac	tor: Capri	corn We	ston	Drilling	Project No.: 42626162		Location:	Peak Downs QLD	
Logged By:	AW			re Size: 165 mm	Relative Level: <b>mRL</b>		Drill Type:	Rotary Air	
Checked By: Date Started:	SD 21-5-08			al Depth: 77.00 m sing Size: 50 mm	Coordinates: mN mE		Drill Model:	UDR	
Date Finished:	23-5-08			Ū	Permit No:		Drill Fluid:	Air	
Sample Interval PID (ppm)			ion	DESCRIPT	ION OF STRATA			WELL CONSTRUCTION DETAIL	S
pm)	Sample ID	σ	ficat	_	particle size, colour,	lie	E E		
Sample Int PID (ppm)	·	Legend	Classification	secondary / min	or components (e.g., "trac t, consistency / density,	Moisture	Depth (m)		
PI		Le	ö	and additional o	t, consistency / density, bservations	Ĕ			
-				Dark brown silty CLA			0 - 1		
-				Dark brown silty clay	•		2		
-		ľ í í í í		Beige SILT and extre SILTSTONE	emely weathered		3	Cement Grout	
-							5		
		× × × ×		Light brown, light gre	y silty clayey extremely NE		6		
-		× ×			ILT and extremely weathe	red	8		
				SILTSTONE			<u>9</u> 10		
-				Brown, red silty CLA	Y and extremely weathere	1 <u>-</u>	11		
-				Light brown silty CLA	Y and extremely weather	ed /	12 13		
-				Beige SILT and extre	emely weathered		-14		
-				Light brown silty CLA	Y and extremely weather	ed	15		
				SILTSTONE	ey SILT with clasts of		16 17		
· · · · · · · · · · · · · · · · · · ·				moderately weathere		_/			
-		× ×		Dark brown, light gre	SILTSTONE		19 20		
-				extremely weathered	I SILTSTONE				
_				Light grey SILT	erately weathered		22		
_				SILTSTONE Dark grey SILT and	clasts of dark grey		24		
		^ ^ X X X X X X X X X X X X X X X X X X		moderately to highly	weathered SILTSTONE RBONACEOUS SILTSTO		25		
-				Dark grey, black CA	RBONACEOUS SILTSTO		26 27		
-		* * * * * * * * * * * *		∖and COAL ∖Dark grey slightly we	athered SILTSTONE	_//	-28		
-				Dark grey SILTSTON	NE		-29 -30	Backfill (Drill —	
.		× × × ×			NE IE and dark grey CLAY,			Backfill (Drill → Cuttings)	
_				Light grey SILTSTO			32		
-		× × × × × × × × × × × × × × × × × × ×		Dark grey SILTSTON		-1	-34		
-		$\begin{vmatrix} \hat{x} & \hat{x} \\ x & x \end{vmatrix}$					-35		
-							-38		
-							41		
				Light grey SILTSTO	NE				
.		× × × ×		Dark grey SILTSTON	JE		43		
-		× × × ×		Light grey SILTSTON	NE		45		
				Dark grey SILTSTON			-46 -47		
-		* * * * * * * * * * * * * * * *					48		
				Dark grey SILTSTON	IE and dark grey CLAY		-49		



## **MONITORING WELL Pz09**

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

Phone +61 7 3243 2111	Project
Fax +61 7 3243 2199	No.:

42626162

Project Reference: Caval Ridge EIS

	PID (ppm)	Sample ID	pu	Classification	<b>DESCRIPTION OF STRATA</b> Type, plasticity / particle size, colour,	ture	Depth (m)	WELL CONSTRUCTION DETAILS
(	PID (		Legend	Class	secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Dept	
			× × × × × × × × × ×		Light grey SILTSTONE		-51 -52	
			XX		Light grey, black SILTSTONE		53 54	
			× × × × × × × ×		Light grey SILTSTONE Dark grey SILTSTONE		55	
			<pre></pre>		Dark grey SILTSTONE		56 57	
							58	
			$\hat{\mathbf{x}}$ $\hat{\mathbf{x}}$ $\mathbf{x}$				-59 -60	目目目
			×× ××		Light grey SILTSTONE Light grey, dark grey CLAY, moist		61	
							62 63	
			× × × × × ×		Light grey SILTSTONE		64	Bentonite Seal —
					Dark grey SILTSTONE - hard		65 66	
			×× X/X/		Light grey SILTSTONE Light grey CLAY, slightly moist		67	Gravel Pack —
			////  × ×		Light grey moderately weathered SILTSTONE		68	Gravel Pack
			$\begin{array}{c} \times & \times \\ \times & \times \\ \times & \times \end{array}$		Dark grey SILTSTONE COAL		69 70	
					COAL		-71 -72	
			× × × × × ×		Dark grey, black, light brown CARBONACEOUS SILTSTONE		-73 -74	50 mm uPVC Screen
			× ×		COAL		-75 -76	
					Light grey SILTSTONE	_	77	
							79         80         81         82         83         84         85         86         87         90         91         92         93         94         95         97         98         99         100         101         102         103         104         107         108         109	
			<u>   </u>		1	<u> </u>	Ē	

Bit Reserve LD     Ear. HT 7 242 TW     Project No:     2426162     Common Peak Down SQLD       Ning Contractor     Capricom Weston Drilling     Project No:     42626162     Lonit Tweet Reserve Arr       Ning Contractor     Sam Pint Contractor     Project No:     42626162     Lonit Tweet Reserve Arr       Ning Contractor     Sam Pint Contractor     Project No:     42626162     Lonit Tweet Reserve Arr       Ning Contractor     Sam Pint Contractor     Project No:     42626162     Lonit Tweet Reserve Arr       Ning Contractor     Sample ID     Bit Specific Same Reserve Arr     Promitive Contractor     Primitive Contractor       Ning Contractor     Sample ID     Bit Specific Same Reserve Arr     Primitive Contractor     Primitive Contractor     Primitive Contractor       Ning Contractor     Sample ID     Bit Specific Same Reserve Arr     Primitive Contractor     Primitive Contractor     Primitive Contractor       Ning Contractor     Bit Specific Same Reserve Arr     Data Specific Contractor     Primitive Contractor     Primitive Contractor       Ning Contractor     Bit Specific Contractor     Primitive Contractor     Primitive Contractor     Primitive Contractor       Bit Specific Contractor     Data Specific Contractor     Primitive Contractor     Primitive Contractor     Primitive Contractor       Bit Specific Contractor     Data Specific Contr	URS Australia Pty Ltd	Project Caval Ridge EIS			NG WELL Pz10		
Implementation     Capacity in Subsection     Projective: 42826182     Dif Type: Rotary Air       Predext by SD     Data (percent result)     Data (percent result)     Dif Type: Rotary Air       Data (percent result)     Data (percent result)     Dif Type: Rotary Air       Data (percent result)     Data (percent result)     Premative:     Dif Type: Rotary Air       Data (percent result)     Data (percent result)     Premative:     Dif Type: Rotary Air       Data (percent result)     Data (percent result)     Premative:     Dif Type: Rotary Air       Data (percent result)     Data (percent result)     Premative:     Dif Type: Rotary Air       Data (percent result)     Data (percent result)     Premative:     Dif Type: Rotary Air       Data (percent result)     Data (percent result)     Premative:     Dif Type: Rotary Air       Data (percent result)     Data (percent result)     Premative:     Dif Type: Rotary Air       Data (percent result)     Data (percent result)     Premative:     Dif Type: Rotary Air       Data (percent result)     Data (percent result)     Premative:     Dif Type: Rotary Air       Data (percent result)     Data (percent result)     Premative:     Dif Type: Rotary Air       Data (percent result)     Data (percent result)     Premative:     Dif Type: Rotary Air       Upit percent Air     Data (percent	evel 14, 240 Queen St, Brisbar		Fax +61 7 3243 2199	Reference:			
Betzkeit By:     SD zeinig Size: 30 mm     Total Depth:     83.00 m (Sig Size: 30 mm)     Coordinates:     mN mE     Dnil Model:     UDR       met Finande:     21-5.48     0     Coordinates:     mN     mE     Dnil Model:     UDR       met Finande:     21-5.48     0     Coordinates:     mN     mE     Dnil Model:     UDR       met Finande:     21-5.48     0     Coordinates:     mN     mE     Dnil Model:     UDR       met Finande:     21-5.48     0     Coordinates:     mN     met Site     Dnil Model:     UDR       met Finande:     21-5.48     0     DSCRIPTION OF STRATA metodatary (minor components (e.g., trace), site     mil Finande     MetLL CONSTRUCTION DETAILS       metodational observations     0     0     0     0     0     0       1     Dark gray, compace CLAY (tow plasticity)     1     1     0     1     0       1     Ught gray, dark brown CLAY and SiLT     1     1     1     0     0     0       1     Ught gray, CLAYSTONE     1     1     1     1     1     1     1       1     Ught gray, CLAYSTONE     1     1     1     1     1     1     1       1     Ught gray, CLAYSTONE     1 </th <th>vrilling Contractor: Capri</th> <th>icorn West</th> <th>on Drilling</th> <th>Project No.: 42626162</th> <th></th> <th>Location:</th> <th>Peak Downs QLD</th>	vrilling Contractor: Capri	icorn West	on Drilling	Project No.: 42626162		Location:	Peak Downs QLD
Date Startist     20-5-08     Casing Size: 50 mm     mE     Dril Model:     UDR       Date Freehed:     21-5-08     Description OF strata     grad     Air       Deg Go L     Sample ID     0     0     Sample ID     grad     Description OF strata     grad       Type, plasticity / particle size, colour, molecular, consistency / density, molecular, consistency / density, molecular, consistency / density, and defined lose rational def	66 <i>)</i>					Drill Type:	Rotary Air
Bit Primetric     Diff Fluit     Diff Fluit     Art       Image: Sample ID     Bit	····,					Drill Model:	UDR
Dark grey, orange CLAY, low plasticity     0       Light brown sill CLAY     23       Beige light brown SILT     4       Light grey, dark brown CLAY and SILT     7       Light grey, dark brown SLT     9       Light grey, dark brown SLT     9       Light grey, dark brown SLT     11       Light grey, dark brown SLT     9       Light grey, dark brown SLT     11       Light grey, CLAYSTONE     14       Dark grey, light brown CLAYSTONE     16       COAL     16       Light grey SILTSTONE     22       Light grey SILTSTONE     22       X     Light grey SILTSTONE       X     Light grey fine sandy SILTSTONE       X     Light grey fine sandy SILTSTONE						Drill Fluid:	Air
Image: Second Secon							
Image: Construction of the standard sta	zal		_				
Dark grey, orange CLAY, low plasticity     0       Light brown sill CLAY     23       Beige light brown SILT     4       Light grey, dark brown CLAY and SILT     7       Light grey, dark brown SLT     9       Light grey, dark brown SLT     9       Light grey, dark brown SLT     11       Light grey, dark brown SLT     9       Light grey, dark brown SLT     11       Light grey, CLAYSTONE     14       Dark grey, light brown CLAYSTONE     16       COAL     16       Light grey SILTSTONE     22       Light grey SILTSTONE     22       X     Light grey SILTSTONE       X     Light grey fine sandy SILTSTONE       X     Light grey fine sandy SILTSTONE	m m			FION OF STRATA	۵	Ê	WELL CONSTRUCTION DETAILS
Image: Construction of the standard sta	a Sample ID	end	Type, plasticity secondary / min	particle size, colour, or components (e.g., "trace").	sture	th (	
Dark grey. orange CLAY, low plasticity     0       Light troom silly CLAY     12       Beige light brown SILT     5       Light grey. dark brown CLAY and SILT     5       Light grey. dark brown CLAY and SILT     11       Light grey. dark brown CLAY and SILT     11       Light grey. dark brown CLAY and SILT     11       Light grey. CLAYSTONE     11       Could grey CLAYSTONE     11       Light grey CLAYSTONE     11       Light grey SILTSTONE     12       Light grey SILTSTONE     12       Light grey SILTSTONE     13       Light grey SILTSTONE     13       Light grey SILTSTONE     13       Light grey SILTSTONE     13       Dark grey SILTSTONE     14       Dark grey SILTSTONE     14       Dark grey SILTSTONE     13       Dark grey SILTSTONE     14       Light grey SILTSTONE     14       Dark gre	PID Sar	Leg	moisture conten	t, consistency / density,	Moi	Dep	
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Beige light brown SILT     3     Cement Grout       Light brown SILT     4       Light prey, dark brown CLAY and SILT     5       Light prey, dark brown CLAY and SILT     10       Light prey, dark brown CLAY and SILT     10       Light prey, dark brown CLAY and SILT     11       Light prey, CLAYSTONE     11       COAL     16       COAL     16       Light grey CLAYSTONE     11       Light grey CLAYSTONE     11       Light grey CLAYSTONE     12       Light grey CLAYSTONE     12       Light grey SILTSTONE     12       Light grey SILTSTONE     13       Light grey SILTSTONE     13       Dark grey SILTSTONE     14       Light grey SILTSTONE     14       Dark grey SILTSTONE     14       Light grey SILTSTONE     14       Dark grey SILTSTONE     14       Dark grey SILTSTONE     14       Dark grey SILTSTONE     14 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td>E</td> <td></td>						E	
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X     X     Dark grey slightly CARBONACEOUS     43       X     X     SILTSTONE     44       X     Light grey SILTSTONE     45       X     Dark grey SILTSTONE     46       X     Dark grey bichtly CARBONACEOUS     47							目目
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			Light grey SILTSTO	NE		49	

MOD\_WELL CAVAL RIDGE BORE LOGS.GPJ WCC\_AUS.GDT 7/10/08

	tralia Pty Ltd 240 Queen St, Brisband			Fax +61 7 3243 2199	No.: 42020102		Project Reference	
Sample Interval	Sample ID	Legend	Classification	Type plasticity /	TION OF STRATA particle size, colour, or components (e.g., "trace"), t, consistency / density, bservations	Moisture	Depth (m)	WELL CONSTRUCTION DETAILS
				COAL			50 51	
							-52	
		XX		COAL and CARBON Light grey SILTSTON	ACEOUS SILTSTONE		53 54	
				Dark grey SILTSTON	1E		55 56	
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		× × × ×					72	
							-73 -74	Bentonite Seal —
							-75	
		× ×		Dark may alay a slip			-76 -77	Gravel Pack
							78	
				Dark brown MUDST COAL with some hig	INE /		-79 -80	50 mm uPVC
				MUDSTONE			81	
						<u> </u>	82 83	
							-84	
							85 86	
							87 88	
							-89	
							90 91	
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							-101	
							102 103	
							-104	
							-105 106	
							-106 -107	
							-108 -109	
							F	

Sheet 2 of 2

URS Australi Level 14, 240	Queen St, Brisbar			Phone +61 7 3243 2111 Fax +61 7 3243 2199	Project Caval Ridge EIS Reference:		Client: Location:	BMA Coal	
Drilling Contractor: Capricor Logged By: AW Checked By: SD Date Started: 21-5-08 Date Finished: 21-5-08		Bore Size:165 mmTotal Depth:58.00 mCasing Size:50 mm		re Size: 165 mm tal Depth: 58.00 m	Project No.: 42626162 Relative Level: mRL Coordinates: mN mE Permit No:		Drill Type: Drill Model: Drill Fluid:	l: UDR	
Sample Interval PID (ppm)	Sample ID	Legend	Classification	Type, plasticity / secondary / min	FION OF STRATA ' particle size, colour, or components (e.g., "trace"), t, consistency / density, bservations	Moisture	Depth (m)		s
				Orange, red, brown v Dark brown, fine to n Dark brown, light bro minor fine GRAVEL, Dark brown, light bro minor fine GRAVEL, well sorted, very clea Tan fine sandy SILT Cream, light brown fi minor GRAVEL class to sub-round, well so Dark brown, light gre weathered CLAYSTO Dark brown, light gre Weathered CLAYSTO Dark brown, light gre ULAYSTONE Light grey SILTSTON Dark grey SILTSTON Dark grey, black SILT Dark grey, black CAF COAL Dark grey, black CAF Dark grey, black CAF Dark grey, black CAF Dark grey SILTSTON Dark grey SILTSTON	AND		0 1 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 2 3 4 5 6 7 8 9 10 11 12 3 4 5 6 7 8 9 10 11 12 3 4 5 6 7 8 9 10 11 12 3 4 4 5 6 7 8 9 10 11 12 3 14 11 12 3 14 5 6 7 8 9 10 11 12 3 14 14 5 6 7 8 9 10 11 12 3 13 4 11 12 3 3 4 5 6 7 8 9 10 11 12 3 3 4 5 6 7 8 9 10 11 12 3 3 4 4 5 6 7 8 9 10 11 12 3 3 4 4 5 6 7 8 9 10 11 12 3 3 4 4 5 6 7 8 9 10 11 12 3 3 4 4 5 6 7 8 9 10 11 12 3 3 4 4 5 6 7 8 9 10 11 12 3 3 4 4 5 6 6 7 8 9 10 11 12 3 3 4 4 5 6 6 7 8 9 10 11 12 3 3 4 4 5 6 6 7 8 9 10 11 12 3 3 4 5 6 6 7 8 9 0 11 12 3 3 4 5 6 6 7 8 9 0 11 12 3 3 4 5 6 6 7 8 9 0 11 12 3 3 4 5 6 6 7 8 9 0 1 12 2 3 3 4 5 6 6 7 8 9 0 1 2 3 3 4 5 6 6 7 8 9 0 1 2 3 3 4 5 6 6 7 8 9 0 1 2 3 3 4 5 6 6 7 8 9 0 1 2 3 3 4 5 6 6 7 8 9 0 1 2 3 3 4 5 6 6 7 8 9 0 1 2 3 3 4 5 6 6 7 8 9 0 1 2 3 3 4 5 6 6 7 8 9 0 0 1 2 3 3 4 5 6 6 7 8 9 0 0 1 2 2 3 4 5 6 6 7 8 9 0 0 1 1 2 3 3 4 5 6 7 8 9 0 0 1 1 2 3 3 4 5 6 6 7 8 9 0 0 1 1 2 3 1 2 3 3 4 5 6 7 8 9 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Cement Grout	PVC sc
				Light grey SILTSTON	NE and dark grey CLAY,				



## Sheet 2 of 2 **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 **42626162** 

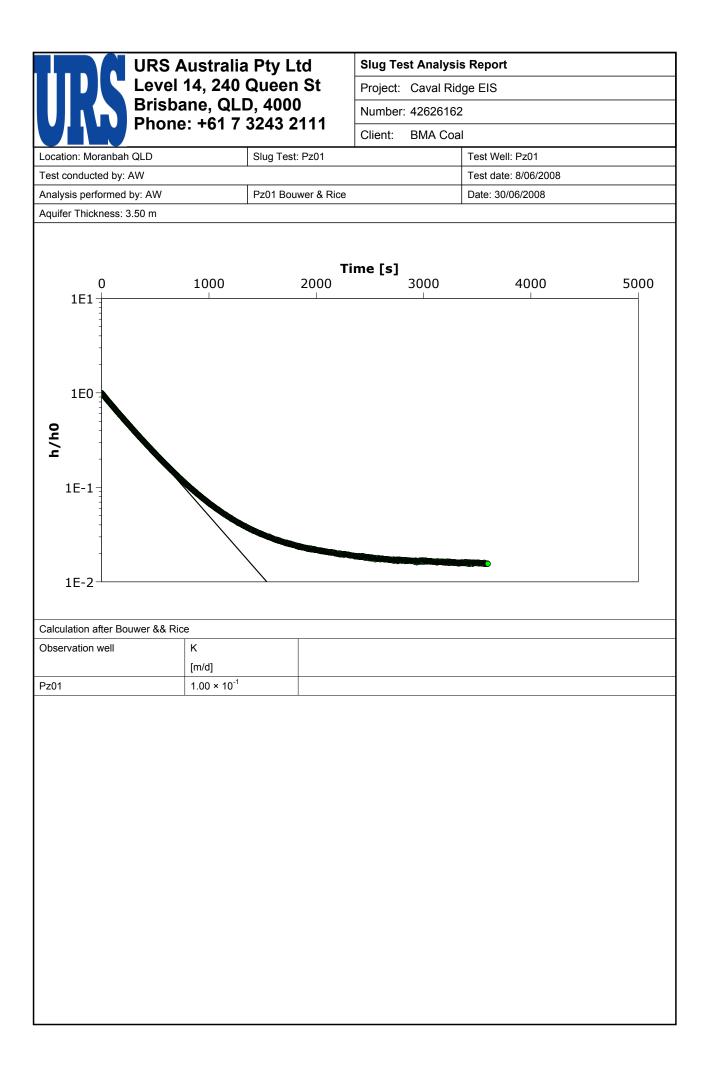
Project Reference: Caval Ridge EIS

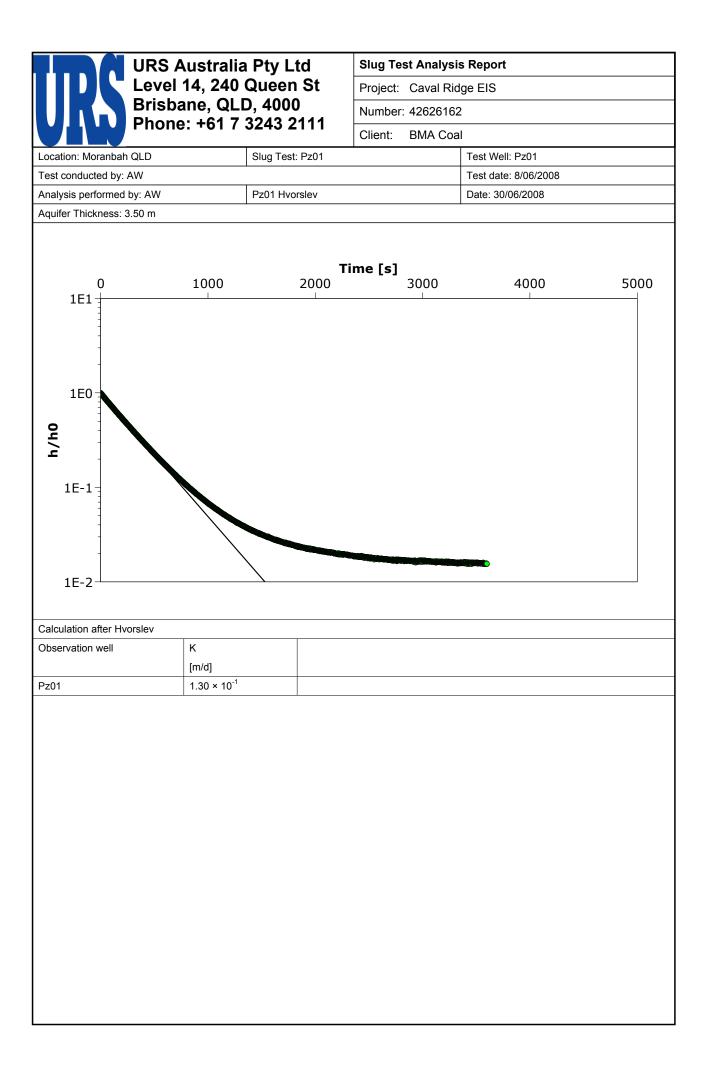
Sample Interval PID (ppm)	Sample ID	Legend	Classification	DESCRIPTION OF STRATA Type, plasticity / particle size, colour, secondary / minor components (e.g., "trace"), moisture content, consistency / density, and additional observations	Moisture	Depth (m)	WELL CONSTRUCTION DETAILS
			C	moisture content, consistency / density, and additional observations / Light grey SILTSTONE Light grey SILTSTONE, very soft Light grey SILTSTONE and dark grey CLAY, moist		$ \begin{array}{c} & & & \\ & & & $	Bentonite seal
						93 94 95 97 98 99 100 101 102 103 104 105 106 107 108 109	

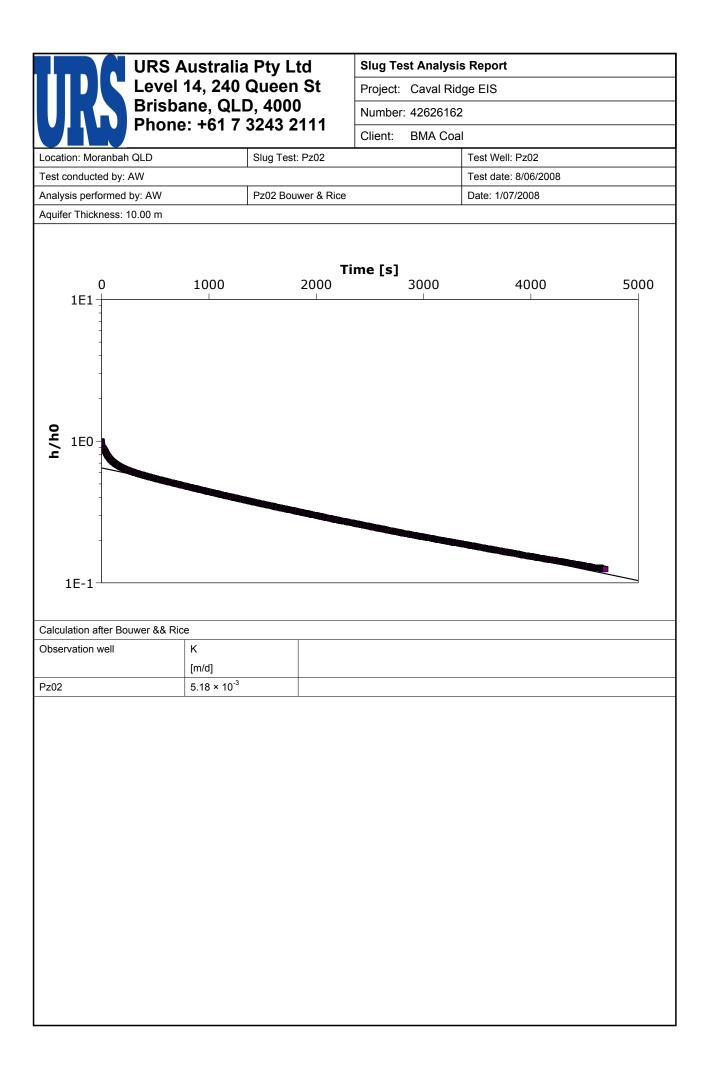
## Falling/Rising Head Test Data

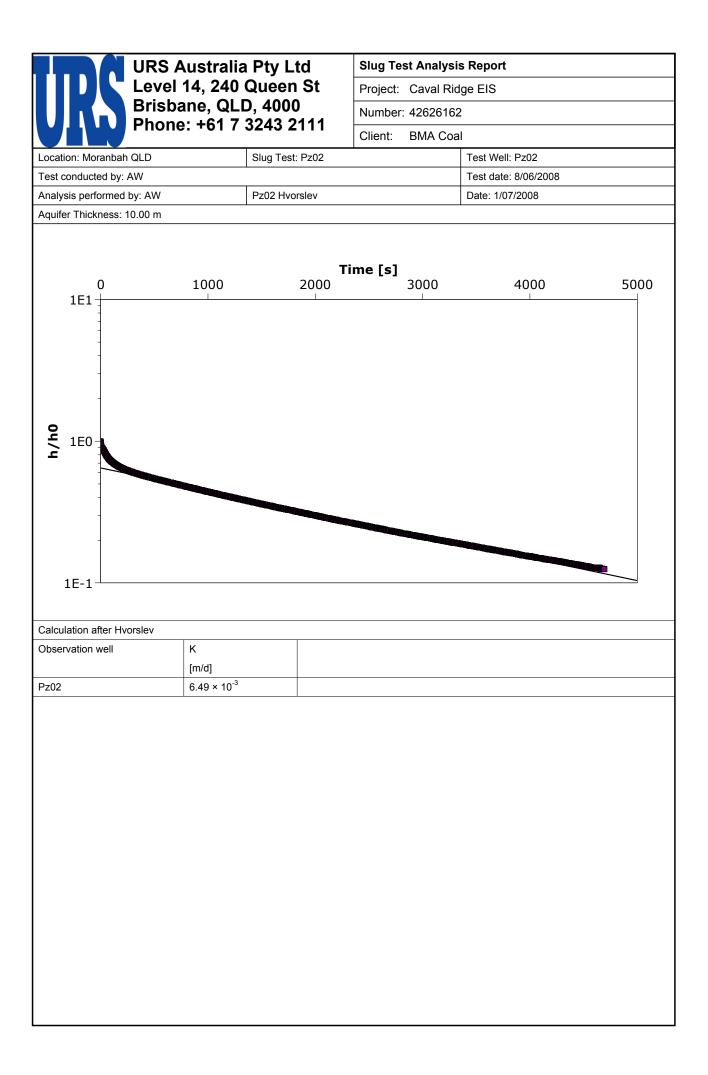
Appendix D

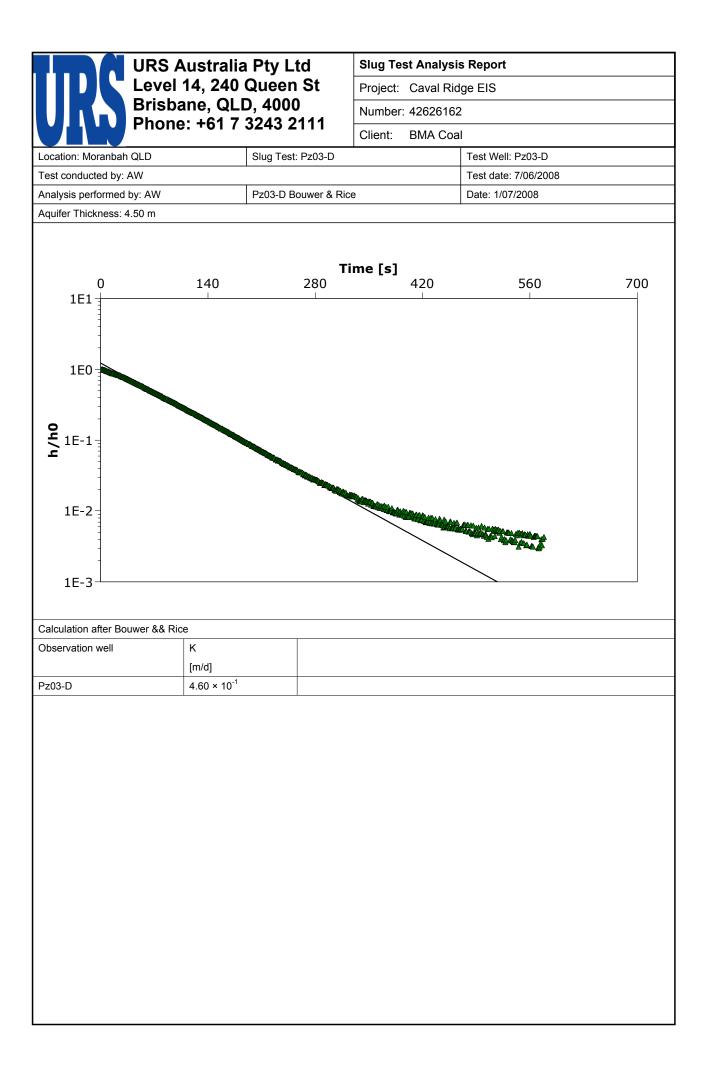


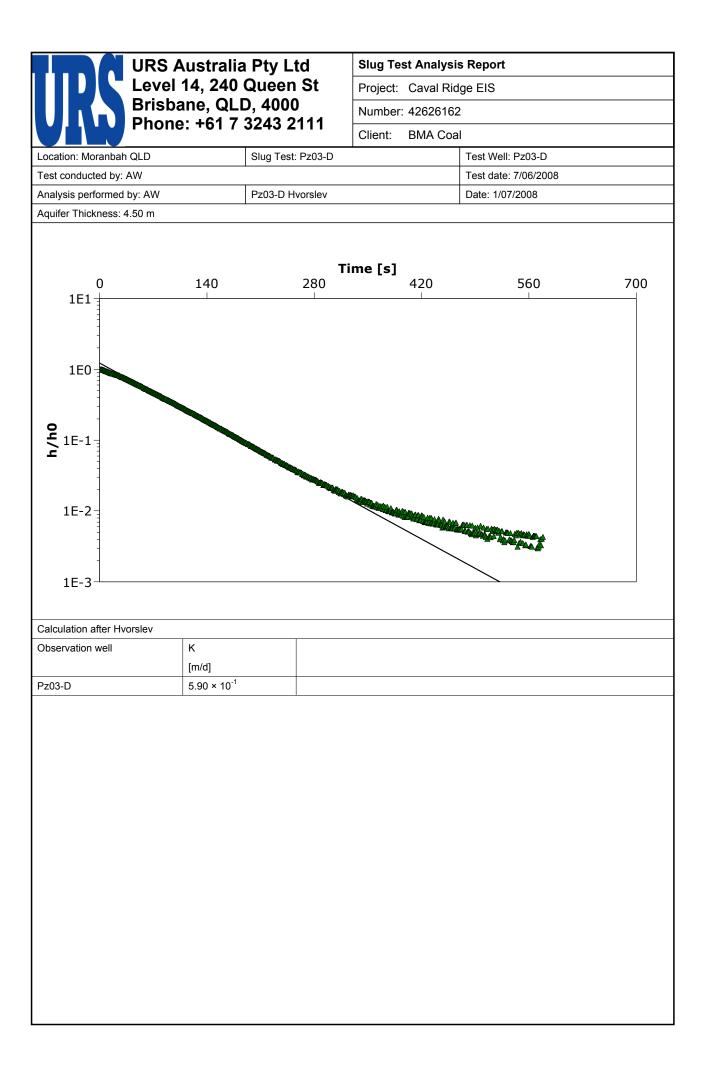


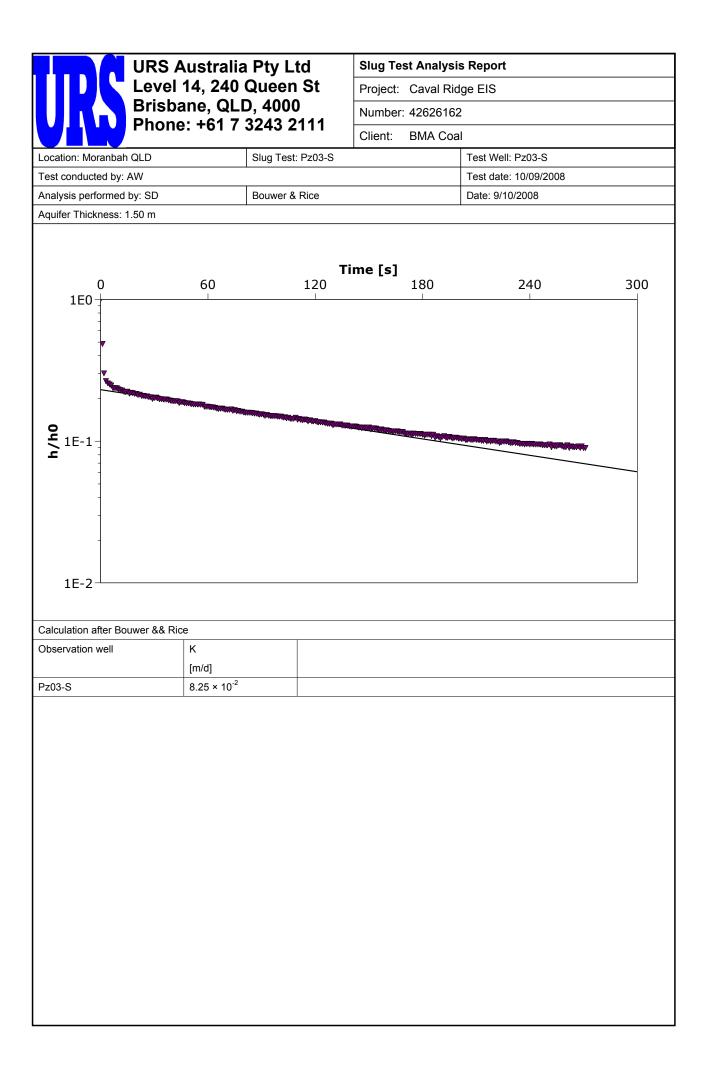


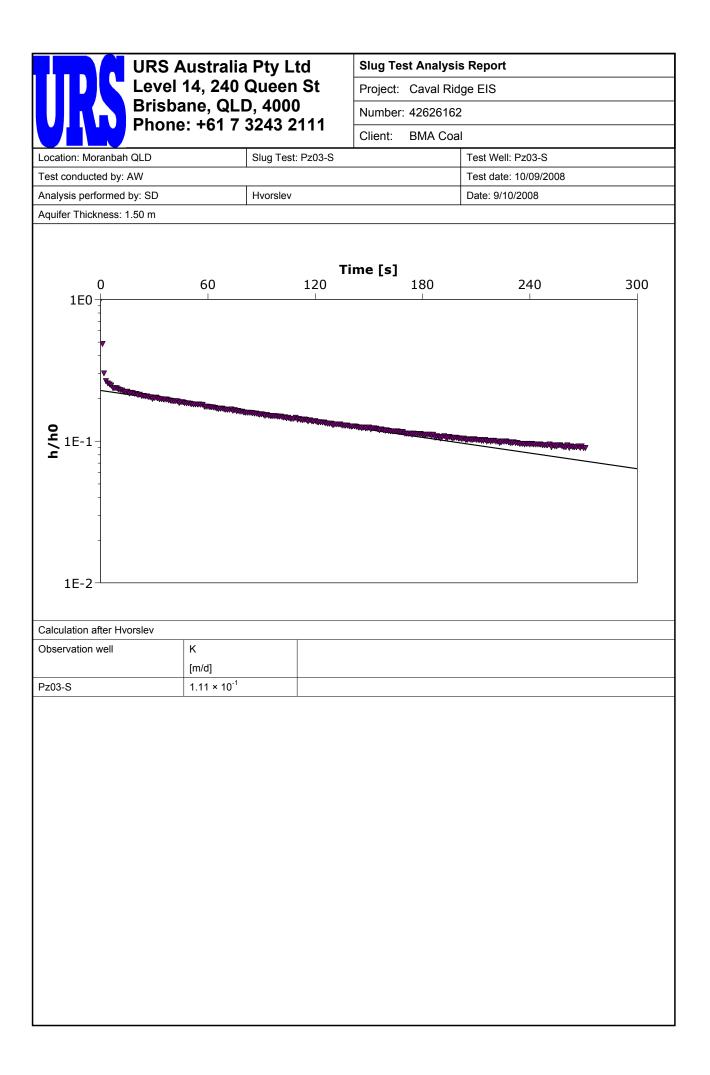


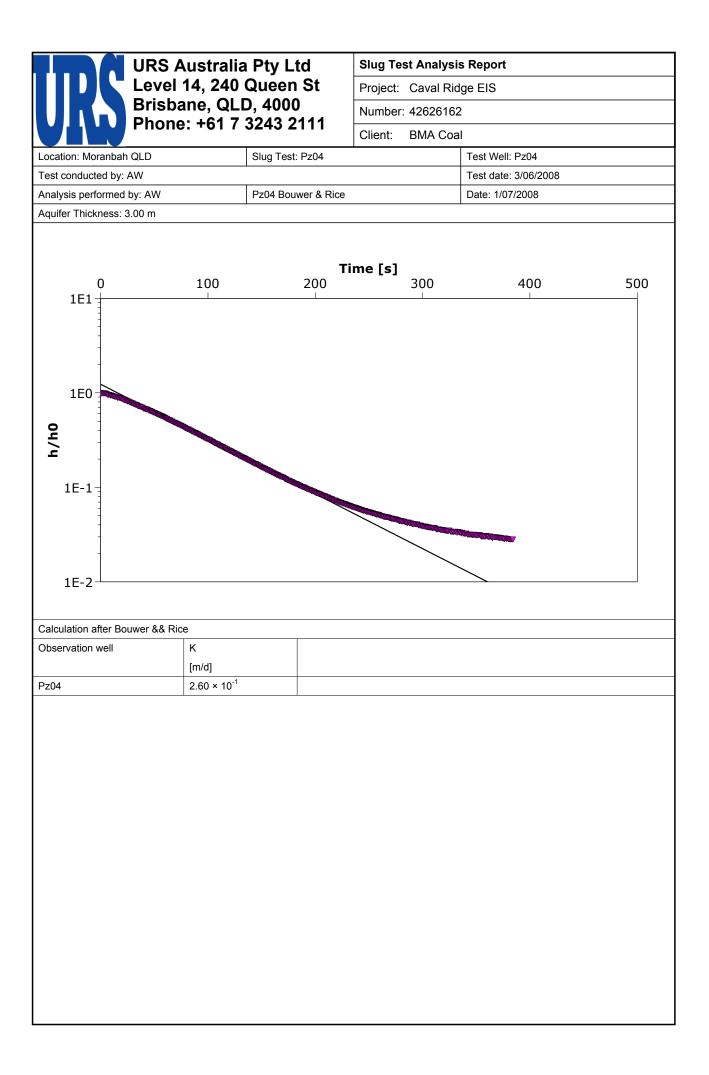


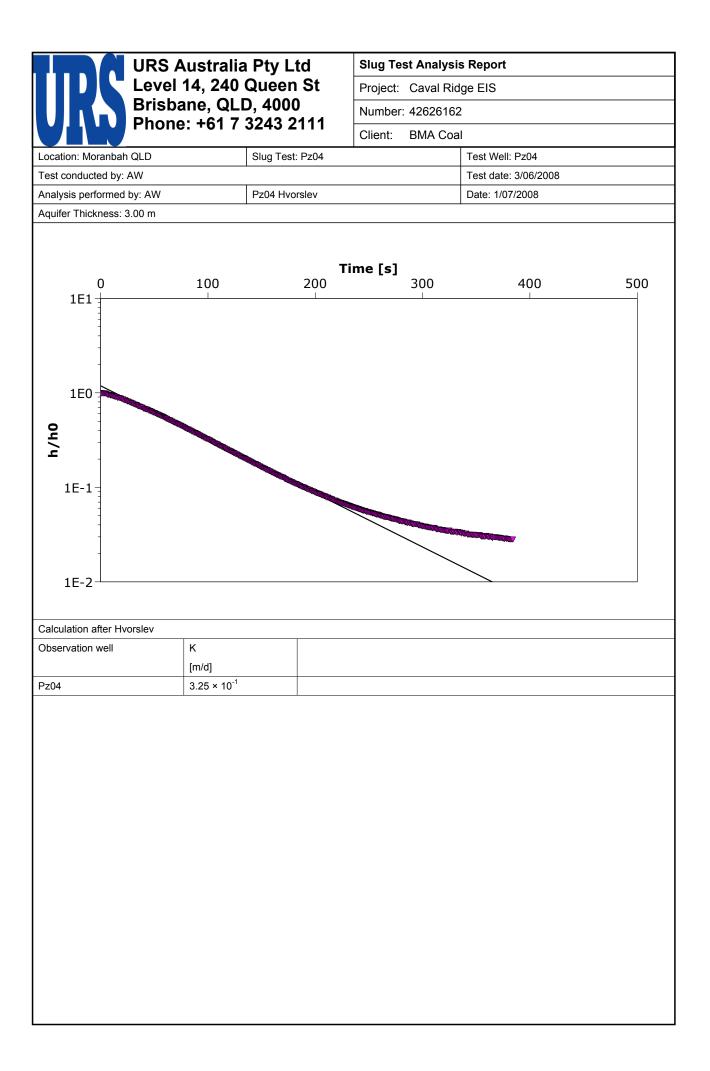


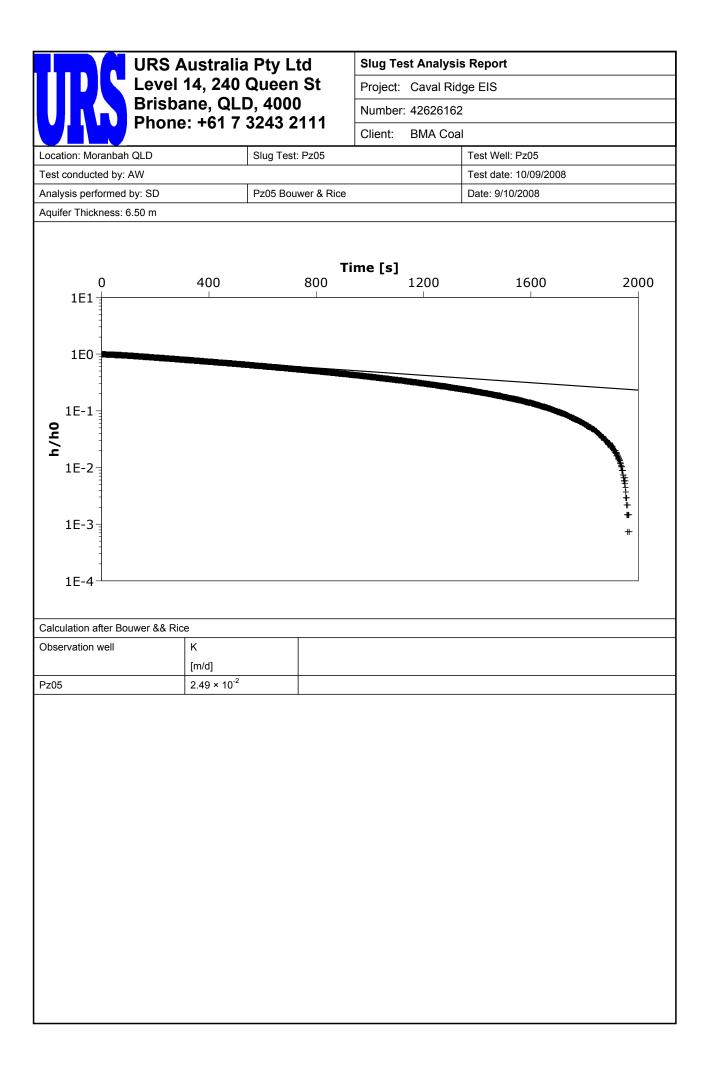


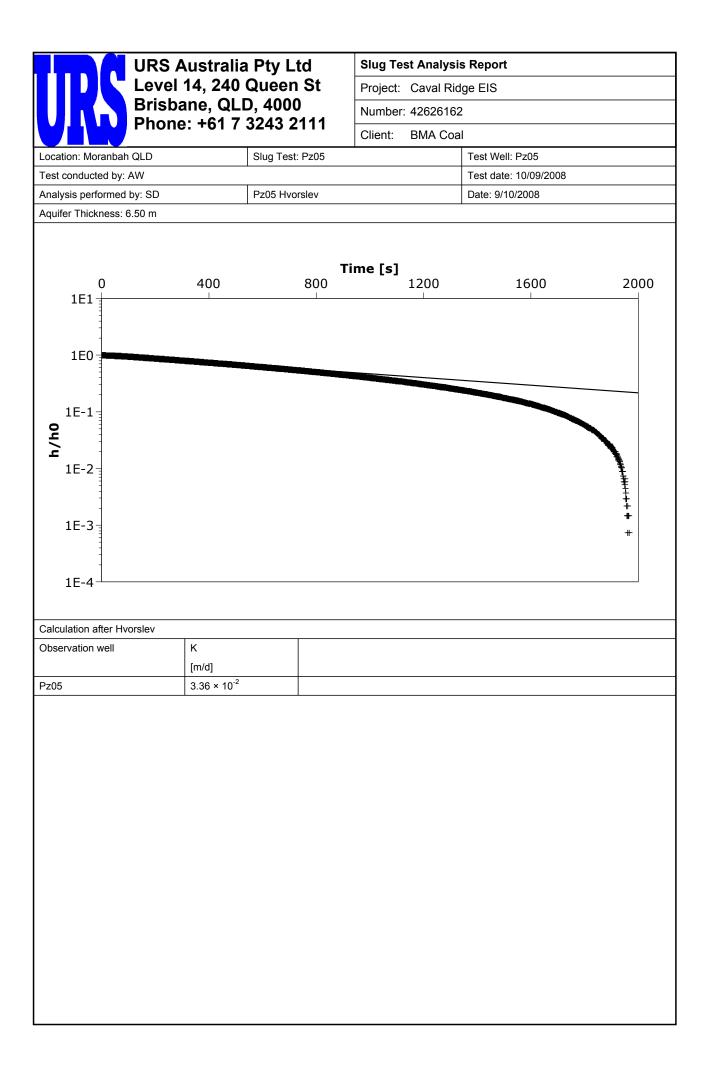


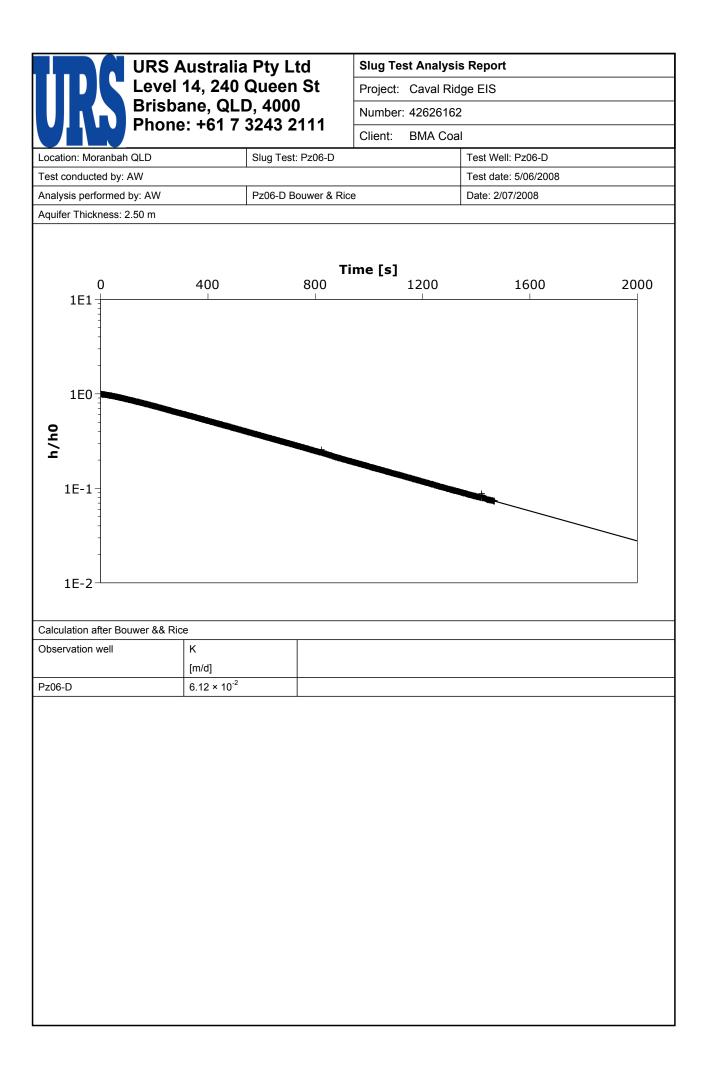


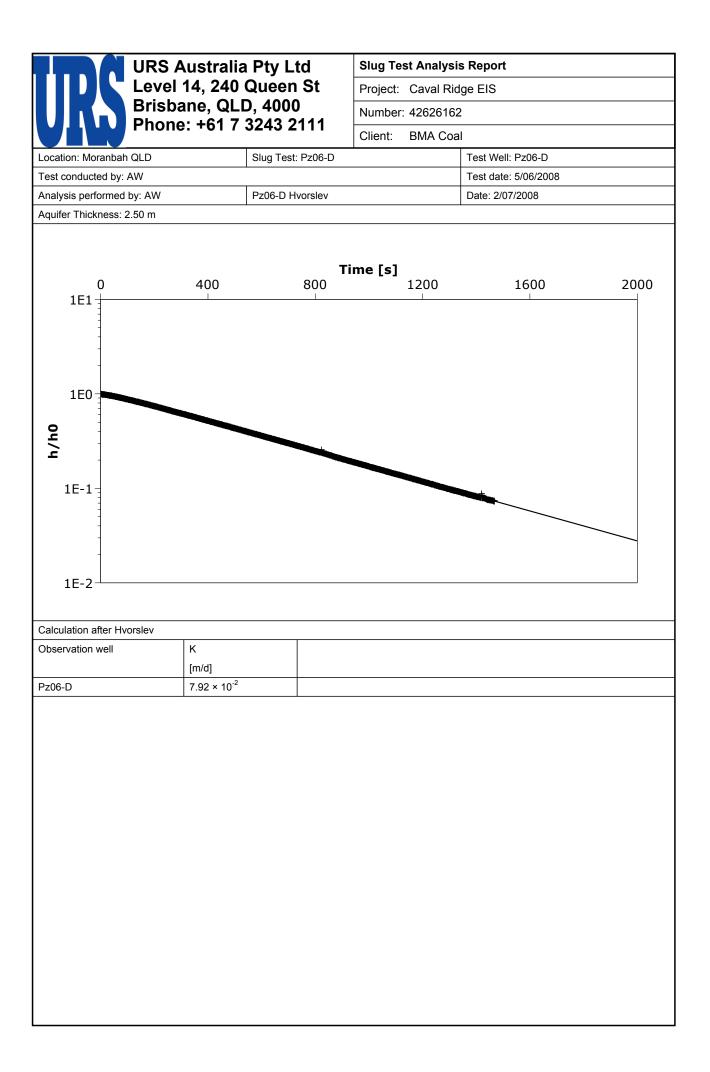


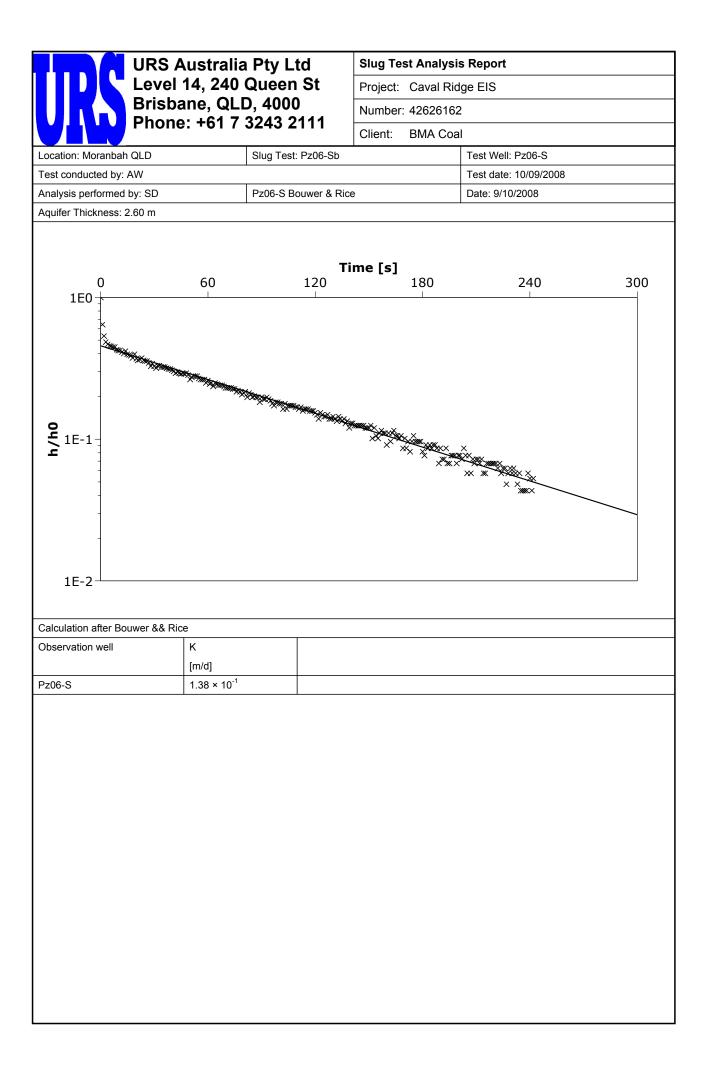


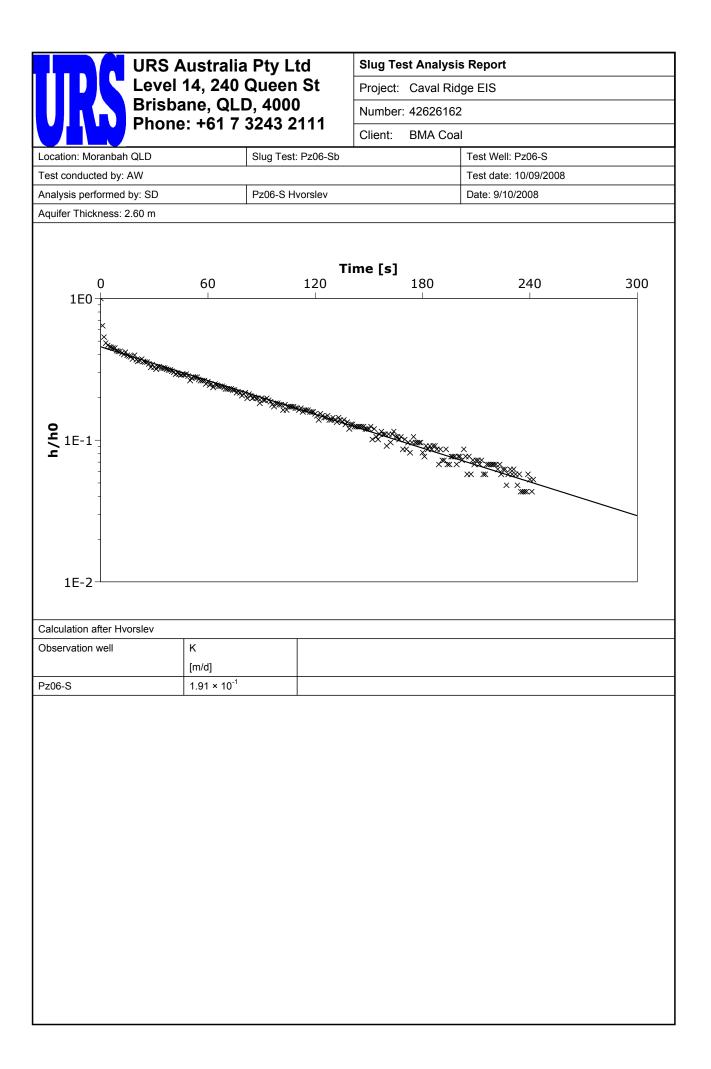


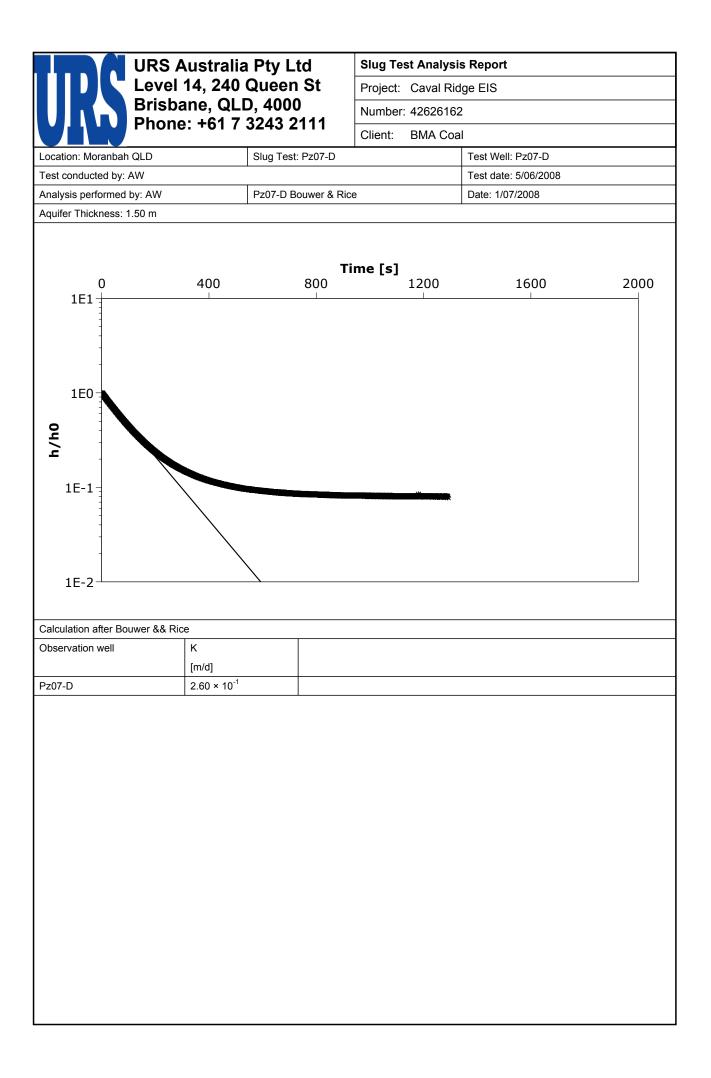


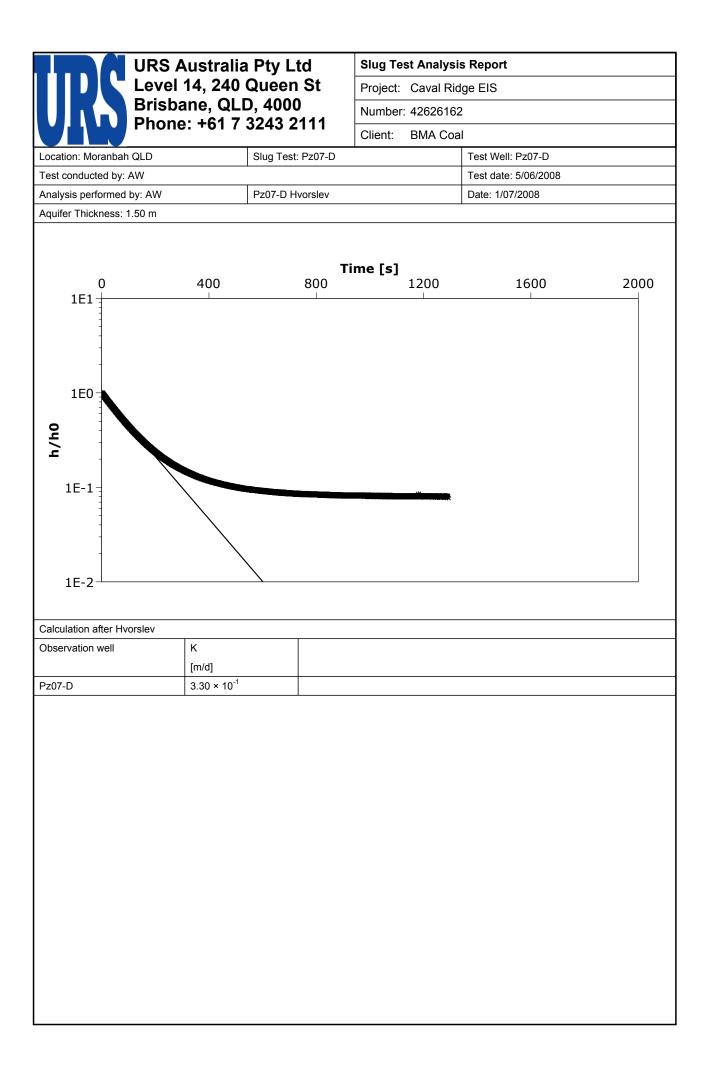


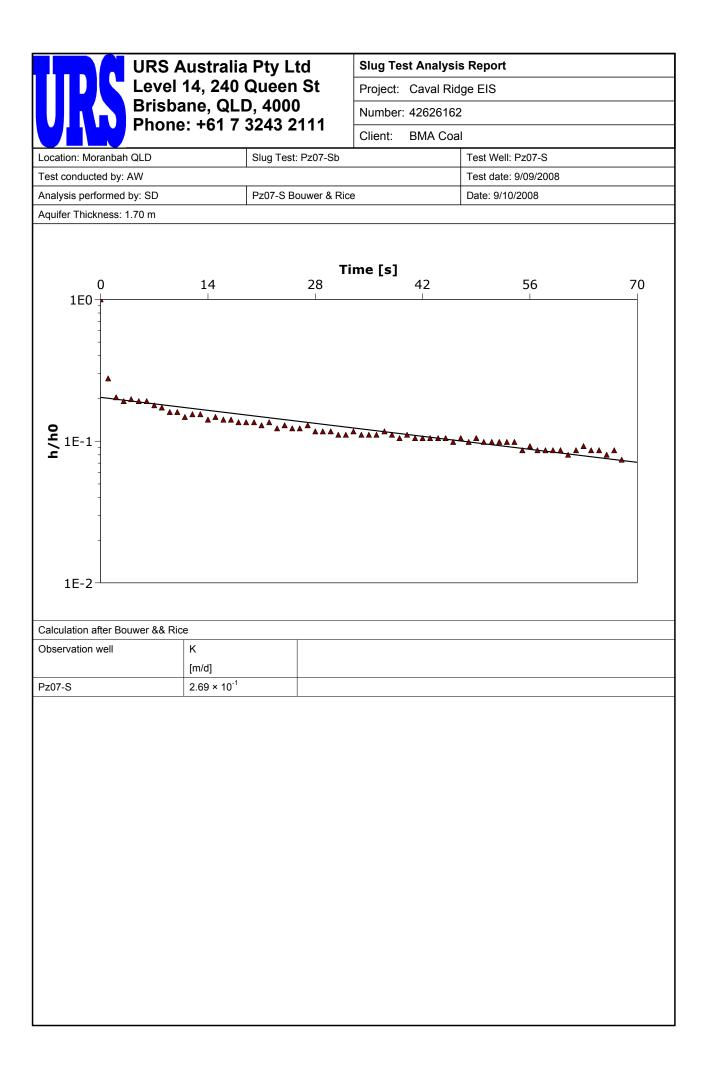


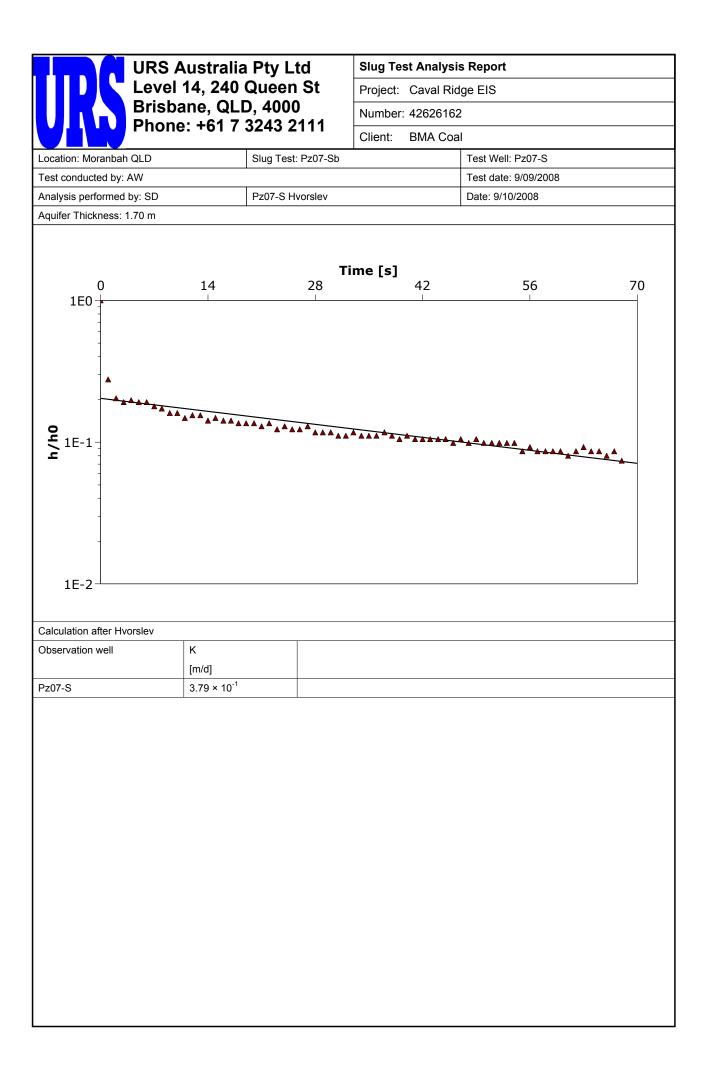


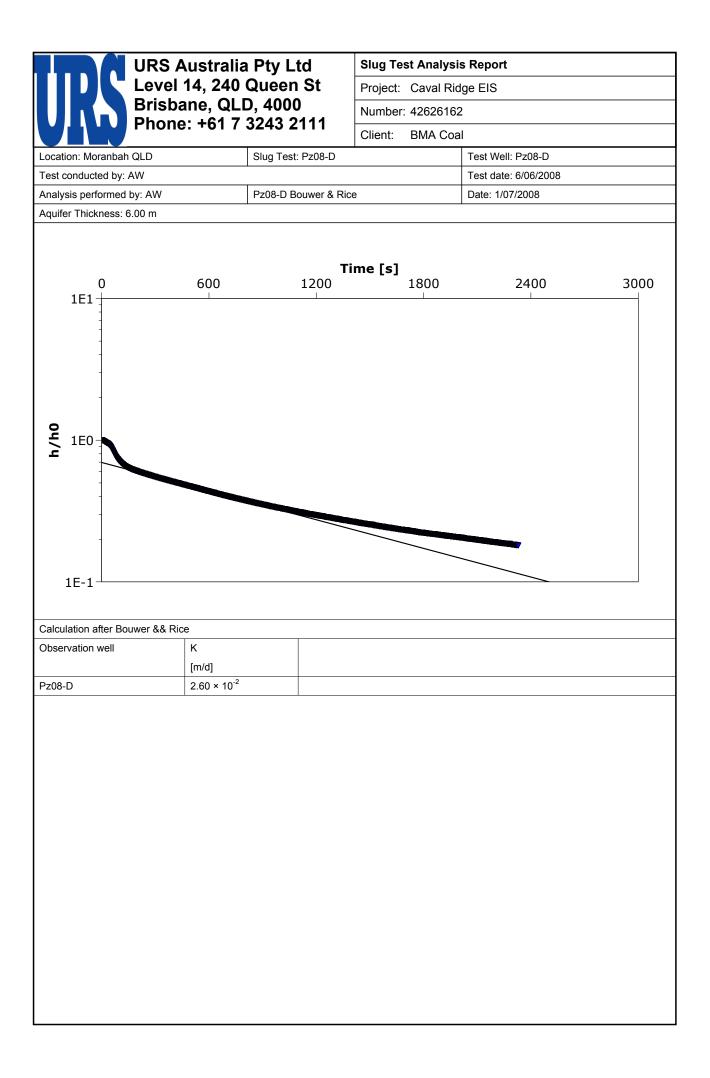


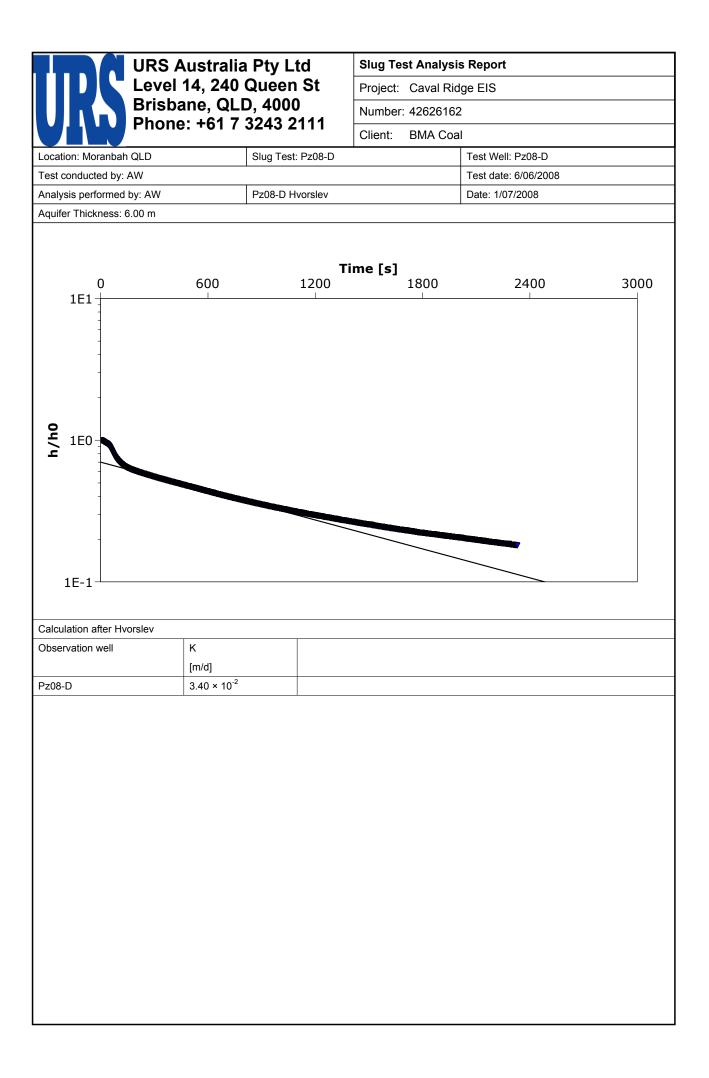


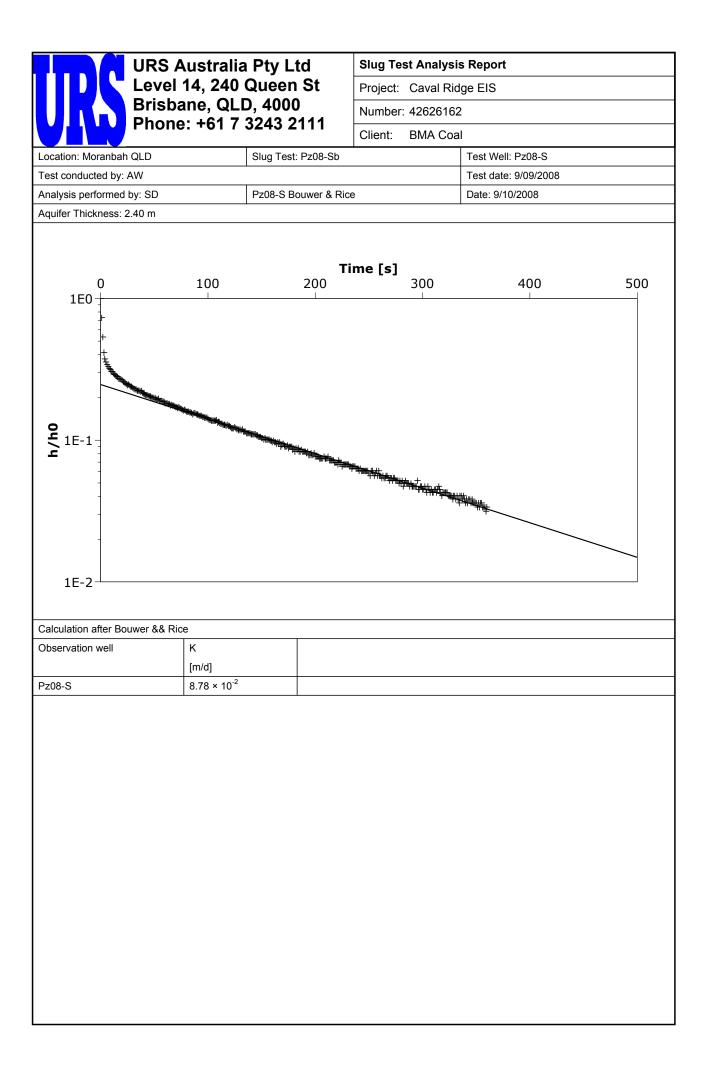


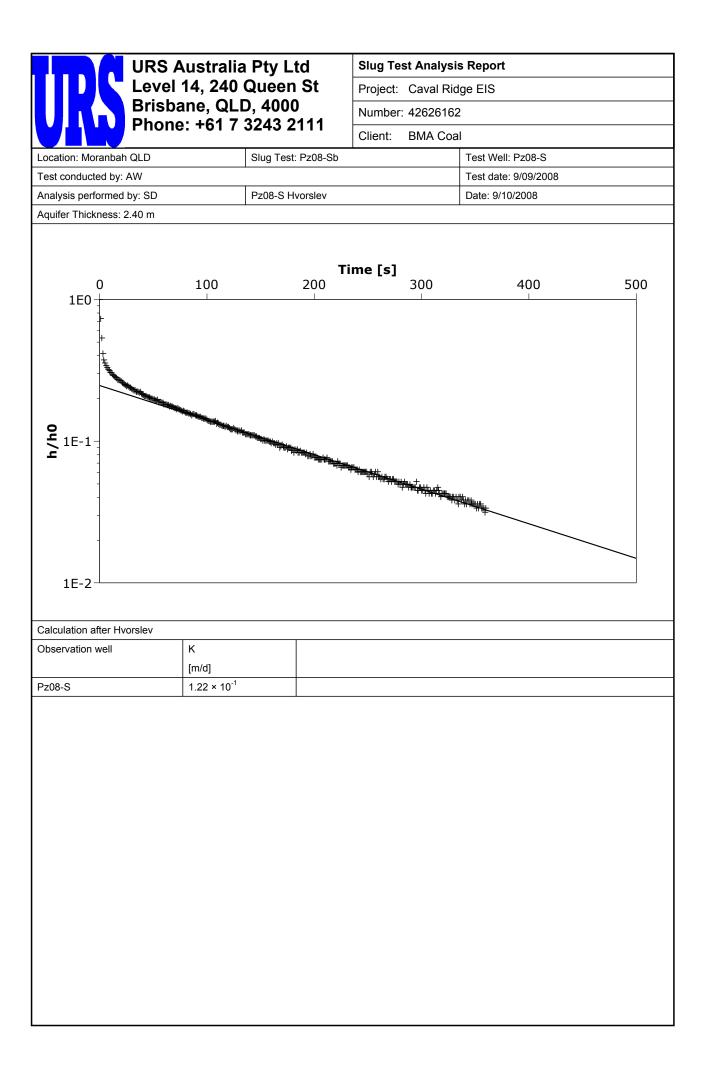


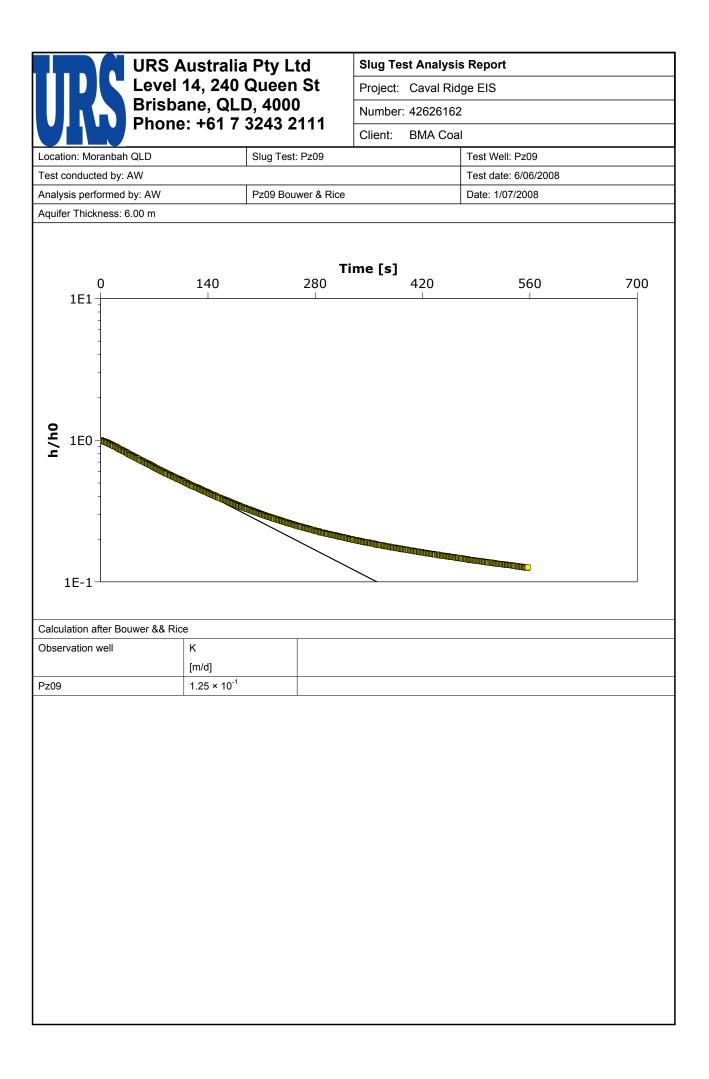


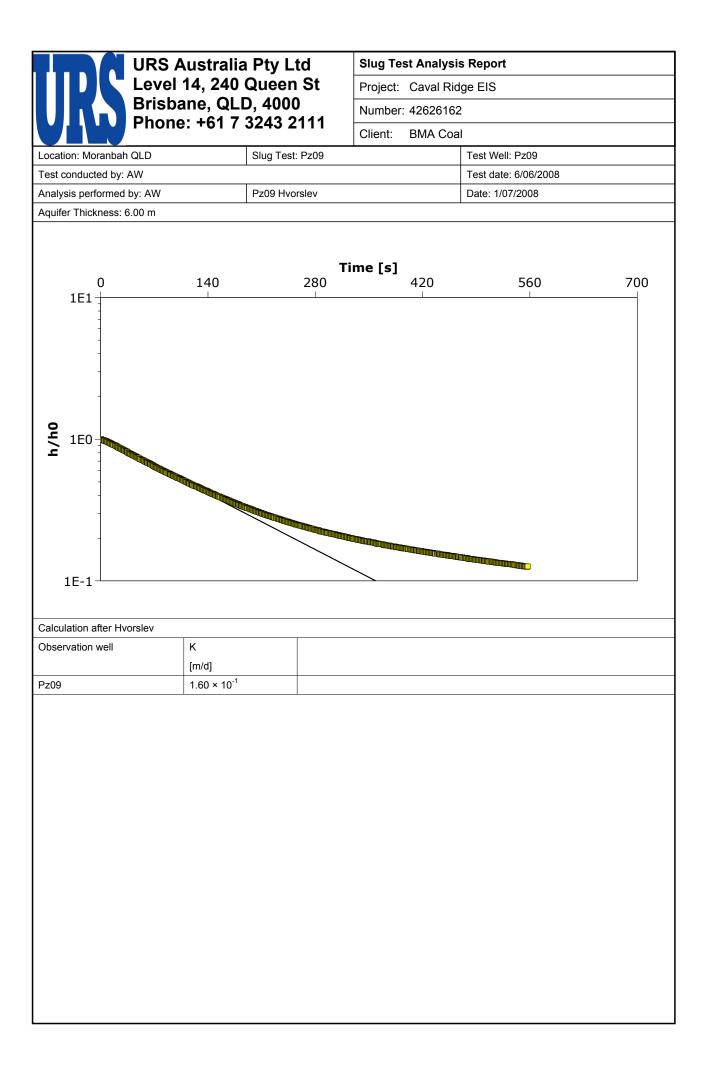


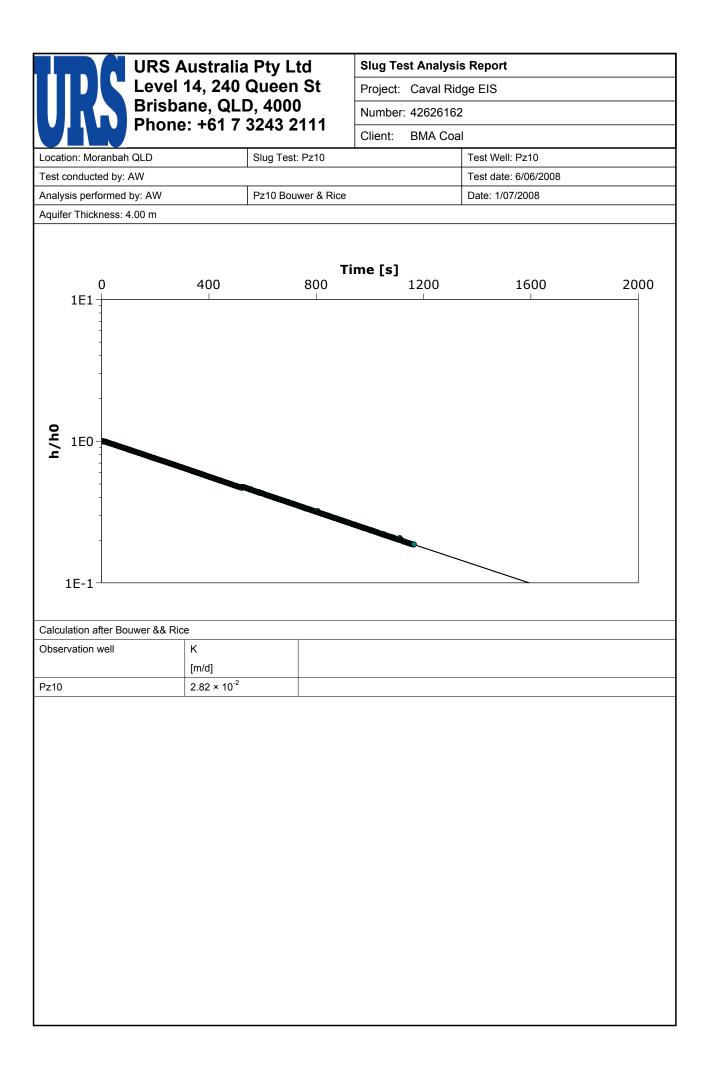


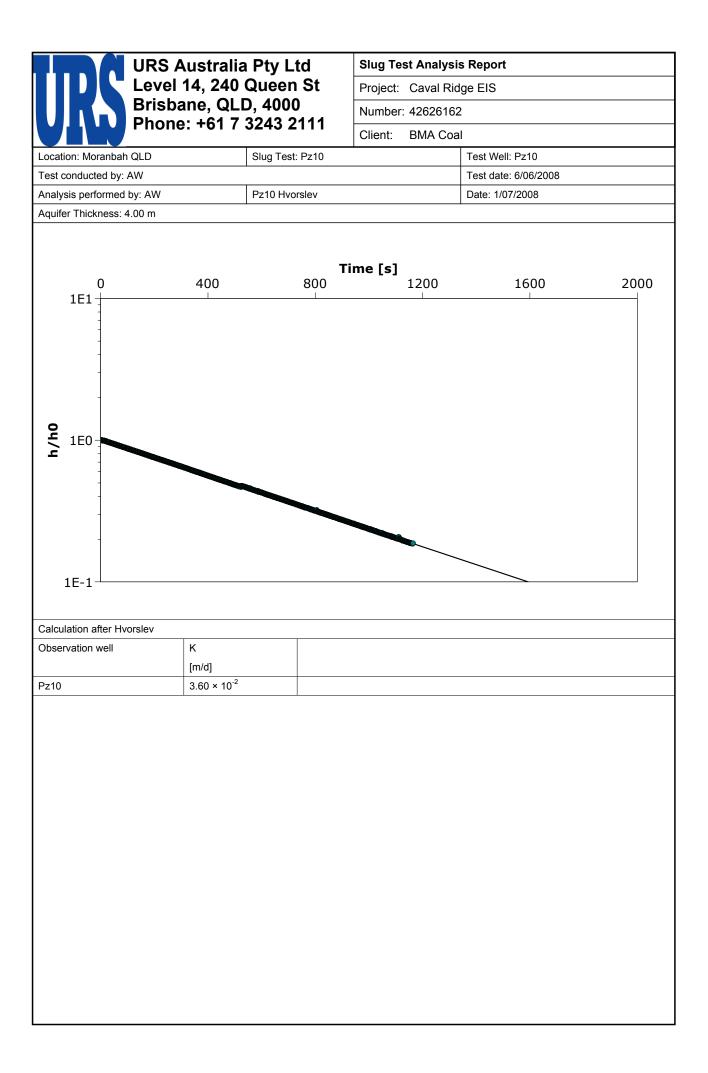


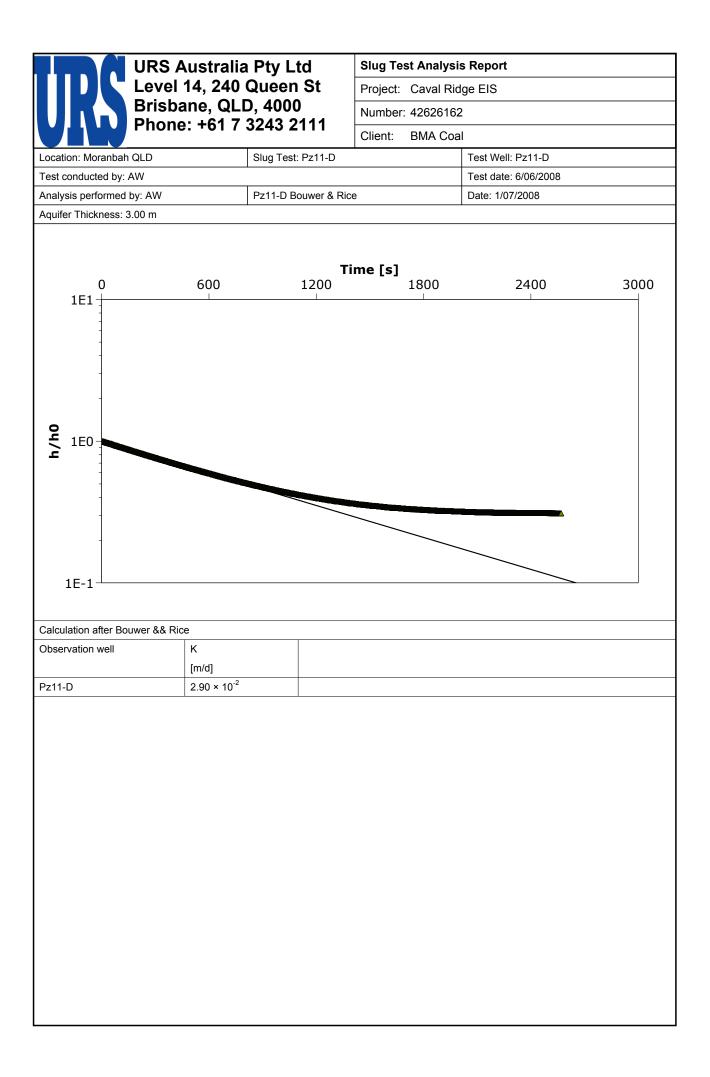


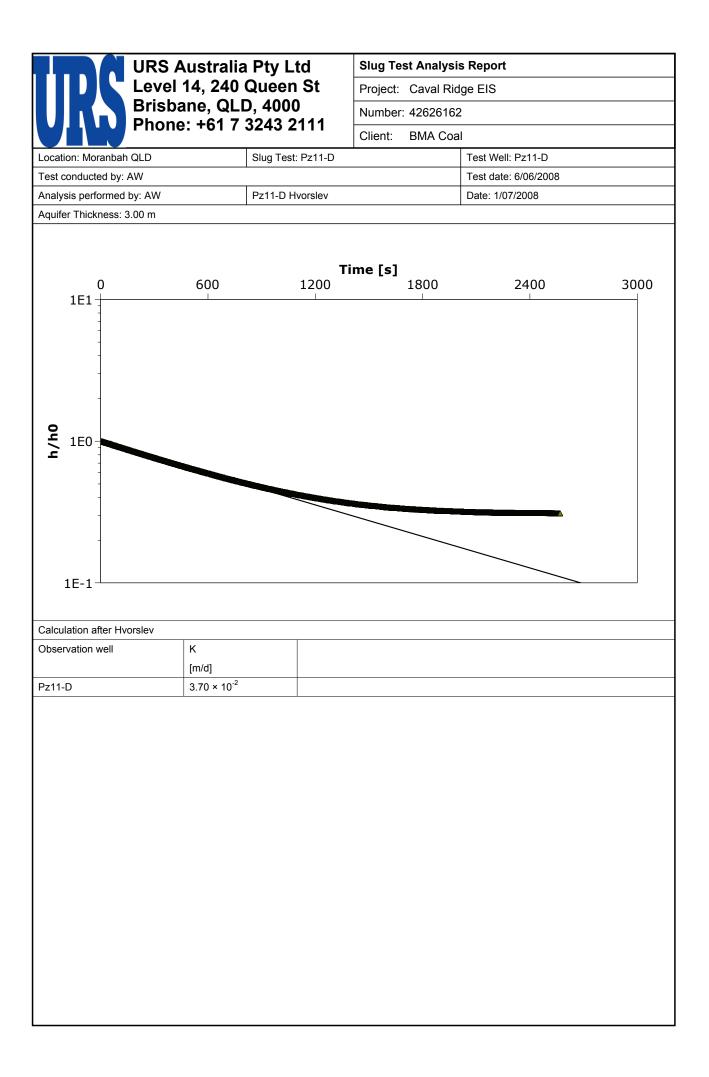












### Groundwater Monitoring Well Purge Sheets



Appendix E

BORE No: <u>PZO4</u>

Development		2Uq-1-1	BMA Caval I	MW 455	_				
Development Meth			-	17126-					- (- )
Time Start			SWL (start)	67.62 (T	$(\underline{C})$ Volu	ne Removed	l	Bore Depth (start) Bore Depth (end)	gbm(ToC)
Time Stopp Comme			SWL (end)		_ Di	scharge Rate			
Comme	nts							NAPL Present	
Field Analyses		<u> </u>						(If yes thickness)	
Development	1.V.1.D								
Time	Vol Removed	EC	pН	T	Redox		d Oxygen	Comments	nelable
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	03/00/0
									05/06/1 67.5
		- w -							
							-		
Purging	Date: (	)	Done by:	AW/BS	I.		I	11	
					_				
Purge Meth			Purge Depth						
Time Star			SWL (start)	······	I	Bore Volume		Bore Depth (start)	
Time Stopp			SWL (end)	· · · · · · ·	Volu	ne Removed	1		
Comme	nts							NAPL Present	
Wald Amplement				-	· · · · · · · · · · · · · · · · · · ·			(If yes thickness)	
Field Analyses Purging				•					
Time	Vol Removed	EC	pН	T	Redox	Dissolve	d Oxygen	Comments	
	(L)	(uS/cm)	P**	(Ĉ)	(mV)	(%)	(mg/L)	(Color, turbidity)	
						(/4)			
					· · · ·				
~			Done by:	AW/BS	<del></del>				
Sampling	Date:					Groundwate	er Disposal R		
Sampling Meth	lod	S	ampling Depth				T 14	Disposal method	
Sampling Meth Time Star	lod	S	SWL (start)		_ [	Date	Litres		
Sampling Meth Time Star Time Stopp	ted	S			devmt	Date			
Sampling Meth Time Star	ted	S	SWL (start)		devmt purging	Date			

	0 42626162	Project Name	BMA Caval						QLO
Development				B		<u>1-1-1-2-01-2-0-2-7-5-1-5-1-5-1</u>			<b>~</b>
Development Metho	1								
Time Starte			SWL (start)		Volu	ne Removed		Bore Depth (start)	
Time Stoppe			SWL (end)		_ Di	scharge Rate		Bore Depth (end)	
Comment	S							NAPL Present	
Field Analyses Development					·····			(If yes thickness)	
Time	Vol Removed	EC	pН	T ·	Redox	Dissolve	d Oxygen	Comments	
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	
<u> </u>									
				-					
Purging Purge Methor Time Starter Time Stanner	1	50608	Done by: Purge Depth SWL (start)	· · ·		Bore Volume		Bore Depth (start)-R4	03(T.C)
Purge Method Time Started Time Stopped Comment	1 1		Purge Depth		Toć, I GC Volu	Bore Volume ne Removed		Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)	
Purge Metho Time Starte Time Stopped	1 1	<b></b>	Purge Depth	· · ·	Toć) I GC) Volu	Bore Volume ne Removed		Bore Depth (end) NAPL Present	
Purge Method Time Started Time Stopped Comment Field Analyses	d d s Vol Removed	EC	Purge Depth	29.935 ( 31.024 (7 T	Redox	ne Removed	d Oxygen	Bore Depth (end) NAPL Present	
Purge Method Time Started Time Stopped Comment Field Analyses Purging	1 1 1 5 		Purge Depth SWL (start) SWL (end)	29.935 ( 31.024 (7		ne Removed	·	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Method Time Started Time Stopped Comment Field Analyses Purging	d d s Vol Removed	EC	Purge Depth SWL (start) SWL (end)	29.935 ( 31.024 (7 T	Redox	Dissolve	d Oxygen	Bore Depth (end) ' NAPL Present (If yes thickness) Comments	
Purge Method Time Started Time Stopped Comment Field Analyses Purging	d d s Vol Removed	EC	Purge Depth SWL (start) SWL (end)	29.935 ( 31.024 (7 T	Redox	Dissolve	d Oxygen	Bore Depth (end) ' NAPL Present (If yes thickness) Comments	
Purge Method Time Started Time Stopped Comment Field Analyses Purging	d d s Vol Removed	EC	Purge Depth SWL (start) SWL (end)	29.935 ( 31.024 (7 T	Redox	Dissolve	d Oxygen	Bore Depth (end) ' NAPL Present (If yes thickness) Comments	
Purge Method Time Started Time Stopped Comment Field Analyses Purging Time	d d s Vol Removed	EC	Purge Depth SWL (start) SWL (end)	29.935 ( 3) • 24 (7 T (C)	Redox	Dissolve	d Oxygen	Bore Depth (end) ' NAPL Present (If yes thickness) Comments	
Purge Method Time Started Time Stopped Comment Field Analyses Purging Time Sampling	d	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH	29.935 ( 3) • 24 (7 T (C) AW/BS	Redox (mV)	Dissolve (%)	d Oxygen (mg/L)	Bore Depth (end)       '         NAPL Present       (If yes thickness)         (If yes thickness)       '         Comments       (Color, turbidity)	
Purge Method Time Started Time Stopped Comment Field Analyses Purging Time Sampling Sampling Method	1	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH Done by:	29.935 ( 3) • 24 (7 T (C) AW/BS	Redox (mV)	Dissolve (%) Groundwate	d Oxygen (mg/L) 	Bore Depth (end)     NAPL Present     (If yes thickness)      Comments     (Color, turbidity)   ecord	
Purge Method Time Started Time Stopped Comment Field Analyses Purging Time Sampling	i	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH	29.935 ( 3; 24 (7 (C) AW/BS	Redox (mV)	Dissolve (%)	d Oxygen (mg/L)	Bore Depth (end)       '         NAPL Present       (If yes thickness)         (If yes thickness)       '         Comments       (Color, turbidity)	

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	Project No	44020102	110,000	e BMA Caval	muge or vullur				
D	Development	Date: C	2/06/08	Done by:	AWilson				7.Stossan
	Development Method								
	Time Started			SWL (start)	)	Volu	me Removed	1	Bore Depth (start)
	Time Stopped			SWL (end)	)	D	ischarge Rate		Bore Depth (end)
	Comments								NAPL Present
									(If yes thickness)
	field Analyses								
<u></u>	Development							۰.	· · · · · · · · · · · · · · · · · · ·
	Time	Vol Removed	EC	pН	T	Redox		d Oxygen	Comments
	·····	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)
							******		
		n 1114							
				4					
		-							
P	Purging Purge Method Time Started Time Stopped Comments	· · · · · · · · · · · · · · · · · · ·	270008	Done by: Purge Depth SWL (start) SWL (end)	. (₽ ) 3 <del>3 62 (</del> 1		Bore Volume me Removed	714.4.4	Bore Depth (start) $\approx 120 \text{ m} (tape m, o, box)$ Bore Depth (end)
	Purge Method Time Started Time Stopped Comments		2708 2008	Purge Depth SWL (start)	. (₽ ) 3 <del>3 62 (</del> 1			714.4.4	Bore Depth (start) $\approx 120 \text{ m} (tape m, o, 0)$ Bore Depth (end) NAPL Present (If yes thickness)
F	Purge Method Time Started Time Stopped Comments		2 <del>210/08</del>	Purge Depth SWL (start)	. (₽ ) 3 <del>3 62 (</del> 1			714.4.4	NAPL Present
P	Purge Method Time Started Time Stopped Comments		EC	Purge Depth SWL (start)	. (₽ ) 3 <del>3 62 (</del> 1		me Removed	·	NAPL Present (If yes thickness)
FI P	Purge Method Time Started Time Stopped Comments Field Analyses Purging 05 Time	0608		Purge Depth SWL (start) SWL (end)	g(₽ 3 <del>7+62 (1</del>	Volu	me Removed	714.4.4	NAPL Present (If yes thickness)
FI Pi	Purge Method Time Started Time Stopped Comments Field Analyses Purging 05 Time 05	Vol Removed (L)	EC (uS/cm) 1424	Purge Depth SWL (start) SWL (end)		Redox (mV)	me Removed	d Oxygen	NAPL Present (If yes thickness)
FI P	Purge Method Time Started Time Stopped Comments Field Analyses Purging 05 Time	NolO3 Vol Removed	EC (uS/cm) 11424 1468	Purge Depth SWL (start) SWL (end)		Volu Redox	me Removed	d Oxygen (mg/L)	NAPL Present (If yes thickness)
FI P	Purge Method Time Started Time Stopped Comments Field Analyses Purging 05 Time 05 9.15 9.15 9.15 9.15 9.15 9.15 9.15 9.1	Vol Removed (L) pumpx g 11	EC (uS/cm) 1424 1468 1577	Purge Depth SWL (start) SWL (end)		Redox (mV) -306 -300 - 8114	me Removed	d Oxygen (mg/L) 1.82- 0.67- 1.05	NAPL Present (If yes thickness)
FI Pi	Purge Method Time Started Time Stopped Comments Field Analyses Purging 05 Time 05 9.15 am 9.15 am 9.15 am 9.15 am 9.15 am	Vol Removed (L) pumpx g 11 1t	EC (uS/cm) 1424 1424 1468 1517 2263	Purge Depth SWL (start) SWL (end) pH 6 - 80 b - 98 7 - 34 7 - 96		Redox (mV) -306 -300 - 8114	me Removed	d Oxygen (mg/L) 1.82- 0.67- 1.05	NAPL Present (If yes thickness)
FI P	Purge Method Time Started Time Stopped Comments Field Analyses Purging 05 Time 05 9.15 9.15 9.15 9.15 9.15 9.15 9.15 9.1	Vol Removed (L) pumpx g 11	EC (uS/cm) 1424 1424 1468 1577 2263	Purge Depth SWL (start) SWL (end) pH 6 - 80 6 - 80 7 - 10 7 - 06 6 - 8 1	T (C) 7.7 7.8 4.7 8.5 22 5 5 2	Redox (mV) -306 -300 -314 -314	me Removed	d Oxygen (mg/L) 1.52- 0.67	NAPL Present (If yes thickness)
Fi P	Purge Method Time Started Time Stopped Comments Field Analyses Purging 05 Time 05 9.15 am 9.15 am 9.15 am 9.15 am 9.15 am	Vol Removed (L) pumpx g 11 1t	EC (uS/cm) 1424 1424 1468 1577 2263	Purge Depth SWL (start) SWL (end) pH $G \cdot SQ$ $F \cdot SQ$ $F \cdot SQ$ $F \cdot SQ$ $F \cdot SQ$ $F \cdot SQ$ $F \cdot SQ$	T (C) 7.7 7.8 4.7 8.5 22 5 5 2	Redox (mV) -306 -300 - 8114	me Removed	d Oxygen (mg/L) 1.82- 0.67- 1.05	NAPL Present (If yes thickness) Comments
Fi P	Purge Method Time Started Time Stopped Comments Field Analyses Purging 05 Time 05 9.15 9.15 9.15 9.15 9.15 9.15 9.15 9.1	Vol Removed (L) Pumpx g 11 11 11 11 Date:	EC (uS/cm) 1424 1424 1468 1517 2263 1691 1pmbroxtat	Purge Depth SWL (start) SWL (end) pH $G \cdot & Q$ $F \cdot &$	$ \begin{array}{c}                                     $	Redox (mV) -306 -314 -301 -301	Dissolve (%)	d Oxygen (mg/L) 1.82 0.67 1.05 0.70 0.42	Comments (If yes thickness) (Color, turbidity) (Color, turbidity) (Col
F P	Purge Method Time Started Time Stopped Comments Field Analyses Purging 05 Time 05 9.15 9.15 9.15 9.15 9.15 9.15 9.15 9.1	Vol Removed (L) <u>pian px g</u> 11 11 11 Date:	EC (uS/cm) 1424 1424 1468 1517 2263 1691 1pmbroxtat	Purge Depth SWL (start) SWL (end) pH $6 \cdot 80$ $7 \cdot 90$ $7 \cdot 90$ $7 \cdot 90$ $6 \cdot 81$ Sampling Depth	T T C T T C T T T T T T T T	Redox (mV) -306 -314 -301 -301	Dissolve (%)	d Oxygen (mg/L) 1.52- 0.67- 1.05 0.70 0.70 0.42 er Disposal R	Comments (If yes thickness) (Color, turbidity) light grey - turbid-Sulphi- is - u light grey - Slightly turbid/clea i gut grey - Cloudy / cleaner-su light grey - Cloudy / cleaner-su
Fi P	Purge Method Time Started Time Stopped Comments Field Analyses Purging 05 Time 05 9.15 9.15 9.15 9.15 9.15 9.15 9.15 9.1	$\frac{1}{1}$	EC (uS/cm) 1424 1424 1468 1517 2263 1691 1pmbroxtat	Purge Depth SWL (start) SWL (end) pH $6 \cdot 80$ $7 \cdot 90$ $7 \cdot 90$ $7 \cdot 90$ $6 \cdot 81$ Sampling Depth SWL (start)	T 37-62 (1) 37-62 (1) (C) 7-7 7-8 7-8 7-7 7-8 7-7 7-8 7-7 7-8 7-7 7-8 7-7 7-8 7-7 7-8 7-7 7-8 7-7 7-7	Redox (mV) -306 -314 -314 301	Dissolve (%)	d Oxygen (mg/L) 1.82 0.67 1.05 0.70 0.42	Comments (If yes thickness) (Color, turbidity) (Color, turbidity) (Col
Fi P	Purge Method Time Started Time Stopped Comments Field Analyses Purging 05 Time 05 9.15 9.15 9.15 0.17 0.17 0.17 0.17 0.15 0.17 0.15 0.17 0.15 0.17 0.15 0.17 0.15 0.17 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15	$\frac{1}{1}$	EC (uS/cm) 1424 1424 1468 1517 2263 1691 1pmbroxtat	Purge Depth SWL (start) SWL (end) pH $6 \cdot 80$ $7 \cdot 90$ $7 \cdot 90$ $7 \cdot 90$ $6 \cdot 81$ Sampling Depth	T 37-62 (1) 37-62 (1) (C) 7-7 7-8 7-8 7-7 7-8 7-7 7-8 7-7 7-8 7-7 7-8 7-7 7-8 7-7 7-8 7-7 7-8 7-7 7-7	Redox (mV) -306 -314 -301 -301	Dissolve (%)	d Oxygen (mg/L) 1.82- 0.67- 1.05 0.70 0.70 0.42 er Disposal R	Comments (If yes thickness) (Color, turbidity) light grey - turbid-Sulphi- is - u light grey - Slightly turbid/clea i gut grey - Cloudy / cleaner-su light grey - Cloudy / cleaner-su

BORE No: <u>PZO6-</u>5

\* 985 - S. (\* S. (\*

Development	Date:		Done by:		_				
Development Method Time Started Time Stopped Comment	dd		- SWL (start) SWL (end)			me Removed ischarge Rate		Bore Depth (start) Bore Depth (end) NAPL Present	
								(If yes thickness)	
Field Analyses Development		. e.							
Time	Vol Removed (L)	EC (uS/cm)	pН	T (C)	Redox (mV)	Dissolve (%)	d Oxygen (mg/L)	Comments (Color, turbidity)	
····		· · · ·	~		-				
								-	
Purging	Date	05/06/08	Done by:	AW/BS					
Time Starte Time Stoppe			SWL (start)	76 127 15	r\	D ¥7 1		· · · · · · · · · · · · · · · · · · ·	
Comment			SWL (end)	26.232 (To 26.25 (T)	Volu	Bore Volume me Removed		Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)	29.055 (Tol)
Comment	S		SWL (end)	26.25(1)	SE) Volu			_ NAPL Present	<u>29.055</u> (16L)
Comment Field Analyses Purging ()S/C Time	s 76/08 Vol Removed (L)	EC (uS/cm)	pH	26.25 (T) T (C)	Redox (mV)	me Removed	d Oxygen	_ NAPL Present _ (If yes thickness) Comments	<u>29.055</u> (16C)
Comment Field Analyses Purging	s 76/0K Vol Removed (L)		pH	76.25 (T	Redox	me Removed	1	Comments (Color, turbidity) 944 4 104 bid -	
Comment Field Analyses Purging OS/C Time 9:36AM 9:50 10:09	$\frac{5}{16/0k}$ Vol Removed (L) 6L 136	(uS/cm) Ranging (ond.	pH 7.68 7.74 7.73	T (C) 3.3 25.5 27.9 / 17.0	Redox (mV)	me Removed Dissolve (%)	d Oxygen (mg/L)	NAPL Present (If yes thickness) Comments (Color, turbidity)	
Comment Field Analyses Purging OS/C Time 9.36 Am 9.50 10.09	s 76/0K Vol Removed (L)	(uS/cm) Ranging (ond.	pH	T (C) 3.3 25.5 27.9 / 17.0	Redox (mV)	me Removed Dissolve (%)	d Oxygen (mg/L)	Comments (Color, turbidity) 944 4 104 bid -	
Comment Field Analyses Purging 05/C Time 9.36 AM 9.36 AM 9.3	s 76/08 Vol Removed (L) 6 L 13/2 192 Date:	(uS/cm) Ranging lond, Ranging in	pH 7.68 7.74 7.74 7.73 Done by: ampling Depth	T (C) 3.3 25.5 27.9/17.0 AW/BS	Redox (mV) -192 -143 -151	Dissolve (%)	d Oxygen (mg/L)	Comments (Color, turbidity) 9 HCY & TU, bid - 4 S OVEY brown 9 Stry brown, h	
Comment Field Analyses Purging OS/C Time 9:36AM 9:50 10:09 Sampling	s 76/08 Vol Removed (L) 6 L 13/92 Date: d d	(uS/cm) Ranging lond, Ranging in	pH 7.68 7.74 7.73 Done by:	T (C) 3.3 25.5 27.9 / / 1.0 AW/BS	Redox (mV) -192 -143 -151	me Removed Dissolve (%)	d Oxygen (mg/L) $7 \cdot 7!$ $7 \cdot 73$	Comments (Color, turbidity) <i>GRCY &amp; Turbid</i> - <i>QRCY &amp; Turbid</i> - <i>QRCY &amp; Turbid</i> - <i>QRCY &amp; Turbid</i> - <i>QRCY &amp; Turbid</i> -	

Development	Date:		_ Done by:						
Development Metho	bd							a.	
Time Start			SWL (start)		Volu	me Removed	1	Bore Depth (start)	
Time Stopp			SWL (end)			scharge Rate		Bore Depth (start)	
Commer			······································			501101 80 1101		NAPL Present	
				·· ·	·			(If yes thickness)	
Field Analyses								(11)00000	
Development									
Time	Vol Removed	EC	pН	Т	Redox	Dissolve	ed Oxygen	Comments	
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	
				-			_		
		**** ·····							
		11/100							
Purging	Date C	XIGHIIX	Dama have	A 317/03-05					
Purge Metho Time Start	od ed	5/06/08	Done by: Purge Depth SWL (start)	14.146 (1		Bore Volum		Bore Depth (start)	44.57(To(
Purge Metho	od ed ed	900100	Purge Depth	14.146 (1	Volu	Bore Volum me Remove		Bore Depth (start) Bore Depth (end) NAPL Present (If ves thickness)	44.57(To(
Purge Methe Time Start Time Stopp Commer Field Analyses	od ed ed	90~100	Purge Depth SWL (start)	14.146 (1	Volu			Bore Depth (end) NAPL Present (If yes thickness)	44.57(To(
Purge Methe Time Start Time Stopp Commer Field Analyses Purging	od ed ets		Purge Depth SWL (start) SWL (end)	14.14b (1		me Remove	1	Bore Depth (end) NAPL Present (If yes thickness)	44.57(To(
Purge Methe Time Start Time Stopp Commer Field Analyses	od ed nts Vol Removed	EC	Purge Depth SWL (start)	<u> 4.14</u> b (1	Volu	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness)	44.57(To(
Purge Metho Time Start Time Stopp Commer Field Analyses Purging Time	od ed nts Vol Removed	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	14.14 <b>b</b> (1 T (C)	Volu	Dissolve (%)	i ed Oxygen   (mg/L)	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Metho Time Start Time Stopp Commer Field Analyses Purging Time	od ed nts Vol Removed	EC	Purge Depth SWL (start) SWL (end)	14.14b (1 Т (С) 25	Redox (mV)	me Removed	d Oxygen (mg/L)	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Meth Time Start Time Stopp Commer Field Analyses Purging Time	Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	14.14b ( Т (С) 25	Redox (mV) -196 -228	Dissolve (%)	d d Oxygen (mg/L) BLAS O• SS	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Meth Time Start Time Stopp Commer Field Analyses Purging Time	Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH <b>b</b> - <b>BB</b> T.O4 6.96	14.14b (1 Т (С) 25	Redox (mV) -196 -228 -211	Dissolve (%)	$\begin{array}{c} \text{ed Oxygen} \\ (\text{mg/L}) \\ \hline \\ \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Metho Time Start Time Stopp Commer Field Analyses Purging Time	Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	14.14b ( Т (С) 25	Redox (mV) -196 -228	Dissolve (%)	d d Oxygen (mg/L) BLAS O• SS	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Meth Time Start Time Stopp Commer Field Analyses Purging Time	Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH <b>b</b> - <b>BB</b> T.O4 6.96	Ц4. Ц4 b (1 Т (С) 255	Redox (mV) -196 -228 -211	Dissolve (%)	$\begin{array}{c} \text{ed Oxygen} \\ (\text{mg/L}) \\ \hline \\ \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Metho Time Start Time Stopp Commer Field Analyses Purging Time $15^{1}9$ $15^{1}41$ $15^{1}47$ Sampling	od ed ed its Vol Removed (L) <i>PUpping</i> (c (c Y	EC (uS/cm)	Purge Depth SWL (start) SWL (end) PH <b>b</b> - <b>B</b> S <b>f</b> - <b>C</b> 4 <b>f</b>	Т (С) 25 АW/BS	Redox (mV) -196 -228 -211 -197	Dissolve (%)	d Oxygen (mg/L)	Bore Depth (end) NAPL Present (If yes thickness) 1.24 Comments (Color, turbidity) Clark grey trie $11$ glfcr grey	
Purge Metho Time Start Time Stopp Commer Field Analyses Purging Time 15:19 15:21 15:47 Sampling Sampling Metho	od ed nts Vol Removed (L) Pupping tr Understand	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH <b>6</b> .884 7.04 6.76 6.54 <b>6</b> .54 Done by:	Ц4. Ц4 b (Т Т (С) 2-5 – АW/BS	Redox (mV) -196 -228 -211 -197	Dissolve (%)	ed Oxygen (mg/L) (mg/L) ()• 88 ()• 88 ()• 59 (2.02) er Disposal R	ecord	
Purge Methe Time Start Time Stopp Commer Field Analyses Purging Time 15' 19 15' 22 15' 24 Sampling Sampling Methe Time Start	od ed ed tts Vol Removed (L) PUNPILE (( 4 4 4 Date: Date:	EC (uS/cm)	Purge Depth SWL (start) SWL (end) PH PH G-BS G-SS G-SS G-SS Done by: ampling Depth SWL (start)	Т (C) 2:5 – АW/BS	Redox (mV) -196 -228 -211 -197	Dissolve (%)	d Oxygen (mg/L)	Bore Depth (end) NAPL Present (If yes thickness) 1.24 Comments (Color, turbidity) Clark grey trie $11$ glfcr grey	
Purge Metho Time Start Time Stopp Commer Field Analyses Purging Time 15:19 15:21 15:47 Sampling Sampling Metho	od ed ed tts Vol Removed (L) Pupping (c Y Date: od ed	EC (uS/cm)	Purge Depth SWL (start) SWL (end) PH <b>DH</b> <b>DH</b> <b>DH</b> <b>DOH</b> <b>DOH</b> SWL (start)	Ц4. Ц4 b (Т Т (С) 2-5 – АW/BS	Redox (mV) -196 -228 -211 -197	Dissolve (%)	ed Oxygen (mg/L) (mg/L) ()• 88 ()• 88 ()• 59 (2.02) er Disposal R	ecord	

BORE No: <u>P207</u>-D

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Development	Date:		Done by:		_				
Development Method Time Started			- SWL (start)		Volu	me Removed	l	Bore Depth (start	<b>`</b>
Time Stopped			SWL (end)		_ Di	scharge Rate	·	_ Bore Depth (end	)
Comments								NAPL Presen (If yes thickness	
ield Analyses Development									/
Time	Vol Removed	EC	pН	T	Redox		d Oxygen	Comments	1
	(L)	(uS/cm)	· · · · · · · · · · · · · · · · · · ·	(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	-
					-	·			
					-				
urging	Date: C	5/06/08	' Done by:	AW/BS					
Purge Method			Purge Depth		TAC .				15.27
Purge Method Time Started Time Stopped		212-1-3	Purge Depth SWL (start)	13.487m		Bore Volume		Bore Depth (start	<u>15.37</u>
Time Started			Purge Depth SWL (start)		_ Volu	Bore Volume me Removed		Bore Depth (end NAPL Presen	) t
Time Started Time Stopped Comments Field Analyses			Purge Depth SWL (start)	13.487m	_ Volu	me Removed		Bore Depth (end	) t
Time Started Time Stopped Comments Field Analyses	Vol Removed	EC	Purge Depth SWL (start)	13.487m	_ Volu	me Removed	d Oxygen	Bore Depth (end NAPL Presen (If yes thickness Comments	) t
Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)	· ,	Purge Depth SWL (start) SWL (end)	<u>13.487</u> м	Redox (mV)	me Removed	d Oxygen (mg/L)	Comments (Color, turbidity)	) t )
Time Started Time Stopped Comments Field Analyses Purging Time 15:22 (5:25	Vol Removed	EC	Purge Depth SWL (start) SWL (end) pH	13.487m	Redox (mV)	me Removed	d Oxygen (mg/L)	Bore Depth (end NAPL Presen (If yes thickness Comments	) t )
Time Started Time Stopped Comments Field Analyses Purging Time 15:22 (5:25 (5:28)	Vol Removed (L) 4 L 8 L 12 L	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH 6-57 6-20 6-22	T (C) 250 250 250 250 250	Redox (mV) 23 76 136	Dissolve (%)	d Oxygen (mg/L) 2.38 2.08 1.97	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity) $da_{1}h_{1}$ $grey - Ver$	) t ) iy terbies
Time Started Time Stopped Comments Field Analyses Purging Time 15 : 2 2 (5 : 2 5	Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH <u>6-57</u> 6-20	T (C) 250 250	Redox (mV)	Dissolve	d Oxygen (mg/L) 2.38 2.08	Bore Depth (end NAPL Presen(If yes thicknessComments(Color, turbidity) $da_{a}$ $da_{a}$ $a_{a}$ $a_{a}$ $a_{a}$ $a_{a}$	) t ) Ty terbies
Time Started Time Stopped Comments Field Analyses Purging Time 15:22 15:25 15:28 15:28	Vol Removed (L) 4 L 8 L 12 L	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH 6-57 6-20 6-22	T (C) 250 250 250 250 250	Redox (mV) 23 76 136	Dissolve (%)	d Oxygen (mg/L) 2.38 2.08 1.97	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity) $da_{1}h_{2}e_{1}e_{2}-VC_{1}e_{2}$	) t ) iy terbies
Time Started Time Stopped Comments Field Analyses Furging Time 15:22 15:25 15:28 15:28 15:37	Vol Removed (L) 4 L 9 L 1 L 1 L Date:	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH 6-59 6-20 6-22 6-25 Done by: ampling Depth	T (C) 2550 2550 2550 2550 2550 2550 2550 255	Redox (mV) 23 136 6	Dissolve (%)	d Oxygen (mg/L) 2.38 2.08 1.97 2.39	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity) $da_{h} grey - VC_{i}$ i i i i i i i i i i	) t ) iy terbid
Time Started Time Stopped Comments Field Analyses Purging Time 15 : 2 z 15 : 2 z 15 : 2 s 15 : 2 s 15 : 3 z Sampling Sampling Method Time Started	Vol Removed (L) 4 L 9 L 1 2 L 1 6 L Date:	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH 6-59 6-20 6-22 6-35 Done by: ampling Depth SWL (start)	T (C) 2550 2550 2550 2550 2550 2550 2550 255	Redox (mV) 23 76 76 76 76	Dissolve (%)	d Oxygen (mg/L) 2.38 2.08 1.97	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity) $da_{h} grey - VC_{i}$ i i i i i i i i i i	) t ) iy terbies
Time Started Time Stopped Comments Purging Time 75:22 75:28 75:28 75:28 75:28 75:25 75:25 75:25 75:25 75:25 75:25 75:25 75 75 75 75 75 75 75 75 75 75 75 75 75	Vol Removed (L) 4 L 7 2 L 7 2 L 1 6 L Date:	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH <u>6-59</u> <u>6-20</u> <u>6-22</u> <u>6-35</u> Done by: ampling Depth SWL (start) SWL (end)	T (C) 2550 2550 2550 2550 2550 2550 2550 255	Redox (mV) 23 136 6	Dissolve (%)	d Oxygen (mg/L) 2.38 2.08 1.97 2.39 Pr Disposal R	ecord	) t ) iy terbies

Bore Development, Purging and Groundwater Sampling Data Sheet

Page 1 of 1

Checked By:....

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BORE No:

Development	ol Removed (L)	EC	SWL (start) SWL (end)			ne Removed scharge Rate		Bore Depth (start) Bore Depth (end)	
Time Stopped Comments Field Analyses Development		EC	SWL (start) SWL (end)					Bore Depth (start) Bore Depth (end)	
Comments Field Analyses Development		EC	SWL (end)					Bore Depth (end)	
Field Analyses Development		EC				2			
Development		EC						NAPL Present	
Development		EC						(If yes thickness)	
		EC							5 TE 144
			pH	т	Redox	Dissolved	Oxygen	Comments	
*		(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	
		· · ·				(/0)	(111(2) (2))	(Color, turbidity)	
					-	•	TTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTT		
	2			<u>ن</u>					
Purging	Date:		Done by:	AW/BS					
 N	. –				_				
Purge Method			Purge Depth	N AL	_			2	11.1
Time Started			SWL (start)	27.046	M TOC E	Bore Volume	,	Bore Depth (start)	04-14
Time Stopped Comments			SWL (end)		_ Volur	ne Removed		Bore Depth (end)	
Comments								NAPL Present	
Field Analyses	2							(If yes thickness)	
Purging 06 06 06	X .								
Time V	ol Removed	EC	pН	Т	Redox	Dissolved	d Oxygen	Comments	
	(L)	(uS/cm)		(C)	(mV)	. (%)	(mg/L)	(Color, turbidity)	
	mpiz		6.824	generatie	-262	<del>مەربەرىيى</del>	1.37	grey, support	doudy
0:49	11 5		6.61		-271		1.12	11111	elearly.
1:02	((		7.20	C-PROP	1-272		6062	sulphir dea	$\sim$
7116	((	······	6:43		-256		0.91	id it	
Sampling	Date:		Done by:	AW/BS	_				
Sampling Method		S	ampling Depth		(	Groundwate	r Disposal R	ecord	
Time Started			SWL (start)			Date	Litres	Disposal method	
Time Stopped			SWL (end)		devmt				
Comments		•			purging				
_									

Bore Development, Purging and Groundwater Sampling Data Sheet

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Checked By:....

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· BORE No: <u>208</u>-D

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Project No	42626162	Project Name	BMA Caval R	udge Groundw	ater				
Development						<u> </u>			
Development Method Time Started Time Stopped Comments	[		SWL (start) SWL (end)		Volu	me Removed scharge Rate		Bore Depth (start) Bore Depth (end) NAPL Present	)
Field Analyses Development								(If yes thickness)	)
Time	Vol Removed (L)	EC (uS/cm)	рН	T (C)	Redox (mV)	Dissolved (%)	d Oxygen (mg/L)	Comments (Color, turbidity)	
	-								-
Purging	Date:	6/6/08	Done by:	AW/BS	-				1
Purge Method Time Started Time Stopped Comments	I			14.05m		Bore Volume me Removed		Bore Depth (start) Bore Depth (end) NAPL Presen (If yes thickness)	)
Field Analyses Purging	06/06/08							pale	
Time 6:54 7:00 7:14	Vol Removed (L) 3 L; 6 C 9 L	EC (uS/cm)	pH 6 & 45 6 . 524 6 . 49	T (C)	Redox (mV) -91 -78 -92	Dissólve (%)	d Oxygen (mg/L) 3 · 6 4 5 · 30 7 . 1 6	Comments (Color, turbidity) redish brown, 11	turbia
Sampling	Date:		Done by:	AW/BS			I	L.,	_
Sampling Method Time Started		Sa	ampling Depth				r Disposal Re		
Time Started Time Stopped Comments	1		SWL (start) SWL (end)		devmt purging	Date	Litres	Disposal method	·····
							-		

Bore Development, Purging and Groundwater Sampling Data Sheet

Checked By:....

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BORE No: 208-5

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## BORE No: P2610

Project 1	No 42626162	Project Name	BMA Caval	Ridge Groundw	/ater			613691 m	IF
evelopment	Date:		Done by:	*******				613691 m 7548096 m	17
Development Meth	od							1548016 m	$\mathcal{N}$
Time Start			- SWL (start)		Volu	me Removed		Bore Depth (start)	
Time Stopp			SWL (end)					Bore Depth (start)	
	nts					bonai ge rane		NAPL Present	
								(If yes thickness)	
ield Analyses									
evelopment									
Time	Vol Removed	EC	pН	Т	Redox	Dissolve	d Oxygen	Comments	
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	
1.1. 01. 1117/2011									
·····					1				
			<u> </u>	L					
urging	Date: C	60608	Done by:	AW/BS	_				
Deres D.C. dl									
Purge Meth			Purge Depth		-			nil	
Time Star Time Stopp			SWL (start)	41.56		Bore Volume		Bore Depth (start) $\frac{\sim 86.6}{\sim}$	•
Comme			SWL (end)		Volu	me Removed		Bore Depth (end)	
Comme	itts							NAPL Present	
ield Analyses				- /				(If yes thickness)	
urging									
Time	Vol Removed	EC	pH	Т	Redox	Dissolve	d Oxygen	Comments	
	- па	(uS/cm)	<b>1</b>		(mV)	(%)	(mg/L)	(Color tortidity)	
11.28	punging	18-48	7.29	26.6	-1-78		1-96	Light brown clear clear yellowish.	10 5
11-27	1,00	1728	7.36	24.5			1.86	clear yellawish	· •
	ท	1699	1.36	23.4	-199 -196		1.45	11 180	
11:35	1 (1	1770	7.30	24.7	- <i>10</i>	مىي	1.05	10, 11	
11:41								11 11	
11:35 11:41 11:44 11:44		1718	<u>7.40</u>	23.9	-200	وتبيشين	1.91		
11:41		1718	Done by:		-200	<b>و</b> نیسی	17.91		
11:41 II:44 Sampling Sampling Meth	Uj Date:	1718	Done by:	AW/BS	_		,		
11:41 II:44 Sampling Sampling Meth Time Star		1718	_ Done by: ampling Depth SWL (start)	AW/BS	-		er Disposal R	ecord	l
11:41 II:44 Sampling Sampling Meth		1718	_ Done by: ampling Depth SWL (start)	AW/BS	-	Groundwate	er Disposal R		
11:41 II:44 Sampling Sampling Meth Time Star		<u>1718</u> s	_ Done by: ampling Depth SWL (start) SWL (end)	AW/BS	-	Groundwate	er Disposal R	ecord	
II: 41       II: 44       Sampling       Sampling Meth       Time Star       Time Stopp		<u>1718</u> s	_ Done by: ampling Depth SWL (start)	AW/BS	devmt	Groundwate	er Disposal R	ecord	

Projec	et No 42626162	Project Name	e BMA Caval	Ridge Groundy	vater				La QCO4
Development				B				<u>1999), ann an 1999 (1999)</u>	PZOG LDQCO4 For PZOG & Filter the Nas
Development Me	thod								filter th
Time Sta			- SWL (start)		Volu	me Remove	d	Bore Depth (start)	NOK
Time Stop			SWL (end)		Di		e	Bore Depth (end)	
Comm	nents							NAPL Present	
***						· · ·		(If yes thickness)	
Field Analyses									
Development Time	Vol Removed	EC	pH	T	Redox	Discoler	ed Oxygen	Comments.	l
1 mile	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	Comments (Color, turbidity)	
	(2)	(us/eni)				(70)		(Color, turbidity)	5
			_						
Purging	Date: (	60608	Done by:	AW/BS					
	e e	/	_	·					
Purge Me			Purge Depth						
Time Sta Time Sto			SWL (start)	19.678(1	$\frac{d}{d}$	Bore Volum	e	Bore Depth (start)	×78.7(ToC
time Sto	nned		SW/L (end)				4		
			S WL (end)	10.87(7)	页() Volu	me Remove	a	_ Bore Depth (end)	
Comn				20.87(1	ōĆ) Volu	me Remove	u	Bore Depth (end) NAPL Present	
Comm				20.87(7	ŌĆ} Volu	me Remove	u	_ Bore Depth (end)	
Comm Field Analyses				2_0_*8_1(1)	<u>مر</u> ) Volu	me Remove	u	Bore Depth (end) NAPL Present	
Comm		EC	pH	<u>∠_D<sub>u</sub> ~~ (</u> (T)	DC Volu	me Remove		Bore Depth (end) NAPL Present	
Comm Field Analyses Purging Time	Vol Removed (L)	(uS/cm)	pH	T (C)		me Remove	ed Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	
Comn Field Analyses Purging	Vol Removed (L)	(uS/cm) 1622	рН 7.47	T (C) 27.6	Redox (mV)	Dissolv	ed Oxygen (mg/L) (· 48	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	
Comm Field Analyses Purging Time	Vol Removed (L)	(uS/cm) 1622 1664	рН 7.47 7.51	T (C) 27.6 26.2	Redox (mV)	Dissolv (%)	ed Oxygen (mg/L) 1 · 48 Ø- 34	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	
Comm Field Analyses Purging Time	Vol Removed (L) Pump Pump	(uS/cm) 1622 1664	рН 7.47 7.51	T (C) 27.6 26.2	$\begin{array}{c} Redox \\ (mV) \\ \hline -1.70 \\ \hline -2.09 \\ \hline -2.14 \end{array}$	Dissolv (%)	ed Oxygen (mg/L) 1 · 48 0 · 34 0 · 19	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	
Comm Field Analyses Purging Time	Vol Removed (L) (L) (L) (L) (L) (L) (L) (L) (L) (L)	(uS/cm) 1622 1664 1661 1663	рН 7.47 7.51 7.62 7.70	T (C) 27.6 76.7 26.4 26.6	$\begin{array}{c} \text{Redox} \\ (mV) \\ \hline -7.70 \\ \hline -2.14 \\ \hline -2.16 \end{array}$	Dissolv (%)	ed Oxygen (mg/L) 1 · 48 Ø- 34	Comments (Color, turbidity) // Light brown, cla // Light brown, cla	to stightly to
Comm Field Analyses Purging Time 13:03 13:16 13:16 13:20 13:20	Vol Removed (L) Pump Pump (L) (L)	(uS/cm) 1622 1664	рН 7.47 7.51 7.62 7.67 7.67	T (C) 27.6 26.7 26.4 26.6 26.6	$\begin{array}{c} Redox \\ (mV) \\ \hline -1.70 \\ \hline -2.09 \\ \hline -2.14 \end{array}$	Dissolv (%)	ed Oxygen (mg/L) 1 · 48 0 · 34 0 · 19	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	
Comm Field Analyses Purging Time	Vol Removed (L) (L) (L) (L) (L) (L) (L) (L) (L) (L)	(uS/cm) 1622 1664 1661 1663	рН 7.47 7.51 7.62 7.70	T (C) 27.6 26.7 26.4 26.6 26.6	$\begin{array}{c} \text{Redox} \\ (mV) \\ \hline -7.70 \\ \hline -2.14 \\ \hline -2.16 \end{array}$	Dissolv (%)	ed Oxygen (mg/L) 1 · 48 0 · 34 0 · 19	Comments (Color, turbidity) // Light brown, cla // Light brown, cla	to stightly to
Comm Field Analyses Purging Time 13:03 13:15 13:15 13:25 Sampling	Vol Removed (L) Pump Pump (L) (L) (L) (L) (L) (L) (L) (L) (L) (L)	(uS/cm) 1622 1664 1661 1663 1689	pH 7.47 7.51 7.62 7.67 Done by:	T (C) 27.6 26.7 26.4 26.6 26.6 AW/BS	$\begin{array}{c} Redox \\ (mV) \\ \hline -170 \\ \hline -209 \\ \hline -214 \\ \hline -214 \\ \hline -214 \\ \hline \end{array}$	Dissolv (%)	ed Oxygen (mg/L) 1. 48 0. 34 0. 19 0. 19 0. 18 0. 12	Comments (Color, turbidity) 1t brown, clip Light brown, clip Light brown, clip Light brown, clip Light brown, clip	to stightly to
Comm Field Analyses Purging Time 13:03 13:10 13:15 13:25 Sampling Sampling Met	Vol Removed (L) (L) (L) (L) (L) (L) (L) (L) (L) (L)	(uS/cm) 1622 1664 1661 1663 1689	pH 7.47 7.51 7.62 7.67 Done by: ampling Depth	T (C) 27.6 26.2 26.4 26.6 26.6 AW/BS	$\begin{array}{c} Redox \\ (mV) \\ \hline -170 \\ \hline -209 \\ \hline -214 \\ \hline -214 \\ \hline -214 \\ \hline \end{array}$	Dissolv (%)	ed Oxygen (mg/L) 1 · 48 0 · 34 0 · 19 0 · 19 0 · 18 0 · 12 er Disposal R	Comments (Color, turbidity) // Light brown, cha light brown, cha light brown, cha light brown, cha light brown, cha light brown, chan light brown, chan lig	to stightly to
Comm Field Analyses Purging Time 13:03 13:10 13:15 13:25 Sampling Sampling Me Time St	Vol Removed (L) (L) (L) (L) (L) (L) (L) (L) (L) (L)	(uS/cm) 1622 1664 1661 1663 1689	pH 7.47 7.51 7.67 Done by: ampling Depth SWL (start)	T (C) 27.6 76.7 26.4 26.6 26.6 2.6.6 AW/BS	$\begin{array}{c} \text{Redox} \\ (mV) \\ \hline -7.70 \\ \hline -2.09 \\ \hline -2.14 \\ \hline -2.14 \\ \hline -2.14 \\ \hline \end{array}$	Dissolv (%)	ed Oxygen (mg/L) 1. 48 0. 34 0. 19 0. 19 0. 18 0. 12	Comments (Color, turbidity) 1t brown, clip Light brown, clip Light brown, clip Light brown, clip Light brown, clip	to stightly to
Comm Field Analyses Purging Time 13:03 13:10 13:15 13:25 Sampling Sampling Met	Vol Removed (L) Purp Purp (L) (L) (L) (L) (L) (L) (L) (L) (L) (L)	(uS/cm) 1622 1664 1661 1663 1689	pH 7.47 7.51 7.62 7.67 Done by: ampling Depth	T (C) 27.6 76.7 26.4 26.6 26.6 2.6.6 AW/BS	Redox (mV) -770 -209 -214 -214 -214 devmt	Dissolv (%)	ed Oxygen (mg/L) 1 · 48 0 · 34 0 · 19 0 · 19 0 · 18 0 · 12 er Disposal R	Comments (Color, turbidity) // Light brown, Clar Light brown, Clar	to stightly to
Comm Field Analyses Purging Time 12:03 13:10 13:15 13:15 13:25 Sampling Sampling Me Time Sto Time Sto	Vol Removed (L) Purp Purp (L) (L) (L) (L) (L) (L) (L) (L) (L) (L)	(uS/cm) 1622 1664 1661 1663 1689	pH 7.47 7.51 7.67 7.67 Done by: sampling Depth SWL (start)	T (C) 27.6 76.7 26.4 26.6 26.6 2.6.6 AW/BS	$\begin{array}{c} \text{Redox} \\ (mV) \\ \hline -7.70 \\ \hline -2.09 \\ \hline -2.14 \\ \hline -2.14 \\ \hline -2.14 \\ \hline \end{array}$	Dissolv (%)	ed Oxygen (mg/L) 1 · 48 0 · 34 0 · 19 0 · 19 0 · 18 0 · 12 er Disposal R	Comments (Color, turbidity) // Light brown, Clar Light brown, Clar	to stightly t

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Development	Date:		Done by:					
-								
Development Method			SW/I (stowt)		Volu	na Daniaria	1	
Time Started			SWL (start)_			me Kemovec		_ Bore Depth (start)
Comments			SWE (cild)			sonarge Kat		Bore Depth (end) NAPL Present
001111101100					•			(If yes thickness)
field Analyses								
Development Time	Vol Removed	EC	pH	Т	Redox	Dissolars	10	
THIC	(L)	(uS/cm)	рп	(C)	(mV)	(%)	d Oxygen	Comments (Calue to bidit )
		(us/em)		(C)		(%)	(mg/L)	(Color, turbidity)
	· · · · · · · · · · · · · · · · · · ·							
					-			
Purging	Date:		Done by:	AW/BS				
				AW/BS	_			
Purge Method	l		Purge Depth		_			Ę.
Purge Method Time Started	l		Purge Depth SWL (start)	dry!		Bore Volume		Bore Depth (start)_8
Purge Method Time Started Time Stopped			Purge Depth	dry!			>	Bore Depth (end)
Purge Method Time Started			Purge Depth SWL (start)	dry!				Bore Depth (end) NAPL Present
Purge Method Time Started Time Stopped Comments			Purge Depth SWL (start)	dry!				Bore Depth (end)
Purge Method Time Started Time Stopped			Purge Depth SWL (start)	dry!				Bore Depth (end) NAPL Present
Purge Method Time Started Time Stopped Comments Field Analyses		EC	Purge Depth SWL (start)	dry!		me Removed		Bore Depth (end) NAPL Present
Purge Method Time Started Time Stopped Comments Field Analyses Purging			Purge Depth SWL (start) SWL (end)	dry!	Volu	me Removed		Bore Depth (end) NAPL Present (If yes thickness) Comments
Purge Method Time Started Time Stopped Comments Field Analyses Purging	Vol Removed	EC	Purge Depth SWL (start) SWL (end)	dry! T	Volu	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness)
Purge Method Time Started Time Stopped Comments Field Analyses Purging	Vol Removed	EC	Purge Depth SWL (start) SWL (end)	dry! T	Volu	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments
Purge Method Time Started Time Stopped Comments Field Analyses Purging	Vol Removed	EC	Purge Depth SWL (start) SWL (end)	dry! T	Volu	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments
Purge Method Time Started Time Stopped Comments Field Analyses Purging	Vol Removed	EC	Purge Depth SWL (start) SWL (end)	dry! T	Volu	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)	EC	Purge Depth SWL (start) SWL (end)	T (C)	Volu	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness)
Purge Method Time Started Time Stopped Comments Field Analyses Purging	Vol Removed	EC	Purge Depth SWL (start) SWL (end)	T (C)	Volu	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness)
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time Sampling Sampling Method	Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH Done by:	T (C) AW/BS	Redox (mV)	Dissolve (%)	d Oxygen (mg/L)	Bore Depth (end)         NAPL Present         (If yes thickness)         Comments         (Color, turbidity)
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time Sampling Sampling Method Time Started	Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH Done by: Done by: ampling Depth SWL (start)	T (C) AW/BS	Redox (mV)	Dissolve (%)	d Oxygen	Bore Depth (end)     NAPL Present     (If yes thickness)      Comments     (Color, turbidity)      ecord
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time Sampling Sampling Method Time Started Time Stopped	Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH Done by: Done by: ampling Depth SWL (start)	T (C) AW/BS	Redox (mV)	me Removed Dissolve (%) Groundwat	d Oxygen   (mg/L) 	Bore Depth (end)         NAPL Present         (If yes thickness)         Comments         (Color, turbidity)
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time Sampling Sampling Method Time Started	Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH Done by: Done by: ampling Depth SWL (start)	T (C) AW/BS	Volu	me Removed Dissolve (%) Groundwat	d Oxygen   (mg/L) 	Bore Depth (end)     NAPL Present     (If yes thickness)      Comments     (Color, turbidity)      ecord

Bore Development, Purging and Groundwater Sampling Data Sheet

		GING AND						BORE No:	
Project No	42626162	Project Name	BMA Caval	Ridge Ground	water			4	Hr und C PZ10&9 0614320 
Development	Date:		Done by:					in a second s	PZ1089
Development Method			_						0614329
Time Started			SWL (start)	)	Volu	me Removed	1	_ Bore Depth (start)	756
Time Stopped			SWL (end)	)		ischarge Rate	)	Bore Depth (end)	) - r
Comments								NAPL Present	
Field Analyses								(If yes thickness)	)
Development Time	Vol Removed	EC	pН	T T	Redox	Dissolus	d Oxygen		-
* *****	(L)	(uS/cm)	pir	(C)	(mV)	(%)		Comments	
	(12)	(us/cm)		(C)		(%)	(mg/L)	(Color, turbidity)	-
						·			_
					_				_
								-	-
		· · · · · · · · · · · · · · · · · · ·						-	_
Purging	D-4 0	6/06/08	Done by:			····			
Purge Method Time Started Time Stopped		· ·	Purge Depth SWL (start) SWL (end)	1 ·	Tot)	Bore Volume	}	Bore Depth (start)	<u>59.1(</u> 70c)
			Purge Depth SWL (start) SWL (end)		Tor) Tor Volu	Bore Volume me Removed	}	Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)	)t
Time Started Time Stopped Comments			Purge Depth SWL (start) SWL (end)	n	Tor Tor Tor Volu	Bore Volume me Removed		_ NAPL Present	)t
Time Started Time Stopped Comments Field Analyses		EC M	SWL (start) SWL (end)	n				NAPL Present (If yes thickness)	)t
Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)	EC ()	SWL (start) SWL (end)	) 11782( ) 24 27#	Redox	Dissolve	d Oxygen	Comments	) t )
Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)		SWL (start) SWL (end)	$\frac{1}{24 27}$	Redox (mV)	Dissolve (%)	d Oxygen	Comments	) t )
Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed		SWL (start) SWL (end)	T T T T T C T C T C C C C C C C C C C C C C	Redox	Dissolve	d Oxygen (mg/L)	Comments (Color, turbidity)	) t )
Time Started Time Stopped Comments Field Analyses Purging Time $\frac{15}{15}$	Vol Removed (L) PUMP	(11840m) 4-4-8	SWL (start) SWL (end) pH	T (C) 26.6 26.9 25.8	Redox (mV)	Dissolve (%)	d Oxygen (mg/L) 2 4 4	NAPL Present(If yes thickness)Comments(Color, turbidity) $( ear Slignal)$ $( l l l l l l l l l l l l l l l l l l l$	t
Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L) PMMD	(11840m) 4-4-8	SWL (start) SWL (end) pH	T (C) 76.6 76.8	Redox (mV)	Dissolve (%)	d Oxygen (mg/L) 2 4 4	Comments $(Color, turbidity)$ $(Color, furbidity)$	$\frac{1}{1}$
Time Started Time Stopped Comments Field Analyses Purging Time $\frac{15}{15}$	Vol Removed (L) PUMP	(11840m) 4-4-8	SWL (start) SWL (end) pH	T (C) 26.6 26.9 25.8 25.7	Redox (mV)	Dissolve (%)	d Oxygen (mg/L)	Comments $(Color, turbidity)$ $(le grad)$ $(le grad)$ $(le grad)$ $(le grad)$	$\frac{1}{1}$
Time Started Time Stopped Comments Field Analyses Purging Time 75:52 15:35 15:30 15:30 15:44 Sampling	Vol Removed (L) PMMD (L L L L	(480000) 44-148 3-49 3-54 3-54 3-53	SWL (start) SWL (end) pH 7.07 7.24 7.52 7.52 Done by:	$ \frac{T}{C} = \frac{T}{25.8} = \frac{7}{4.75} $	$\begin{array}{c} \text{Redox} \\ (mV) \\ -43( \\ -49 \\ -89 \\ -98 \\ -98 \end{array}$	Dissolve (%) 	d Oxygen (mg/L) 2 4 4 0 - 50 0 39 0 - 26	NAPL Present (If yes thickness) Comments (Color, turbidity) $((e_{GM} Slig_M))$ $i(l_{l}(l_{l})$	$\frac{1}{1}$
Time Started Time Stopped Comments Field Analyses Purging Time 15:35 15:30 15:30 15:30 15:30 15:444 Sampling Sampling Method	Vol Removed (L) PMMD (L L L L	(480000) 44-148 3-49 3-54 3-54 3-53	SWL (start) SWL (end) pH 7.07 7.24 7.52 7.52 Done by: mpling Depth	$ \frac{T}{C} = \frac{T}{25.8} = \frac{XW/BS}{AW/BS} $	$\begin{array}{c} \text{Redox} \\ (mV) \\ -43( \\ -49 \\ -89 \\ -98 \\ -98 \end{array}$	Dissolve (%) 	d Oxygen (mg/L) Q 44 O - SO O .39 O .26 er Disposal Re	NAPL Present (If yes thickness) Comments (Color, turbidity) ((ear) Slight) (l) l(c) l(l) l(c) ecord	$\frac{1}{1}$
Time Started Time Stopped Comments Field Analyses Purging Time 15:52 15:35 15:30 15:30 15:30 15:444 Sampling Sampling Method Time Started	Vol Removed (L) PMMP il il il Date:	(480000) 44-148 3-49 3-54 3-54 3-53	SWL (start) SWL (end) pH 7.07 7.24 7.52 7.52 Done by: mpling Depth SWL (start)	$ \begin{array}{c} 1 & 7 & 8 \\ \hline 1 & 7 & 8 \\ \hline 2 & 4 & 7 \\ \hline 2 & 7 \\ \hline 2 & 6 & 6 \\ \hline 2 & 6 & 9 \\ \hline 2 & 5 & 8 \\ \hline 9 & 7 \\ \hline 4 & 7 \\ \hline 8 & 7 \\ \hline 9 & 7 \\ \hline 4 & 7 \\ \hline 7 & 6 \\ \hline 7 & 7 \\ \hline 7 & $	Redox (mV) 	Dissolve (%) 	d Oxygen (mg/L) 2 4 4 0 - 50 0 39 0 - 26	NAPL Present (If yes thickness) Comments (Color, turbidity) $((e_{GM} Slig_M))$ $i(l_{l}(l_{l})$	$\frac{1}{1}$
Time Started Time Stopped Comments Field Analyses Purging Time $\frac{15:52}{15:35}$ 15:30 15:30 15:30 15:444 Sampling Sampling Method Time Started Time Stopped	Vol Removed (L) PLA pLA il il il Date:	(480000) 44-148 3-49 3-54 3-54 3-53	SWL (start) SWL (end) pH 7.07 7.24 7.52 7.52 Done by: mpling Depth	$ \begin{array}{c} 1 & 7 & 8 \\ 1 & 7 & 8 \\ 2 & 7 & 7 \\ $	Redox (mV) -43( -87 -87 -70 devmt	Dissolve (%) 	d Oxygen (mg/L) Q 44 O - SO O .39 O .26 er Disposal Re	NAPL Present (If yes thickness) Comments (Color, turbidity) ((ear) Slight) (l) l(c) l(l) l(c) ecord	$\frac{1}{1}$
Time Started Time Stopped Comments Field Analyses Purging Time 15:52 15:35 15:30 15:30 15:30 15:444 Sampling Sampling Method Time Started	Vol Removed (L) PLA pLA il il il Date:	(480000) 44-148 3-49 3-54 3-54 3-53	SWL (start) SWL (end) pH 7.07 7.24 7.52 7.52 Done by: mpling Depth SWL (start)	$ \begin{array}{c} 1 & 7 & 8 \\ 1 & 7 & 8 \\ 2 & 7 & 7 \\ $	Redox (mV) 	Dissolve (%) 	d Oxygen (mg/L) Q 44 O - SO O .39 O .26 er Disposal Re	NAPL Present (If yes thickness) Comments (Color, turbidity) ((ear) Slight) (l) l(c) l(l) l(c) ecord	$\frac{1}{1}$
Time Started Time Stopped Comments Field Analyses Purging Time $\frac{15:52}{15:35}$ 15:30 15:30 15:30 15:444 Sampling Sampling Method Time Started Time Stopped	Vol Removed (L) PLA pLA il il il Date:	(480000) 44-148 3-49 3-54 3-54 3-53	SWL (start) SWL (end) pH 7.07 7.24 7.52 7.52 Done by: mpling Depth SWL (start)	$ \begin{array}{c} 1 & 7 & 8 \\ 1 & 7 & 8 \\ 2 & 7 & 7 \\ $	Redox (mV) -43( -87 -87 -70 devmt	Dissolve (%) 	d Oxygen (mg/L) Q 44 O - SO O .39 O .26 er Disposal Re	NAPL Present (If yes thickness) Comments (Color, turbidity) ((ear) Slight) (l) l(c) l(l) l(c) ecord	$\frac{1}{1}$

BORE No: 203-5

	42626162	1 Tojoot Hame	BMA Caval I	Ridge Groundv	vater				
Development	Date:		Done by:						
Development Method Time Started Time Stopped Comments	1		SWL (start) SWL (end)		Volu Di	me Removed ischarge Rate		Bore Depth (start) Bore Depth (end) NAPL Present	
			· · · · · · · · · · · · · · · · · · ·					(If yes thickness)	
Field Analyses Development									10/20
Time	Vol Removed (L)	EC (uS/cm)	pH	Т (С)	Redox (mV)	Dissolve (%)	d Oxygen (mg/L)	Comments (Color, turbidity)	
					-	••••••••••••••••••••••••••••••••••••••			
Purging	Date:		Done by:	AW/BS	_				
Purge Method Time Started Time Stopped Comments Field Analyses	l		Purge Depth SWL (start) SWL (end)	25.492, 25-55	n 700 I n Volu	Bore Volume me Removed	3.752	Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)	27.23 m
Purging		ms			?				
Time	Vol Removed (L) 3.75L 7.5L	EC (us/cm) 14.06	рН 7.04 6.83	T (C) 255 25.4	Redox (mV) -13 - 21	Dissolve (%)	d Oxygen (mg/L) $2 \cdot 1^{5}$ $2 \cdot 7 \cdot 1$	Comments (Color, turbidity)	v/bid
15:09 15:16	11.25L 14L	13.64	6.80 6.78	25.3 25.3	#120 130	فتحتنى خەتتەرى	3,01 3,31		
15:09	11.25L	13.64 13.52			130	ویسینی میبینی			1,

Bore Development, Purging and Groundwater Sampling Data Sheet

Project No	42626162	Project Name	BMA Caval	Ridge Groundy	vater			
Development								
Development Method Time Started Time Stopped Comments	· · · · · · · · · · · · · · · · · · ·		SWL (start)		Volu	me Removed ischarge Rate	l	Bore Depth (end)
Field Analyses							·	NAPL Present       (If yes thickness)
Development	·····							•
Time	Vol Removed (L)	EC (uS/cm)	рН	T (C)	Redox (mV)	Dissolve (%)	d Oxygen (mg/L)	Comments (Color, turbidity)
			·					
Purging	Date:	7/8/08	Done by:	AW/BS			L	
Purge Method Time Started Time Stopped Comments Field Analyses		· ,	Purge Depth SWL (start) SWL (end)	31 757W	TCC 4 Volu	Bore Volume me Removed	) I	Bore Depth (start) <u>243.</u> <i>m</i> 7 Bore Depth (end) <u>1000000000000000000000000000000000000</u>
Purging		mS						
Time 14:33 14:36 14:36 14:39 14:39 14:45	Vol Removed (L) <i>p</i> -mp <i>i</i> ( <i>u</i> <i>i</i> (	EC (1187cm) 18.72 19.35 19.71 20.02 19.97	pH 6.75 7.14 7.15 6.91 7.10	T (C) 26.2 25.9 25.9 25.8 25.8	Redox (mV) -135 -172 -168 -166 -165	Dissolve (%)	d Oxygen (mg/L) $7 \cdot 72$ 0.42 0.27 0.21 0.19	Comments (Color, turbidity) ) Iight grey brown turbid sulphu U( - (( )) () () () () () () () () () () () () () (
Sampling	Date:		Done by:	AW/BS			· · · · · ·	
Sampling Method Time Started Time Stopped Comments					devmt	Groundwate Date	er Disposal Re Litres	QC07 = Pz03 - D Disposal method

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BORE No: <u>P203</u>-D

Bore Development, Purging and Groundwater Sampling Data Sheet

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BORE No: PZUZ

Project No	42626162	Project Name	BMA Caval	Ridge Ground	water						
Development								<u>i den i ne </u>			
Development Method Time Started Time Stopped Comments			SWL (start) SWL (end)		Volu Di	me Removed scharge Rate		Bore Depth (start) Bore Depth (end) NAPL Present			
Field Analyses								_ (If yes thickness)	Palas		
Development Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolve (%)	d Oxygen (mg/L)	Comments (Color, turbidity)			
<b>Purging</b> Purge Method Time Started			Done by: Purge Depth SWL (start)		- (TOC) 1	3ore Volume		Bore Denth (start)	2512	17.0	
Time Stopped Comments Field Analyses			SWL (end)	· · · · · · · · · · · · · · · · · · ·	Volu	me Removed		Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)			
Purging Time	Vol Removed	mS EC ?	pH	Т 🤈	Redox	Dissolve	d Oxygen	Comments			
16:55 16:55 16:58 17:01 17:04	(L) <u>pomp</u> <u>u</u> <u>u</u>	(us/cm) * 2.58 (ang:	7.56 7.56 7.82 7.54	(C) * 24.2 24.2 24.2 24.2 24.2	(mV) -173 -175 -147 -147 -122	(%) 	(mg/L) 1-39 0.40 0.27 0.57	(Color, turbidity) 11 cht grey cl 0 c hc (c c	ear to	slight de J	с.(
<u>i 7:06</u> Sampling	U Date:	/(	7.94 Done by:	24.i AW/BS	-/1/	- <b> </b>	0.68	ις ζζ	ie (e	در	در لر
Sampling Method Time Started Time Stopped Comments	-	Sa	swL (start) SWL (end)	· · · · · · · · · · · · · · · · · · ·	devmt purging	Groundwate Date	r Disposal R Litres	ecord Disposal method			
velopment, Purging and Groundwat	er Sampling Data	Sheet		Page 1		73 23.6		2,5.30 Checke	d By:		

BORE No: <u>P=04</u>

Development	Date:		Done by:		-					
Development Method										
Time Started			SWL (start)		Volu	ne Removed		Bore Depth (start)		
Time Stopped			SWL (end)			scharge Rate		Bore Depth (end)		
Comments					-	-	the second s	NAPL Present		
								(If yes thickness)		
Field Analyses										
Development	17.132 1									
Time	Vol Removed	EC	pН	T	Redox		d Oxygen	Comments		
.*	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)		
,"										
			···							
					· · · · · · · · · · · · · · · · · · ·					
			· · · · · · · · · · · · · · · · · · ·							
		Olita	L							
Purging	Date:	8/6/08	Done by:	AW/BS						
Purge Method		, ,	Denne Dent							
Time Started			Purge Depth		TOC					
Time Started			SWL (start)	67.58		Sore Volume				
Comments			SWL (end)	67.59,	η <sup>Γο</sup> Ψοία	me Removed				
-	• .							NAPL Present		
	•							(If yes thickness)	- 78-5	
Field Analyses						····				
Field Analyses Purging Time	Vol Removed	EC	pH	T	Redox	Dissolve	d Oxygen	(If yes thickness)		
Field Analyses Purging		EC (uS/cm)	pH	T (C)	Redox (mV)		d Oxygen	(If yes thickness)		
Field Analyses Purging	Vol Removed	(uS/cm)		(C)	(mV)	Dissolve (%)	(mg/L)	(If yes thickness)		
Field Analyses Purging Time フ・ン1	Vol Removed (L)			(C) 24-2	(mV)	(%)	(mg/L) 3.26	(If yes thickness)		illy, lig
Field Analyses Purging Time	Vol Removed (L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(If yes thickness)		ilky, lig
Field Analyses Purging Time フ・ン1	Vol Removed (L)	(uS/cm)		(C) 24-2	(mV)	(%)	(mg/L) 3.26	(If yes thickness)		illy, [i]
Field Analyses Purging Time フ・ン1	Vol Removed (L)	(uS/cm)		(C) 24-2	(mV)	(%)	(mg/L) 3.26	(If yes thickness)		illy, lig
Field Analyses Purging Time J: 21 7: 27	Vol Removed (L) 2 L	(uS/cm)	7:00	(C) 24-2 25.7	(mV)	(%)	(mg/L) 3.26	(If yes thickness)		illy, lig
Field Analyses Purging Time フ・ン1	Vol Removed (L)	(uS/cm)		(C) 24-2 25.7	(mV)	(%)	(mg/L) 3.26	(If yes thickness)		ilky, li
Field Analyses Purging Time J: 21 7: 27	Vol Removed (L) 2 L Date:	(uS/cm) 1497 1529	7:00 6:74 Done by:	(C) 24-2 25.7	(mV) -207 -195	<u>(%)</u>	(mg/L) 3.2_6 2.21	(If yes thickness)		ilky, lig
Field Analyses Purging Time J: 21 7: 27 Sampling	Vol Removed (L) 2 L Date:	(uS/cm) 1497 1529	7:00 6:74 Done by:	(C) 24-2 25.7	(mV) -207 -195	(%) – Groundwate	(mg/L) 3. 2_6 2. 21 r Disposal R	(If yes thickness)		ilky, lig
Field Analyses         Purging         Time         J: 21         7: 27         Sampling         Sampling Method         Time Started         Time Stopped	Vol Removed (L) 2 L Date:	(uS/cm) 1497 1529	7.00 6.74 Done by: mpling Depth SWL (start)	(C) 24-2 25.7	(mV) -202 -195	<u>(%)</u>	(mg/L) 3.2_6 2.21	(If yes thickness)		illy, lig
Field Analyses Purging Time J: 21 7: 27 Sampling Sampling Method Time Started	Vol Removed (L) 2 L Date:	(uS/cm) 1497 1529	7.00 6.74 Done by: mpling Depth SWL (start)	(C) 24-2 25.7	(mV) -207 195	(%) – Groundwate	(mg/L) 3. 2_6 2. 21 r Disposal R	(If yes thickness)		illy, Iij

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BORE No:  $\int 20$ 

Development	Date:		_ Done by:						
Development Meth Time Star	ted		SWL (start)	)		me Remove		Bore Depth (start)	
Time Stop Comme			SWL (end)		Di	ischarge Rat	e	Bore Depth (end)	
Comme	s							NAPL Present (If yes thickness)	
Field Analyses								(II yes thickness)	
Development Time	Vol Removed	EC	pH	Т	Redox	Dissolu	ed Oxygen	Commente	l
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	Comments (Color, turbidity)	
· · · · · · · · · · · · · · · · · · ·									
		······································							
<b>Y</b>		QICINQ	Domo hru	AW/BS					
Purging	Date:	8/6/08	_ Done by:	AW/D5	_				
Purge Metl	hod	<u> </u>	Purge Denth		- 700 1	Doro Volum			
	hod ted ped	<u> </u>	Purge Depth SWL (start)		<u>1</u> 7	Bore Volum me Remove		Bore Depth (start) Bore Depth (end) NAPL Present	
Purge Metl Time Star Time Stop Comme	hod ted ped	<u></u>	Purge Depth SWL (start)	8,438	n 700 m T00 volu			Bore Depth (end)	
Purge Metl Time Star Time Stop	hod ted ped	ms	Purge Depth SWL (start)	8,438	<u>n</u> 700 1 _ T00 Volu			Bore Depth (end) NAPL Present (If yes thickness)	
Purge Metl Time Star Time Stop Comme Field Analyses	hod ted ped	ms	Purge Depth SWL (start)	8,438	_ T & Volu	me Removed	d	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Metl Time Star Time Stopp Comme Field Analyses Purging	hod red ped ents Vol Removed	ms EC,	Purge Depth SWL (start) SWL (end) pH	T (C) 25.1	Redox (mV)	me Remove	d ed Oxygen (mg/L) 1-76	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Metl Time Star Time Stop Comme Field Analyses Purging Time	Inted	ms EC,	Purge Depth SWL (start) SWL (end) pH <u>7.00</u> <u>7.21</u> 7.16	T (C) 25.1 25.8 25.9	Redox (mV) -252 -222 -229	me Removed Dissolve (%)	d ed Oxygen (mg/L) 1.76 1.49 0.84	Bore Depth (end)         NAPL Present         (If yes thickness)         Comments         (Color, turbidity)         Clear b dad         (C tc tt         II         II	
Purge Metl Time Star Time Stop Comme Field Analyses Purging Time 9:14 9:14	Vol Removed (L)	m5 EC (u8/cm) 8.49 4.75	Purge Depth SWL (start) SWL (end) pH 7.00 7.21	T (C) 25.1 25.8 25.9 25.1	Redox (mV) -252 -222 -229 -225	me Removed Dissolve (%)	d ed Oxygen (mg/L) 1.76 1.49 0.84 0.84	Bore Depth (end)         NAPL Present         (If yes thickness)         Comments         (Color, turbidity)         Clear by dad         ii tit         ii tit	bubbles on production
Purge Metl Time Star Time Stop Comme Field Analyses Purging Time 9:14 9:14	Inted	m5 EC (u8/cm) 8.49 4.75	Purge Depth SWL (start) SWL (end) PH 7.00 7.21 7.16 7.18	T (C) 25.1 25.9 25.9 25.9 25.9	Redox (mV) -252 -222 -229	me Removed Dissolve (%)	d ed Oxygen (mg/L) 1.76 1.49 0.84	Bore Depth (end)         NAPL Present         (If yes thickness)         Comments         (Color, turbidity)         Clear b dad         (C tc tt         II         II	bubbles on procession for the particulate
Purge Metl Time Star Time Stop Comme Field Analyses Purging Time 74 19 4 24 9 24 9 24 Sampling Sampling Metl	hod rted ped ents Vol Removed (L) $\mu_{\ell}$ $\ell_{\ell}$ $\ell_{\ell}$ $\ell_{\ell}$ Date: hod	m5 EC, (y8/cm) 8.49 4.75 4.20 4.26 3.55	Purge Depth SWL (start) SWL (end) $\overline{7.00}$ $\overline{7.21}$ $\overline{7.18}$ $\overline{7.18}$ $\overline{7.18}$ $\overline{7.29}$ Done by: ampling Depth		Redox (mV) -252 -222 -229 -226 -229	Dissolve (%)	d ed Oxygen (mg/L) 1.76 1.49 0.84 0.84	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clear b dad $(c \ tc \ tc$ $ll \ ll \ tc$ tc $tc$	bubbles on proceeding
Purge Metl Time Star Time Stopp Comme Field Analyses Purging Time 9:14 9:14 9:24 9:24 Sampling Sampling Metl Time Star	hod rted ped ped vol Removed (L) $\ell_{\ell}$ $\ell_{\ell}$ $\ell_{\ell}$ $\ell_{\ell}$ $\ell_{\ell}$ Date: hod	m5 EC, (y8/cm) 8.49 4.75 4.20 4.26 3.55	Purge Depth SWL (start) SWL (end) pH 7.00 7.21 7.16 7.18 7.18 7.29 Done by: ampling Depth SWL (start)		Redox (mV) -252 -222 -229 -226 -229	Dissolve (%)	d ed Oxygen (mg/L) 1.76 1.49 0.84 0.84 0.84 0.84 0.84	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clear b dad $(c \ tc \ tc$ $ll \ ll \ tc$ tc $tc$	bubbles on proceeding
Purge Metl Time Star Time Stop Comme Field Analyses Purging Time 74 19 4 24 9 24 9 24 Sampling Sampling Metl	inted	m5 EC, (y8/cm) 8.49 4.75 4.20 4.26 3.55	Purge Depth SWL (start) SWL (end) $\overrightarrow{PH}$ $\overrightarrow{7.00}$ $\overrightarrow{7.21}$ $\overrightarrow{7.18}$ 	$ \begin{array}{c}     T \\                               $	Redox (mV) -252 -222 -229 -226 -229	me Removed Dissolve (%)	d ed Oxygen (mg/L) 1 - 76 1 - 49 0 - 84 0 - 76 0 -	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) C.lear b dad (c c c c H H c c Las above	bubbles on proceeding

	No 42626162	-3	BMA Caval						n n L d
Development	Date:		Done by:		<u> </u>			P7	- use d (0 201 + d @ pZ0
Development Metl	hod								(er pzo
Time Star			SWL (start)		Volur	ne Removed		Bore Depth (start)	
Time Stop			SWL (end)		Di	scharge Rate		Bore Depth (end)	
Comme	ents							NAPL Present	
Field Analyses		·····						_ (If yes thickness)	
Development									
Time	Vol Removed	EC	рН	Т	Redox	Dissolve	d Oxygen	Comments	
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	
								· · · · · · · · · · · · · · · · · · ·	
				· · · · · · ·				- <u></u>	
Purging	Date:	7/6/00				·····	I		
Purge Meth Time Star	hod	3/0/09	Done by: Purge Depth SWL (start)		$\overline{\gamma}_{\alpha}$	,		7.69 m TOC Bore Depth (start)	263
Time Star Time Stop Comme	hod ted ped nts	3 <del>/0/08</del> 8/6/08	Purge Depth		Tac Ja Rec Volur	8 / 6 Bore Volume ne Removed		Bore Depth (start)	3b <sup>3</sup>
Time Star Time Stopp Comme Field Analyses Purging	hod $\sim$ ted $\sim$ ped $\sim$ ents $\sim$ $\sqrt{\frac{8}{6}/0.8}$	3 <del>/5/6</del> 8- 8/6/08	Purge Depth		Toc The Noc Volum	' Bore Volume		Bore Depth (start)	363 
Time Star Time Stopp Comme Field Analyses	hod $$ ted $$ ped $$ show $$   Vol Removed	EC	Purge Depth	37.60 m 43.70 T	Redox	Bore Volume ne Removed Dissolve		Bore Depth (start)	= 363 =
Time Star Time Stopj Comme Field Analyses Purging Time	hod ted ped ents $\sqrt[8]{6}/0$ § Vol Removed	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	37.60 m 43.70 T	Redox (mV)	Bore Volume ne Removed Dissolve (%)		Bore Depth (start)	363 
Time Star Time Stopp Comme Field Analyses Purging	hod ted ped 8/6/08 Vol Removed (L) $\mu mp$	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH 7.13	37.60 m 43.70 T (C) 25. (	Redox (mV) ~ 142	Bore Volume ne Removed Dissolve (%)		Bore Depth (start)	363 
Time Star Time Stopj Comme Field Analyses Purging Time	hod $\frac{1}{8}$ rted $\frac{1}{9}$ ped $\frac{1}{9}$ mts $\frac{8}{6}/6$ $\frac{9}{6}$ Vol Removed $(L)$ $\frac{1}{9}$ $\frac{1}{9}$	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	37.60 m 43.70 T (C) 25.1 25.3	Redox (mV) 142 181	Bore Volume ne Removed Dissolve (%)		Bore Depth (start)	= 363 $= (06/08)$ $= 1000000000000000000000000000000000000$
Time Star Time Stopj Comme Field Analyses Purging Time	hod ted ped 8/6/08 Vol Removed (L) $\mu mp$	EC (uS/cm)	Purge Depth SWL (start) SWL (end) pH 7.13	37.60 m 43.70 T (C) 25. (	Redox (mV) ~ 142	Bore Volume ne Removed Dissolve (%)		Bore Depth (start)	363 
Time Star Time Stopj Comme Field Analyses Purging Time	hod ted ped ents $\frac{8}{6}/08$ Vol Removed (L) $\rho_{ump}$ $\rho_{ump}$	EC $(uS/cm)$ $1823$ $(751)$	Purge Depth SWL (start) SWL (end) pH 7.13 7.29 7.31	37.60 m 43.70 T (C) 25.1 25.3 25.3	Redox (mV) - 142 - 181 - 185	Bore Volume ne Removed Dissolve (%)		Bore Depth (start)	- 363 
Time Star Time Stopj Comme Field Analyses Purging Time	hod $\frac{1}{8}$ red $\frac{1}{9}$ ped $\frac{1}{9}$ solution $\frac{1}{8}/\frac{6}{0}$ $\frac{8}{8}$ Vol Removed $(L)$ $\frac{1}{9}$ $\frac{1}{9$	EC $(uS/cm)$ $1823$ $(751)$	Purge Depth SWL (start) SWL (end) pH 7.13 7.29 7.31	37.60 m 43.70 T (C) 25.1 25.3 25.3 24.4	Redox (mV) - 142 - 181 - 185	Bore Volume ne Removed Dissolve (%)		Bore Depth (start)	
Time Star Time Stop Comme Field Analyses Purging Time II: 20 II: 20 II: 20 II: 20 II: 30 Sampling	hod	EC (uS/cm) 18(2, 3) 1751 1737	Purge Depth SWL (start) SWL (end) pH 7.73 7.29 7.29 7.21 7.2	37.60 m 43.70 T (C) 25.1 25.3 25.3 24.4 AW/BS	Redox (mV) - 142 - 181 - 185 - 176	Bore Volume ne Removed Dissolve (%)	d Oxygen (mg/L) 5-88 0-96 0-57 0-42	Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) 1:24 grey grey 0:124 (Color, turbidity) 1:24 grey 1:24	363 part por part por bailer viel
Time Star Time Stop Comme Field Analyses Purging Time Time (1): 20 (1): 20 (1)	hod ted ped ped 8/6/08 Vol Removed (L) $\mu_{mp}$ $\mu_{mp}$ $\mu_{mp}$ $\mu_{mp}$ $\mu_{mp}$ Date: hod	EC (uS/cm) 18(2, 3) 1751 1737	Purge Depth SWL (start) SWL (end) pH 7.73 7.29 7.29 7.21 7.21 7.21	37.60 m 43.70 T (C) 25.1 25.3 25.3 24.4 AW/BS	Redox (mV) - 142 - 181 - 185 - 176	Bore Volume ne Removed Dissolve (%)	d Oxygen (mg/L) 5 . 83 0 . 9 6 0 . 5 7 0 . 42 r Disposal Re	Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity), $(1e)$ (Color, turbidity), $(1e)(Color, turbidity), (1e)(Color, turbidity), (1$	363 
Time Star Time Stop Comme Field Analyses Purging Time II: 20 II: 20 II: 20 II: 20 II: 20 Sampling Sampling Metl	hod	EC (uS/cm) 18(2, 3) 1751 1737	Purge Depth SWL (start) SWL (end) pH 7.73 7.29 7.2	37.60 m 43.70 T (C) 25.1 25.3 25.3 24.4 AW/BS	Redox (mV) - 142 - 181 - 185 - 176	Bore Volume ne Removed Dissolve (%)	d Oxygen (mg/L) 5-88 0-96 0-57 0-42	Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) 1:24 grey grey 0:124 (Color, turbidity) 1:24 grey 1:24	- 363 

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Project No	42626162		BMA Caval	Ridge Groundy	vater			la de la companya de La companya de la comp	
Development	Date:								
Development Method Time Started Time Stopped Comments			SWL (start) SWL (end)			me Removed scharge Rate	d	Bore Depth (start) Bore Depth (end) NAPL Present	
Field Analyses Development								(If yes thickness)	
Time	Vol Removed (L)	EC (uS/cm)	рН	T (C)	Redox (mV)	Dissolvo (%)	ed Oxygen (mg/L)	Comments (Color, turbidity)	
Purging	· · · · · · · · · · · · · · · · · · ·				· · · · · · · · · · · · · · · · · · ·				
Purge Method Time Started Time Stopped Comments Field Analyses Purging	Date: Boule g	iveb sample	Purge Depth SWL (start) SWL (end)	67.535	E E Volu	Bore Volume ne Removee		Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)	94.51
Time 7:29	Vol Removed (L)	EC (u\$/cm) ;   0 7	рН 5-09	т (С) 24.1	Redox (mV) -209	Dissolvc (%)	ed Oxygen (mg/L) 1.24	Comments (Color, turbidity) Dork grey , Clearte Shifl	by burbrid, clark porticles
Sampling Sampling Method		Sa	Done by: mpling Depth		-	Groundwate	er Disposal R	ecord	
Time Started Time Stopped Comments			SWL (start) SWL (end)		devmt purging	Date	Litres	Disposal method	· · · · · · · · · · · · · · · · · · ·

Bore Development, Purging and Groundwater Sampling Data Sheet

Checked By:....

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BORE No: P204

Project No	42626162	Project Name	BMA Caval J	Ridge Groundy	water				
Development	Date:	·					· <u>······························</u>		
Development Method Time Started Time Stopped Comments Field Analyses			SWL (start) SWL (end)		a tom	ime Removed ischarge Rate		Bore Depth (start Bore Depth (end NAPL Presen (If yes thickness	) t
Development		·							
Time	Vol Removed (L)	EC (uS/cm)	pŀł	Т (С)	Redox (mV)	Dissolve (%)	ed Oxygen (mg/L)	Comments (Color, turbidity)	
· · · · · · · · · · · · · · · · · · ·									
Purging	Date:	10/9/08	Done by:	AW/DG					
Time Started Time Stopped Comments Field Analyses	18:44	мр 	Purge Depth SWL (start) SWL (end)	8.395v 12.66m	vi Volu	Bore Volume		Bore Depth (start Bore Depth (end NAPL Presen (If yes thickness	)t
Purging Time	Vol Removed	EC	nH	<u>т</u>	De terr	D' 1	10		-
18:1 <b>6</b> 18:27 18:36 18:36 18:44	(L) 2 0 30 40	(uS/cm) 5790 7360 7340 7330	pH 5.51 5.51 5.54 5.53	т (C) 27.0 27.6 27.9 27.9 27.9	$ \begin{array}{r} \text{Redox} \\ (mV) \\ -301 \\ -324 \\ -325 \\ -322 \\ \end{array} $	Dissolve (%)	d Oxygen (mg/L) 1,06 0.08 0.05 0.05	Comments (Color, turbidity) Clear Sulpher 1 1 11 11 11 11	odeu
Sampling	Date:		Done by:	AW/DG					
Sampling Method Time Started Time Stopped Comments		Sa	mpling Depth SWL (start) SWL (end)		T	Groundwate Date	er Disposal R Litres	ecord Disposal method	

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Bore Development, Purging and Groundwater Sampling Data Sheet

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Checked By:....

BORE No: Pzo/

Project No		Project Name							
Development	Date:		Done by:						
Development Method									
Time Started			SWL (start)	·	Volu	me Removed		Bore Depth (start)	
Time Stopped			SWL (end)		Di		; <u> </u>	Bore Depth (end)	
Comments	5				-	2		NAPL Present	
· · · ·								(If yes thickness)	
Field Analyses Development								na ya na	
Time	Vol Removed	EC	pН	Т	Redox	Dissolve	d Oxygen	Comments	
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	
		·····							
·····									
·									
	i					· · · · ·			
urging	<b>n</b> (								
urging	Date:	10/9/08	Done by:	AW/DG					
Purge Method		10/9/08	Purce Denth						-
	1	10/9/08	Purce Denth			Bore Volume		Bore Depth (start)	42 9
Purge Method	 	10/9/08	Purge Depth SWL (start)	31.73 m	Volu	Bore Volume	,	Bore Depth (start)	42.2
Purge Method Time Started	 	10/9/08	Purge Depth SWL (start)		l Volu	Bore Volume me Removed	,	Bore Depth (end)	42.2
Purge Method Time Started Time Stopped Comments	 	10/9/08	Purge Depth SWL (start) SWL (end)	31.73 m	Volu	Bore Volume me Removee		Bore Depth (end) NAPL Present	42.2
Purge Method Time Started Time Stopped Comments	 	10/9/08	Purge Depth SWL (start) SWL (end)	31.73 m	Volu	Bore Volume me Removec	;	Bore Depth (end)	42.2
Purge Method Time Started Time Stopped Comments Field Analyses Purging	 	• ,	Purge Depth SWL (start) SWL (end)	31.73 m	Volu	me Removed		Bore Depth (end) NAPL Present	42.2
Purge Method Time Started Time Stopped	Vol Removed	EC	Purge Depth SWL (start) SWL (end)	31.73 m	Redox	me Removed	d Oxygen	Bore Depth (end) NAPL Present	42.2
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	<u>3і.73</u> м Т (С)	Volu Redox (mV)	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)	EC (uS/cm) \$1 {	Purge Depth SWL (start) SWL (end) pH	<u>Зі.73</u> м Т (С) Z6-9	Volu Redox (mV) ~ 2SE	me Removed	d Oxygen (mg/L) 1 4 3	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time (636 16:53	Vol Removed (L)	EC (uS/cm) 591 21410	Purge Depth SWL (start) SWL (end) pH Le-07 5.42	<u>Зі. 73 м</u> Т (С) 26.9 26.4	Volu Redox (mV) ~ 255 ~ 204	me Removed	d Oxygen (mg/L) 1243 6.46	Bore Depth (end) NAPL Present (If yes thickness) Comments	
Purge Method Time Started Time Stopped Comments Field Analyses Furging Time (636 16:53 17:02	Vol Removed (L) 1 22 32	EC (uS/cm) 591 21410 21430	Purge Depth SWL (start) SWL (end) pH Le-02 5.42 5.62	<u>Т</u> (C) 26.9 26.4 26.5	Volu Redox (mV) - 255 - 204 - 204	me Removed	d Oxygen (mg/L) 1:43 6:46 0:22	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time (636 16:53	Vol Removed (L)	EC (uS/cm) 591 21410	Purge Depth SWL (start) SWL (end) pH Le-07 5.42	<u>Зі. 73 м</u> Т (С) 26.9 26.4	Volu Redox (mV) ~ 255 ~ 204	me Removed	d Oxygen (mg/L) 1243 6.46	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) <i>Clear. Sullar oder</i> <i>it</i>	
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time (636 16:53 17:02	Vol Removed (L) 1 22 32	EC (uS/cm) 591 21410 21430	Purge Depth SWL (start) SWL (end) pH Le-02 5.42 5.62	Т (C) 26.9 26.5 26.5	Volu Redox (mV) - 255 - 204 - 204	me Removed	d Oxygen (mg/L) 1:43 6:46 0:22	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clar. Sular oder it it	
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time (636 17:53 17:02 17:02	Vol Removed (L) 1 22 32 40 Date:	EC (uS/cm) 591 21430 21430 21450	Purge Depth SWL (start) SWL (end) pH $\frac{26.07}{5.42}$ 5.58 Done by:	Т (C) 26.9 26.4 26.5 26.5 ЛW/DG	Volu Redox (mV) - 255 - 201 - 201 - 197	Dissolve (%)	d Oxygen (mg/L) 1:43 6:46 0:22 0:16	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time (636 17:53 17:02 17:02 17:10 Sampling Sampling Method	Vol Removed (L) 1 22 32 40 Date:	EC (uS/cm) 591 21430 21430 21450	Purge Depth SWL (start) SWL (end) pH $\frac{26.07}{5.42}$ 5.58 Done by: ampling Depth	Т (C) 26.9 26.5 26.5 26.5	Volu Redox (mV) - 255 - 201 - 201 - 197	me Removed Dissolve (%) Groundwate	d Oxygen (mg/L) 1:43 6:46 0:22 0:16 or Disposal R	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time (636 17:53 17:02 17:02 17:10 Sampling Method Time Started	Vol Removed (L) 1 22 32 40 Date:	EC (uS/cm) 591 21430 21430 21450	Purge Depth SWL (start) SWL (end) pH $2e \cdot 07$ $5 \cdot 42$ $5 \cdot 58$ Done by: ampling Depth SWL (start)	Т (C) 26.9 26.5 26.5 26.5	Volu Redox (mV) - 255 - 201 - 201 - 197	Dissolve (%)	d Oxygen (mg/L) 1:43 6:46 0:22 0:16	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time (636 16:53 17:02 17:02 17:10 Sampling Method Time Started Time Stopped	Vol Removed (L) 1 22 32 40 Date: 17:11 17:13	EC (uS/cm) 591 21430 21430 21450	Purge Depth SWL (start) SWL (end) pH $2e \cdot 07$ $5 \cdot 42$ $5 \cdot 58$ Done by: ampling Depth SWL (start)	Т (C) 26.9 26.5 26.5 26.5	Volu Redox (mV) - 255 - 204 - 204 - 201 - 201 - 197	me Removed Dissolve (%) Groundwate	d Oxygen (mg/L) 1:43 6:46 0:22 0:16 or Disposal R	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time (636 17:53 17:02 17:02 17:10 Sampling Method Time Started	Vol Removed (L) 1 22 32 40 Date: 17:11 17:13	EC (uS/cm) 591 21430 21430 21450	Purge Depth SWL (start) SWL (end) pH $2e \cdot 07$ $5 \cdot 42$ $5 \cdot 58$ Done by: ampling Depth SWL (start)	Т (C) 26.9 26.4 26.5 26.5 ЛW/DG	Volu Redox (mV) - 255 - 201 - 201 - 197	me Removed Dissolve (%) Groundwate	d Oxygen (mg/L) 1:43 6:46 0:22 0:16 or Disposal R	Bore Depth (end) NAPL Present (If yes thickness)	

Bore Development, Purging and Groundwater Sampling Data Sheet

Checked By:....

BORE No: P203-D

						Done by:	Project Name		evelopment
						Done by.			•
							·····		Development Method
	Bore Depth (start		Removed			SWL (start)			Time Started Time Stopped
	_ Bore Depth (end		arge Rate	Dis		$S W L (end)_{-}$			Comments
	NAPL Preser (If yes thickness								comments
iess)									ield Analyses
									evelopment
	Comments	ygen	Dissolved O	Redox	Т	рН	EC	Vol Removed	Time
	(Color, turbidity)	(mg/L)	(%)	(mV)	(C)		(uS/cm)	(L)	
						······································			
								· · · · · · · · · · · · · · · · · · ·	
	····								
	I								•
			I		AW/DG	Done by:	10/9/08	Date: /	urging
				·· <u> </u>		· · · ·	10/9/08		urging Purge Method
start) 27.02	3L Bore Depth (star		e Volume	<u>.</u>		Purge Depth	10/9/08		<b>arging</b> Purge Method Time Started
start) <u>27.02</u>			e Volume	E Volur	25 5250	Purge Depth SWL (start)	10/9/08		Purge Method Time Started Time Stopped
(end)	Bore Depth (start Bore Depth (end NAPL Preser	<b>1</b>	e Volume	F Volut		Purge Depth SWL (start)	10/9/08		Purge Method Time Started
(end) esent	Bore Depth (end	<b>1</b>	e Volume Removed	E Volut	25 5250	Purge Depth SWL (start)	10/9/08		Purge Method Time Started Time Stopped Comments
(end) esent	Bore Depth (enc NAPL Preser	<b>1</b>	e Volume	E Volut	25 5250	Purge Depth SWL (start)	10/9/08		Purge Method Time Started Time Stopped Comments cld Analyses
(end) esent	Bore Depth (enc NAPL Preser (If yes thickness		Removed	Volur	25.525n	Purge Depth SWL (start) SWL (end)	· ·		Purge Method Time Started Time Stopped Comments eld Analyses urging
(end) esent	Bore Depth (end NAPL Preser (If yes thickness Comments	ygen	Removed Dissolved C	Volur Redox	25.525n T	Purge Depth SWL (start)	EC	Vol Removed	Purge Method Time Started Time Stopped Comments eld Analyses
(end) esent ness)	Bore Depth (end NAPL Preser (If yes thickness Comments (Color, turbidity)	ygen (mg/L)	Removed Dissolved C (%)	Volur Redox (mV)	23.525n T (C)	Purge Depth SWL (start) SWL (end) pH	EC (uS/cm)	Vol Removed (L)	Purge Method Time Started Time Stopped Comments ield Analyses urging Time
(end) esent ness)	Bore Depth (end NAPL Preser (If yes thickness Comments (Color, turbidity)	ygen (mg/L)	Removed Dissolved C (%)	Redox (mV) $\rightarrow 129$	25.525n T (C) 25.9	Purge Depth SWL (start) SWL (end) pH 5-33	EC (uS/cm)	Vol Removed (L)	Purge Method Time Started Time Stopped Comments eld Analyses arging Time
(end) esent ness)	Bore Depth (end NAPL Preser (If yes thickness Comments	ygen	Removed Dissolved C (%)	Volur Redox (mV)	23.525n T (C)	Purge Depth SWL (start) SWL (end) pH	EC (uS/cm)	Vol Removed	Purge Method Time Started Time Stopped Comments aeld Analyses arging Time
(end) esent ness)	Bore Depth (end NAPL Preser (If yes thickness Comments (Color, turbidity)	ygen (mg/L)	Removed Dissolved C (%)	Redox (mV) $\rightarrow 129$	25.525n T (C) 25.9	Purge Depth SWL (start) SWL (end) pH 5-33	EC (uS/cm)	Vol Removed (L)	Purge Method Time Started Time Stopped Comments aeld Analyses urging Time 16 : 50
(end) esent ness)	Bore Depth (end NAPL Preser (If yes thickness Comments (Color, turbidity)	ygen (mg/L)	Removed Dissolved C (%)	Redox (mV) $\rightarrow 129$	25.525n T (C) 25.9	Purge Depth SWL (start) SWL (end) pH 5-33	EC (uS/cm)	Vol Removed (L)	Purge Method Time Started Time Stopped Comments aeld Analyses urging Time 16 : 50
(end) esent ness)	Bore Depth (end NAPL Preser (If yes thickness Comments (Color, turbidity)	ygen (mg/L)	Removed Dissolved C (%)	Redox (mV) $\rightarrow 129$	25.525n T (C) 25.9 25.7	Purge Depth SWL (start) SWL (end) pH <u>5.33</u> <u>5.46</u>	EC (uS/cm)	Vol Removed (L) 4 8	Purge Method Time Started Time Stopped Comments eld Analyses arging Time 16:50 (7:00
(end) esent ness)	Bore Depth (end NAPL Preser (If yes thickness Comments (Color, turbidity)	ygen (mg/L)	Removed Dissolved C (%)	Redox (mV) $\rightarrow 129$	25.525n T (C) 25.9 25.7 AW/DG	Purge Depth SWL (start) SWL (end) pH 5.33 5.46 Done by:	EC (uS/cm) 11260 12470	Vol Removed (L) 4 8 Date:	Purge Method Time Started Time Stopped Comments eld Analyses arging Time 16:50 (7:00
(end) esent ness)	Bore Depth (end NAPL Preser (If yes thickness Comments (Color, turbidity)	ygen (mg/L) 13-44 16-5	Removed Dissolved C (%)	Volur Redox (mV) $\rightarrow 129$ $\sim 100$	25.525n T (C) 25.9 25.7 AW/DG	Purge Depth SWL (start) SWL (end) pH 5.33 5.46 Done by:	EC (uS/cm) 11260 12470	Vol Removed (L) 4 8 Date:	Purge Method Time Started Time Stopped Comments eld Analyses riging Time 16:50 (7:00
(end) esent ness)	Bore Depth (end NAPL Preser (If yes thickness Comments (Color, turbidity)	ygen (mg/L) 13-44 16-5	Removed Dissolved C (%)	Volur Redox (mV) $\rightarrow 129$ $\sim 100$	23.525n T (C) 25.9 25.7 AW/DG	Purge Depth SWL (start) SWL (end) pH 5.33 5.46 Done by: mpling Depth SWL (start)	EC (uS/cm) 11260 12470	Vol Removed (L) 4 8 Date:	Purge Method Time Started Time Stopped Comments eld Analyses arging Time 16:50 (7:00 (7:00) mpling Sampling Method Time Started
(end) esent ness)	Bore Depth (end NAPL Preser (If yes thickness Comments (Color, turbidity) Lybt brown/gray	ygen (mg/L) .3-4 .6-5 sposal Re	Dissolved C (%)	Volur Redox (mV) $\rightarrow 129$ $\sim 100$	25.525n T (C) 25.9 25.7 AW/DG	Purge Depth SWL (start) SWL (end) pH 5.33 5.46 Done by: mpling Depth SWL (start)	EC (uS/cm) 11260 12470	Vol Removed (L) 4 8 Date:	Purge Method Time Started Time Stopped Comments ield Analyses urging Time 16:50 (7:00 ampling Sampling Method

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BORE No: P203-5

BORE No: 1202

Project No	42626162	Project Name	BMA Caval I	Ridge Groundw	ater				
Development	Date:		Done by:						
Development Method Time Started Time Stopped Comments			SWL (start) SWL (end)		D	ime Removed ischarge Rate		Bore Depth (end NAPL Presen	) t
ield Analyses								(If yes thickness	)
Development Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolve (%)	d Oxygen (mg/L)	Comments (Color, turbidity)	
urging Purge Method	Date: 1 AP2 Pum	0/9/08	Done by:		( Pumo	in scre	en)		
Time Started Time Stopped Comments	<u>15:11</u>	ř	SWL (start) SWL (end)	え 34 m 25.643 m	Volu	Bore Volume	, <i>U</i>	Bore Depth (start Bore Depth (end NAPL Presen (If yes thickness	) it
'ield Analyses 'urging			Support	broken					,
Time 15:13 15:24 15:31 15:37	Vol Removed (L) 1 20 20 32	EC (uS/cm) 1682 1494 1529 1540	(pH) 4.36 4.55 4.26 4.19	T (C) 25.9 25.6 25.6 25.6	Redox (mV) -267 -194 -198 -221	Dissolve (%)	d Oxygen (mg/L) 0-7 0-66 0-23 0-14	Comments (Color, turbidity) Clog Sullur Closhy - II HC II HC	odour odour
Sampling	Date:		Done by:	AW/DG			. <b></b>		
Sampling Method Time Started Time Stopped Comments	15:37	Sa	ampling Depth SWL (start) SWL (end)		devmt purging	Groundwate Date	er Disposal R Litres	ecord Disposal method	

Bore Development, Purging and Groundwater Sampling Data Sheet

Development	Date:		Done by:	······	_					
Development Method Time Started Time Stopped Comment	1		- SWL (start) SWL (end)	V	D	ime Removed	e	Bore Dep		
			~~~~~					(If yes th		
'ield Analyses Development										
Time	Vol Removed (L)	EC (uS/cm)	pН	T (C)	Redox (mV)	Dissolvo (%)	ed Oxygen (mg/L)	Comments (Color, turbidity)		
			***	· • • • • • • • • • • • • • • • • • • •	·····					
		·····						•••		
	·····									
urging	Date:		Done by:	AW/DG						
Time Started Time Stopped			SWL (start)	29,9651	A	Bore Volum	e	Bore Den	th (start)	\$35
Comment						ime Remove		Bore Dep	oth (end)	
Comment				bog Caps		ume Remove		Bore Dep	oth (end)	
Comment	s Vol Removed	EC		bes Cays	Volu	ime Removed		Bore Dep	oth (end)	<u></u>
Comment eld Analyses irging Time	s Vol Removed (L)	(uS/cm)	Ріс рн 🖌	bes Cays T (C)	Still on Redox	ime Remove	d ed Oxygen (mg/L)	Bore Dep NAPL (If yes th Comments (Color, turbidity)	oth (end) Present lickness)	<u> </u>
Comment eld Analyses irging Time 09:59	s Vol Removed (L) 2	(uS/cm) (0ちん	Ріс рн 🖌	bey Cays Т (С) 25-8	Still on Redox	ime Removed	d ed Oxygen (mg/L) 1 - 2 - 2	Bore Dep NAPL (If yes th Comments (Color, turbidity) CCur, So	oth (end) , Present , ickness)	err (
Comment ield Analyses urging Time 0٩: ٢٩ تکھ ٥٥ : ۵٩	s Vol Removed (L) 2 B	(uS/cm) 1059 1434	Pio pH L S.C. acon L. S.C.	tog Caps Т (С) 25-8 № 26-1	Redox (mV)	ime Removed	d ed Oxygen (mg/L) i - 2 2 j - 3 7	Bore Dep NAPL (If yes th Comments (Color, turbidity) CCccr. Sou	th (end) Present ickness) Alan of a	orr .
Comment eld Analyses arging Time 09:59 coa (0:10 i0:75	s Vol Removed (L) 2.5 4.3	(uS/cm) 1059 1434 i447	Pio pH V A.C. quas L. b.C. L. b.C.	Боз Саря (С) 25-8 № 26.4	Volu Still on Redox (mV) 129 col 86 or 88	ime Removed	d ed Oxygen (mg/L) 1 - 2 - 2 0 - 3 - 7 0 - 8 5	Bore Dep NAPL (If yes th Comments (Color, turbidity) CCccr. So " "	th (end) Present ickness) Allow of a	err (
Comment eld Analyses irging Time 04:54 04:640 00:75 14:12 14:728	s Vol Removed (L) 2 2 3 9 0	(uS/cm) 1059 1434 i447	Pio pH V 2.6 9005 4.60 4.72 4.43	tog Caps Т (C) 25-8 26.4 26.8	Volu Still on Redox (mV) 129 col 86 or 88	ime Removed	d ed Oxygen (mg/L) 1 - 2 - 2 0 - 3 - 7 0 - 8 5	Bore Dep NAPL (If yes th Comments (Color, turbidity) CCur, So (Color, Lurbidity)	h (end) Present ickness) Ala o L A I (	err.
Comment ield Analyses urging Time 09:59 00:75 10:12 11:28	s Vol Removed (L) 2 2 3 9 0	(uS/cm) 1059 1434	Pio pH V 2.6 9005 4.60 4.72 4.43	tog Caps Т (C) 25-8 26.4 26.8	Redox (mV)	ime Removed	d ed Oxygen (mg/L) i - 2 2 j - 3 7	Bore Dep NAPL (If yes th Comments (Color, turbidity) CCccr. so ( L L L L L	th (end) Present ickness) Allow of a	orr . inter
Comment ield Analyses urging Time 04:54 04:54 00:75 10:72 11:28 ampling $11:47$	s Vol Removed (L) 2 2 3 3 3 3 3 3 3 3 3 3	(uS/cm) 1059 1434 1434 1947 2005 1993 1993 1981	Pie pH V A-C acad 4 - 7 2 4 - 7 2 4 - 4 - 3 4 - 3 4 - 3 2 Uone by:	Т (C) 25-8 26-9 26-9 26-8 26-6 АW/DG	Volu Still on Redox (mV) 199 col 296 ol 296 ol 296 ol 296 ol 296 ol 296 ol 297 col 296 ol 297 col 297	Dissolva (%)	d ed Oxygen (mg/L) <i>l</i> · 2 · 2 <i>g</i> · 3 · 7 <i>o</i> · 85 <i>O</i> · 26 <i>O</i> · 39 <i>c</i> · 28	Bore Dep NAPL (If yes th Comments (Color, turbidity) CCccr. So " " L L L L L L L L	h (end) Present ickness) Ala o L A I (	err .
Comment ield Analyses arging Time 04:54 04:54 00:755 10:12 11:28 ampling Sampling Method	s Vol Removed (L) 2 2 30 30 100 14 Date: AP 2 mmp	(uS/cm) 1059 1434 1434 1947 2005 1993 1993 1981	Pie pH 4 - C aca 4 - 7 a 4 - 7 a 5 - 7 a 4 - 7 a 5 - 7 a	T (C) 25-8 26-9 26-9 26-9 26-6 AW/DG	Volu Still on Redox (mV) 199 col 296 ol 296 ol 296 ol 296 ol 296 ol 296 ol 297 col 296 ol 297 col 297	Ime Removed Dissolva (%)	d ed Oxygen (mg/L) l · 2 2 g · 3 7 g · 85 Ø - 2 6 Ø - 3 7	Bore Dep NAPL (If yes th Comments (Color, turbidity) CCccr. so ( L L ight, Giay ecord	h (end) Present ickness) Ala o L A I (	err. Libel
Comment eld Analyses Irging Time 09:59 09:59 10:12 11:28 II:12 II:28 II:12 II:28 II:12 II:28 II:12 II:28 II:12 II:28 II:12 II:28 II:12 II:28 III:12 II:28 III:12 II:28 III:12 II:28 III:12 II:28 III:12 II:28 III:12 II:28 III:12 II:28 III:12 II:28 III:12 II:28 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III:12 III	s Vol Removed (L) 20 40 30 100 14 Date: $AP^{2} pmp$	(uS/cm) 1059 1434 1434 1947 2005 1993 1993 1981	Pie pH 2.6 9,04 4.6 4.7 4.43 4.37 4.37 5.74 Done by: ampling Depth SWL (start)	Г (C) 25-8 26.4 26.8 26.8 26.6 26.6 А₩/DG	Volu Still on (mV) 199 col 86 ch 88 -198 -194 -192	Dissolva (%)	d ed Oxygen (mg/L) <i>l</i> · 2 · 2 <i>g</i> · 3 · 7 <i>o</i> · 85 <i>O</i> · 26 <i>O</i> · 39 <i>c</i> · 28	Bore Dep NAPL (If yes th Comments (Color, turbidity) CCccr. So " " L L L L L L L L	h (end) Present ickness) Ala o L A I (	y i laby
Comment ield Analyses urging Time 04:54 04:54 00:75 11:12 11:28 ampling $M$ 4 Sampling Method Time Started Time Stopped	s Vol Removed (L) 2 2 3 3 3 3 3 3 3 3 3 3	(uS/cm) 1059 1434 1434 1947 2005 1993 1993 1981	Pie pH 4 - C aca 4 - 7 a 4 - 7 a 5 - 7 a 4 - 7 a 5 - 7 a	Г (C) 25-8 26.4 26.8 26.8 26.6 26.6 А₩/DG	Volu Still on Redox (mV) 199 col 86 ch 88 -198 -194 -192	Ime Removed Dissolva (%)	d ed Oxygen (mg/L) l · 2 2 y 3 7 0 · 85 Ø · 2 6 Ø · 2 6 0 · 2 7 er Disposal R	Bore Dep NAPL (If yes th Comments (Color, turbidity) CCccr. so ( L L ight, Giay ecord	h (end) Present ickness) Ala o L A I (	err .
Comment ield Analyses urging Time 09:59 09:59 10:75 11:12 11:28 ampling Method Time Started	s Vol Removed (L) 2 2 3 3 3 3 3 3 3 3 3 3	(uS/cm) 1059 1434 1447 2005 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 1975 197	Pie pH 2.6 9,04 4.6 4.7 4.43 4.37 4.37 5.74 Done by: ampling Depth SWL (start)	Г (C) 25-8 26.4 26.8 26.8 26.8 26.6 Л₩/DG <b>25.7</b> Л₩/DG	Volu Still on (mV) 199 col 86 ch 88 -198 -194 -192	Ime Removed Dissolva (%)	d ed Oxygen (mg/L) l · 2 2 y 3 7 0 · 85 Ø · 2 6 Ø · 2 6 0 · 2 7 er Disposal R	Bore Dep NAPL (If yes th Comments (Color, turbidity) CCccr. so ( L L ight, Giay ecord	h (end) Present ickness) Ala o L A I (	err,

BORE No:  $f_2 \circ 6 - D$ 

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Bore Deve

Project No	42626162	Project Name	<b>BMA Caval</b>	<b>Ridge Ground</b>	water				
Development	Date:		Done by:			14			
Development Method									
Time Started			SWL (start)		Volu	me Removed	1	Bore Depth (start	•)
Time Stopped			SWL (end)	<u> </u>	D	ischarge Rate	3	Bore Depth (start	ク  )
Comments	······································							NAPL Presen	it
					·			(If yes thickness	:)
Field Analyses Development								$\tilde{n}_{\mu} \Delta \left[ \frac{1}{2} \right]_{\mu \mu \nu} = \frac{1}{2} \left[ \frac{1}{2} \right]_{\mu \nu} \left$	
Time	Vol Removed	EC	pН	Т	Redox	Dissolve	ed Oxygen	Comments	-1
	(L)	(uS/cm)	•	(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	
								· · · · · · · · · · · · · · · · · · ·	- ·
							· · · ·		
Purging Purge Method Time Started	Baile.	10/9/08	Purge Depth			Doro Volum		- <u></u>	
Purge Method Time Started Time Stopped Comments	Baile	10/9/03	Purge Depth	26.255	۳۹ Volu	Bore Volume me Removed	5.2 L	Bore Depth (start Bore Depth (end NAPL Presen (If yes thickness	) it
Purge Method Time Started Time Stopped	Baile	10/9/03	Purge Depth SWL (start)	26.255	۳۹ Volu	Bore Volume me Removed	5.2 L	Bore Depth (end NAPL Presen	) it
Purge Method Time Started Time Stopped Comments Field Analyses	Raile-	EC	Purge Depth SWL (start)	<u>26,255</u>	My Volu	me Removed	5.2 L	Bore Depth (end NAPL Presen	) it
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Raile- Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	<u>26.255</u> T (C)	Redox (mV)	me Removed	i od Oxygen   (mg/L)	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity)	) it
Purge Method Time Started Time Stopped Comments Field Analyses Purging	Raile Vol Removed (L) 5.8	EC (uS/cm) 1563	Purge Depth SWL (start) SWL (end) pH 4.42	26.255 T (C) 25.3	Redox (mV) -202	Dissolve (%)	1 od Oxygen (mg/L)	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity)	) it
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Raile Vol Removed (L) 5.8 if - 6	EC (uS/cm) 1563 1798	Purge Depth SWL (start) SWL (end) pH 4.42	26.255 T (C) 25.3 25.5	Redox (mV) -202 -366-20	Dissolve (%)	d Oxygen (mg/L) レフト	Comments (Color, turbidity)	) it
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Raile Vol Removed (L) 5.8	EC (uS/cm) 1563	Purge Depth SWL (start) SWL (end) pH 4.42	26.255 T (C) 25.3	Redox (mV) -202	Dissolve (%)	1 od Oxygen (mg/L)	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity)	) it
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Raile Vol Removed (L) 5.8 if - 6	EC (uS/cm) 1563 1798	Purge Depth SWL (start) SWL (end) pH 4.42	26.255 T (C) 25.3 25.3 26.1	Redox (mV) -202 -366-20	Dissolve (%)	d Oxygen (mg/L) レフト	Comments (Color, turbidity)	) it
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 11-17 11-26 12-02	Raile Vol Removed (L) 5.8 17.4	EC (uS/cm) 1563 r795 1639	Purge Depth SWL (start) SWL (end) pH 4.42 '4.42 '4.35 Done by:	<u>Т</u> (C) 25.3 25.4 26.1	Volu Redox (mV) -202 -202 -202 -128	Dissolve (%)	d Oxygen (mg/L) 1.71 1.92 2.81	Comments (Color, turbidity)	) it
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time Ii - 17 II - 26 II - 26 II - 26 II - 26 II - 26 Sampling Sampling Method Time Started	Raile Vol Removed (L) 5, 8 <i>if - 6</i> -17-4 Date:	EC (uS/cm) 1563 r795 1639	Purge Depth SWL (start) SWL (end) pH 4.42 '4-42 '4-35	<u>Т</u> (C) 25.3 25.4 76.1	Volu Redox (mV) -202 -202 -202 -128	Dissolve (%)	d Oxygen (mg/L) レフト	Comments (Color, turbidity) Dark grey (trbic)	) it
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 1:-:17 -:1-:26 -:12-:02 Sampling Sampling Method	Raile Vol Removed (L) 5,8 44-6 17-4 Date:	EC (uS/cm) 1563 r795 1639	Purge Depth SWL (start) SWL (end) pH 4.42 4.35 Done by:	<u>Т</u> (C) 25.3 25.5 26.1 АW/DG	Volu Redox (mV) -202 -202 -202 -128	Dissolve (%) Groundwate	d Oxygen (mg/L) 1.71 1.92 2.8 ( 	Comments (Color, turbidity)	) it

Development	Date:		Done by:						
Development Meth	od		· · · ·	Jan Start Start					
Time Star			SWL (start)	·	Volur	ne Remove	1	Bore Depth (start)	
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Comme	nts		. ,		-			NAPL Present	
								(If yes thickness)	
Field Analyses Development	:					· · · · · · · · · · · · · · · · · · ·			
Time	Vol Removed	EC	pН	Т	Redox	Dissolvo	ed Oxygen	Comments	
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	
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urging	Date:		Done by:	AW/DG					
				2311700					
Durgo Motk					<u> </u>				
Purge Meth Time Star			Purge Depth				_		11 20
Time Star	nod		Purge Depth SWL (start)	25.615		Bore Volum		Bore Depth (start)	
Time Star Time Stopp	rod ted		Purge Depth	25.615		Bore Volum		Bore Depth (end)	
Time Star	rod ted		Purge Depth SWL (start)	25.615				Bore Depth (end) NAPL Present	•
Time Star Time Stopp Comme	rod ted		Purge Depth SWL (start)	25.615				Bore Depth (end)	
Time Star Time Stopp Comme Field Analyses	rod ted		Purge Depth SWL (start)	25.615				Bore Depth (end) NAPL Present	4
Time Star Time Stopp Comme Field Analyses	rod ted	EC	Purge Depth SWL (start)	25.615		ne Remove	1	Bore Depth (end) NAPL Present	
Time Star Time Stopp Comme Field Analyses Purging	vod ted nts Vol Removed	(uS/cm)	Purge Depth SWL (start) SWL (end)	25. 615 T (C)	Volur	ne Remove		Bore Depth (end) NAPL Present (If yes thickness)	
Time Star Time Stopp Comme Field Analyses Purging Time	vod ted nts Vol Removed (L)	(uS/cm) ০ের্ডণ্	Purge Depth SWL (start) SWL (end) pH	25. 615 T (C) 27.8	Volur	ne Removed	d Oxygen	Comments (Color, turbidity)	
Time Star Time Stopp Comme Field Analyses Purging Time 7 16 12 - 440	vod ted nts Vol Removed (L)	(uS/cm) 6054 5690	Purge Depth SWL (start) SWL (end) pH L · 57 L · 67	25.615 T (C) 72.5 78.3	Redox (mV)           \$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$	ne Removed	i ed Oxygen (mg/L)	Comments (Color, turbidity)	
Time Star Time Stopp Comme Field Analyses Purging Time (7) 16 12 - 140 18 - 01	Iod           ted           nts           Vol Removed           (L)           2           2           2           2           2           2           2           2           2           3	(uS/cm) [054 5690 12400	Purge Depth SWL (start) SWL (end) pH $\frac{1}{4} \cdot \frac{57}{3}$ 5.06	25.615 T (C) 77.5 78.3 28.6	Volur Redox (mV) 236 2 -330 -22 9	ne Removed	i ed Oxygen (mg/L) (সু. পৃত্ব	Comments (Color, turbidity)	
Time Star Time Stopp Comme Field Analyses Purging Time 13 - 140 18 - 01 18 - 13	Iod           ted           nts           Vol Removed           (L)           2           4.0           6.3           7.0	(uS/cm) [054 5 6 90 12 400 12 490	Purge Depth SWL (start) SWL (end) pH $\underline{L}_{1} \cdot \underline{57}$ $\underline{4}_{2} \cdot \underline{93}$ $\underline{5.06}$ $\underline{5.06}$	T (C) 73.5 78.3 28.6 28.6	Redox (mV)           \$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$	ne Removed	d Oxygen (mg/L) (۲. ۹۶ ۵۰ / ۲	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	
Time Star Time Stopp Comme Field Analyses Purging Time 7 16 12 440 18 0 1	Iod           ted           nts           Vol Removed           (L)           2           2           2           2           2           2           2           2           2           3	(uS/cm) [054 5690 12400	Purge Depth SWL (start) SWL (end) pH $\frac{1}{4} \cdot \frac{57}{3}$ 5.06	2.5. 615 T (C) 7.7.5 7.8.3 2.8.6	Volur Redox (mV) 236 2 -330 -22 9	ne Removed	ed Oxygen (mg/L) 0.98 0.13 0.12	Comments (Color, turbidity) (Color, turbidity) clear, no olor, dun - spring clear, V strong	
Time Star Time Stopp Comme Field Analyses Purging Time 13 - 140 18 - 01 18 - 13	ited         bed         mts         Vol Removed         (L)         2         4.0         6.3         7.0         4.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         2.0         Date:	(uS/cm) [054 5 6 90 12 400 12 490	Purge Depth SWL (start) SWL (end) pH $\underline{L}_{1} \cdot \underline{57}$ $\underline{4}_{2} \cdot \underline{93}$ $\underline{5.06}$ $\underline{5.06}$	T (C) 72.5 78.3 28.6 28.6 28.6 28.6 28.6 28.6	Redox           (mV)           \$\$2 2           -330           -229           -213           201	ne Removed	1 ed Oxygen (mg/L) (). 98 0.13 0.12 0.14	Comments (Color, turbidity) (Color, turbidity) clear, no olor, dun - spring clear, V strong	
Time Star Time Stopp Comme Field Analyses Purging Time 12 - 140 18 - 01 18 - 01 18 - 13 11 - 20 Sampling	$ \begin{array}{c}     \text{Ind} \\     \text{ted} \\     \text{bed} \\     \text{Ints} \\   \end{array} $ $ \begin{array}{c}     \text{Vol Removed} \\     \text{(L)} \\      \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\ $	(uS/cm) 6054 5690 12400 12490 12510	Purge Depth SWL (start) SWL (end) pH $L_{1} \cdot 57$ $L_{2} \cdot 67$ $L_{3} \cdot 66$ $5 \cdot 66$ $5 \cdot 66$ $5 \cdot 69$ Done by:	T (C) 72.5 78.3 28.6 28.6 28.6 28.6 28.6 28.6 28.6 28.6	Volur Redox (mV) Pz 2 -330 -229 -213 -205 -205	ne Removed	1 ed Oxygen (mg/L) (). 98 0.13 0.12 0.14	Comments (Color, turbidity) (Color, turbidity) clear, no olor, dun - spring clear, V strong	
Time Star Time Stopp Comme Field Analyses Purging Time 13 40 18 0 1 18 0 1 18 13 11 20 Sampling Sampling Meth	icd         bed         mts         Vol Removed         (L)         2         4.0         6.3         7:0         8.0         Date:         Al2         Al2         Al2         Al2         Al2	(uS/cm) 6054 5690 12400 12490 12510	Purge Depth SWL (start) SWL (end) pH $\underline{L}_{1} \cdot \underline{\sigma}\overline{7}$ $\underline{C}_{1} \cdot \underline{\sigma}\overline{3}$ $\underline{5} \cdot \underline{\sigma}\underline{6}$ $\underline{5} \cdot \underline{\sigma}\underline{6}$ $\underline{5} \cdot \underline{\sigma}\underline{3}$ Done by: ampling Depth	T (C) 73.5 28.6 28.6 28.6 28.6 28.6 28.6 28.6 28.6	Volur Redox (mV) Pz 2 -330 -229 -213 -205 -205	Dissolva (%)	1 ed Oxygen (mg/L) (). 98 0.13 0.12 0.14	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Cleer, no odor, dun Shrm Clear, Victor	
Time Star Time Stopp Comme Field Analyses Purging Time 12 - 440 13 - 0 18 - 0 18 - 0 18 - 13 11 - 20 Sampling Sampling Meth Time Star	$ \begin{array}{c}     \text{Ind} \\     \text{ted} \\     \text{ind} \\   \end{array} $ $ \begin{array}{c}     \text{Vol Removed} \\     \text{(L)} \\   $	(uS/cm) 6054 5690 12400 12490 12510	Purge Depth SWL (start) SWL (end) pH $\underline{L}_{1} \cdot \underline{\sigma} \overline{7}$ $\underline{\zeta}_{1} \cdot \underline{\sigma} \overline{3}$ $\underline{5} \cdot \underline{\sigma} \underline{6}$ $\underline{5} \cdot \underline{\sigma} \underline{6}$ $\underline{5} \cdot \underline{\sigma} \underline{3}$ Done by: ampling Depth SWL (start)	T (C) 73.5 78.3 28.6 28.6 28.6 28.6 28.6 28.6 28.6 28.6	Volur Redox (mV) Pz 2 -330 -229 -213 -205 -205	Dissolva (%)	d Oxygen (mg/L) 0. १४ 0.13 0.12 0.14 0.14	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Cleer, no odor, dun Shrm Clear, Victor	
Time Star Time Stopp Comme Field Analyses Purging Time 13 - 140 18 - 01 18 - 01 18 - 13 11 - 20 Sampling Sampling Meth	$ \begin{array}{c}     \text{Ind} \\     \text{ted} \\     \text{bed} \\     \text{Ints} \\   \end{array} $ $ \begin{array}{c}     \text{Vol Removed} \\     \text{(L)} \\      \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\     \text{(L)} \\ $	(uS/cm) 6054 5690 12400 12490 12513	Purge Depth SWL (start) SWL (end) pH $\underline{L}_{1} \cdot \underline{\sigma}\overline{7}$ $\underline{C}_{1} \cdot \underline{\sigma}\overline{3}$ $\underline{5} \cdot \underline{\sigma}\underline{6}$ $\underline{5} \cdot \underline{\sigma}\underline{6}$ $\underline{5} \cdot \underline{\sigma}\underline{3}$ Done by: ampling Depth	T (C) 73.5 78.3 28.6 28.6 28.6 28.6 28.6 28.6 28.6 28.6	Volur Redox (mV) Pz 2 -330 -229 -213 -205 -205	Dissolvo (%) Groundwat	ed Oxygen (mg/L) 0.13 0.12 0.14 0.14 0.12 er Disposal R	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) clear, no olor, clear, Shrong clear, V shrong line 11	

Bore Development, Purging and Groundwater Sampling Data Sheet

Checked By:....

BORE No: 1208-D

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Project No	42626162	Project Name	e BMA Caval I	Ridge Groundv	vater	en de la constante de la const Reference de la constante de la Reference de la constante de la			
Development	Date:		Done by:				·····		
Development Method	1								
	1E		SWL (start)		Volur	ne Removed		Bore Depth (start	h)
Time Stopped	1		SWL (end)		Dis			Bore Depth (start	
Comments	S							NAPL Presen	
								(If yes thickness	
Field Analyses									
Development									
Time	Vol Removed	EC	pН	Т	Redox	Dissolve	d Oxygen	Comments	٦
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	
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								· · · · · · · · · · · · · · · · · · ·	145 au
Purge Methoc Time Startec	1		Done by: Purge Depth SWL (start)	13 i) m	- - - E	Bore Volume	4.5L	Bore Depth (start	<b>5</b> .51
Purge Method Time Started Time Stopped Comments	-   		Purge Depth SWL (start)		- - - E - 3 · 2 <i>°</i> SV olur	Bore Volume	4.5L	Bore Depth (start Bore Depth (end NAPL Presen (If yes thickness	l)
Purge Methoc Time Startec Time Stoppec Comments Field Analyses	-   	·····	Purge Depth SWL (start)	13 i) m	EE 3`Z@SVolum	Bore Volume ne Removed	<u>4.5</u> L	Bore Depth (end NAPL Presen	l)
Purge Methoo Time Started Time Stopped Comments Field Analyses	1 1 1 3	, EC	Purge Depth SWL (start) SWL (end)	13.11 m 15557 m	_1 3 · 2⊅SVolur	ne Removed		Bore Depth (end NAPL Presen (If yes thickness	l)
Purge Methoc Time Startec Time Stoppec Comments Field Analyses Purging	1 1 2 3 3 5 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	EC (uS/cm)	Purge Depth SWL (start)	13.11 m I → m T	_1 3 · 2 · SVolur Redox	ne Removed	d Oxygen	Bore Depth (end NAPL Presen (If yes thickness Comments	l)
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	1 1 1 3	(uS/cm)	Purge Depth SWL (start) SWL (end)	13.11 m 1555₹m T (C)	I 3.22SVolur Redox (mV)	ne Removed	d Oxygen	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity)	() ht ;)
Time Started Time Stopped Comments Field Analyses Purging Time	I I S Vol Removed (L)	(uS/cm) [817	Purge Depth SWL (start) SWL (end)	13.11 m 1500 ₹ m 1500 ₹ m	_1 3 · 2≥SVolur Redox (mV) → [6	ne Removed	d Oxygen (mg/L) 3.14	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity)	() ht ;)
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)	(uS/cm) 1817 1839	Purge Depth SWL (start) SWL (end)	13.11 m I→→ m T (C) 26.7 2.7.1	$\begin{array}{c} 1 \ 3 \cdot 2 \circ \text{SVolum} \\ \hline \\ \text{Redox} \\ (\text{mV}) \\ \hline \\ \hline \\ \hline \\ \hline \\ \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ $	ne Removed	d Oxygen (mg/L) 3.14 2.72	Comments (Color, turbidity)	() ht ;)
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	I I S Vol Removed (L)	(uS/cm) [817	Purge Depth SWL (start) SWL (end)	13.11 m 1500 ₹ m 1500 ₹ m	_1 3 · 2≥SVolur Redox (mV) → [6	ne Removed	d Oxygen (mg/L) 3.14	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity)	() ht ;)
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Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 17 30 17 34 17 545	Vol Removed (L) Cr.S.C.S.C.S.C.S.C.S.C.S.C.S.C.S.C.S.C.S	(uS/cm) [7[7 (837 [86]	Purge Depth SWL (start) SWL (end) pH 4. 79 4. 79 5. 61	13.11 m 15 m 15 m 15 m 15 m 15 m 15 m 15 m	$\begin{array}{c} 1 \ 3 \cdot 2 \circ \text{SVolum} \\ \hline \\ \text{Redox} \\ (\text{mV}) \\ \hline \\ \hline \\ \hline \\ \hline \\ \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ $	ne Removed	d Oxygen (mg/L) 3.14 2.72	Comments (Color, turbidity)	() ht ;)
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 17 30 17 34 17 54 17 54 5 Sampling	Vol Removed (L) S G.S.C.S.C.S G.S.C.S.C.S Date:	(uS/cm) [9]7 (837 [86]	Purge Depth SWL (start) SWL (end)	13.11 m 15	$\begin{array}{c} 13 \cdot 2 \circ \text{SVolur} \\ \hline \text{Redox} \\ (\text{mV}) \\ \hline \hline 158 \\ \hline 2 \cdot 158 \\ \hline 2 \cdot$	ne Removed	d Oxygen (mg/L) 3.14 2.72	Comments (Color, turbidity)	() ht ;)
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 17 30 17 30 17 34 17 34 17 34 5 Sampling Sampling Method	Vol Removed (L) S G-S dy Date: 1 3 m: Lu	(uS/cm) [9]7 (837 [86]	Purge Depth SWL (start) SWL (end)	T (C) 26:7 27.1 25.9 AW/DG (3. 205.	$\begin{array}{c} 13 \cdot 2 \circ \text{SVolur} \\ \hline \text{Redox} \\ (\text{mV}) \\ \hline \hline 16 \\ \hline 2 \cdot 15 \circ \\ 2 \cdot 15 \circ \\ \hline 2 \cdot 15 \circ \\ \hline 2 \cdot 15 \circ \\ 2 \cdot 15 \circ \\ \hline 2 \cdot 15 \circ \\ 2$	Dissolve (%)	d Oxygen (mg/L) 3 - 1 4 3 - 7 4 3 - 9 4	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity) <u>5. wa</u> , m. ky	() ht ;)
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 17 30 17 30 10	Vol Removed (L) 5 $4 \cdot 5$ $5 \cdot 5$ $5 \cdot 5$ $5 \cdot 5$ $5 \cdot 5$ $5 \cdot 5$ $5 \cdot 5$ Date: $1 \cdot 3 \cdot 5 \cdot 6$	(uS/cm) [9]7 (837 [86]	Purge Depth SWL (start) SWL (end) PH 4, 74 4, 74 4, 32 5, 61 Done by: sampling Depth SWL (start)	T (C) 267 27.1 25.9 AW/DG (3.205.	$\begin{array}{c} 1 \ 3 \cdot 2 \circ \text{SVolur} \\ \hline \\ Redox \\ (mV) \\ \hline \\ \hline \\ 1 \le 2 \\ \hline \\ 1 \\ 1 \\ \hline \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1$	Dissolve (%)	d Oxygen (mg/L) 3.14 2.72	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity) <u>5. wa</u> , m. ky	() ht ;)
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 17 30 17 30 17 34 17	Vol Removed (L) S G : S G : S	(uS/cm) [9]7 (837 [86]	Purge Depth SWL (start) SWL (end) PH 4, 74 4, 74 4, 32 5, 61 Done by: sampling Depth SWL (start)	13.11 m 15	$\begin{array}{c} 1 \ 3 \cdot 2 \circ \text{SVolur} \\ \hline \\ Redox \\ (mV) \\ \hline \\ \hline \\ 1 \le 2 \\ \hline \\ 1 \\ 1 \\ \hline \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1$	Dissolve (%) Groundwate	d Oxygen (mg/L) ろ・レム マ・テース マ・マース マ・アース	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity) 5~ & a monky	() ht ;)
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 17 30 17 30 17 34 17	Vol Removed (L) S G : S G : S	(uS/cm) [9]7 (837 [86]	Purge Depth SWL (start) SWL (end) PH 4, 74 4, 74 4, 32 5, 61 Done by: sampling Depth SWL (start)	T (C) 267 27.1 25.9 AW/DG (3.205.	$\begin{array}{c} 1 \ 3 \cdot 2 \circ \text{SVolur} \\ \hline \\ Redox \\ (mV) \\ \hline \\ \hline \\ 1 \le 2 \\ \hline \\ 1 \\ 1 \\ \hline \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1$	Dissolve (%) Groundwate	d Oxygen (mg/L) ろ・レム マ・テース マ・マース マ・アース	Bore Depth (end NAPL Presen (If yes thickness Comments (Color, turbidity) 5~ & a monky	() ht ;)

Bore Development, Purging and Groundwater Sampling Data Sheet

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BORE No: Pa 37D

Development	Date:		Done by:	······					
Development Met	hod								
Time Sta	rted		SWL (start)	)	Volur	ne Removed	1	Bore Depth (start)	
Time Stop	ped		SWL (end	)			; ;	Bore Depth (start)	
Comm	ents					g		NAPL Present	
				······		····.		(If yes thickness)	
ield Analyses Development								///	
Time	Vol Removed	EC	pH	Т	Redox	Dissolve	d Oxygen	Comments	в
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	1
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urging	Date:		n i	· · · · · · · · · · · · · · · · · · ·					
	Date.		_ Done by:	AW/DG					
Purge Met									
Purge Met Time Sta	hođ		Purge Depth	1	 	Rore Volum	,	Bong Dooth (start)	
Time Sta	hod		Purge Depth SWL (start)	1 ) 164-22	E Volut	Bore Volumo		Bore Depth (start)	44-5
	hod rted ped		Purge Depth SWL (start)	1	E Volur	Bore Volumo ne Removed		Bore Depth (end)	<u>+                                    </u>
Time Sta Time Stop	hod rted ped		Purge Depth SWL (start)	1 ) 164-22	E Volur			Bore Depth (end) NAPL Present	<u>44-5</u>
Time Sta Time Stop Comm	hod rted ped		Purge Depth SWL (start)	1 ) 164-22	E Volur			Bore Depth (end)	£4-5°
Time Sta Time Stop Comm	hod rted ped		Purge Depth SWL (start)	1 ) 164-22	F Volur			Bore Depth (end) NAPL Present	<u> </u>
Time Sta Time Stop Comm ield Analyses	hod rted ped	EC	Purge Depth SWL (start)	1 ) 164-22	Volur Redox	ne Removed	]	Bore Depth (end) NAPL Present (If yes thickness)	£
Time Sta Time Stop Comm Tield Analyses Time	hod rted ped ents	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	1 ) )	Volur	ne Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness)	£.{-5'
Time Sta Time Stop Comm field Analyses urging Time	hod rted ped ents Vol Removed	(uS/cm) 」のとら	Purge Depth SWL (start) SWL (end)	T (C) Σβ, 9	Redox (mV)	ne Removed	d Oxygen (mg/L)	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	
Time Sta Time Stop Comm ield Analyses urging Time 11454 15:10	hod rted ped ents Vol Removed (L) ( 40	(uS/cm) १०२८ ३५ <i>१०</i>	Purge Depth SWL (start) SWL (end)	T (C) 26,9 26,6	Volur Redox (mV)	ne Removed	d Oxygen (mg/L)	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	
Time Sta Time Stop Comm ield Analyses urging Time 1% 54 15:10 15:23	hod rted ped ents Vol Removed (L) (L) (L) (L) (L) (L) (L) (L)	(uS/cm) १०२८ ३५१० ७ <b>४</b> २०	Purge Depth SWL (start) SWL (end)	$\begin{array}{c} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 $	Volur Redox (mV) - 208 - 273 - 260	ne Removed	d Oxygen (mg/L)	Comments (Color, turbidity) Clear, non function, slight \$	
Time Sta Time Stop Comm Sield Analyses Surging Time 11454 15.10	hod rted ped ents Vol Removed (L) ( 40	(uS/cm) १०२८ ३५ <i>१०</i>	Purge Depth SWL (start) SWL (end) pH <u>6:00</u> 5:19 <b>5</b> .19 <b>5</b> .19 <b>4</b> .87	T (C) 26.9 26.7 26.8	Volur Redox (mV) - 208 - 273 - 266 - 247	ne Removed	d Oxygen (mg/L) 0.7/ 0.24 0.18 0.12	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clear, non turbid, slight \$	£4-51
Time Sta Time Stop Comm Field Analyses Purging Time 1/4 54 15 · 10 15 · 23	hod rted ped ents Vol Removed (L) (L) (L) (L) (L) (L) (L) (L)	(uS/cm) १०२८ ३५१० ७ <b>४</b> २०	Purge Depth SWL (start) SWL (end) pH <u>C.oo</u> S.ig <b>5</b> .ig	$\begin{array}{c} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 $	Volur Redox (mV) - 208 - 273 - 260	ne Removed	d Oxygen (mg/L) 0.7/ 0.24 0.18	Bore Depth (end) NAPL Present (If yes thickness)	inthe c
Time Sta Time Stop Comm Field Analyses Purging Time 1/4.54 15.10 15.23 15:33	hod rted ped ents Vol Removed (L) (L) (L) (L) (L) (L) (L) (L)	(uS/cm) १०२८ ३५१० ३८२ ३४२०	Purge Depth SWL (start) SWL (end) pH <u>6:00</u> 5:19 <b>5</b> .19 <b>5</b> .19 <b>4</b> .87	T (C) 26.9 26.8 26.8 26.8	Volur Redox (mV) - 208 - 273 - 266 - 247	ne Removed	d Oxygen (mg/L) 0.7/ 0.24 0.18 0.12	Bore Depth (end) NAPL Present (If yes thickness)	inther c
Time Sta Time Stop Comm Tield Analyses Purging Time 1/4.54 $15 \cdot 10$ $15 \cdot 23$ $15 \cdot 33$ $15 \cdot 33$ $15 \cdot 44$ Sampling	hod rted ped ents Vol Removed (L) (L) (L) (L) (L) (L) (L) (L)	(uS/cm) 1026 3410 3820 3820 3870 3890	Purge Depth SWL (start) SWL (end) pH $c \cdot o o$ $5 \cdot t 9$ $5 \cdot 6$ $5 \cdot 6$ $6 \cdot 6$ $5 \cdot 6$ $6 \cdot 6$	Т Т (C) 26.9 26.7 26.8 26.8 26.8 26.8	Volur Redox (mV) - 2 0 8 - 2 7 3 - 26 0 - 247 - 247 - 247	Dissolve (%)	d Oxygen (mg/L) 0 · 7/ 0 · 24 0 · 18 0 · 12 0 · 22	Bore Depth (end) NAPL Present (If yes thickness)	inther c
Time Sta Time Stop Comm Field Analyses Purging Time 14:54 15: 23 15: 23 15: 33 15: 33 15: 44 Sampling Sampling Met	hod rted ped ents Vol Removed (L) (L) (L) (L) (L) (L) (L) (L)	(uS/cm) 1026 3410 3820 3820 3870 3890	Purge Depth SWL (start) SWL (end) pH $c \cdot o o$ $5 \cdot c q$ $g \cdot g \cdot g$ $4 \cdot g \cdot g \cdot g$ Done by: Sampling Depth	$ \begin{array}{c} T \\ \hline T \\ (C) \\ \hline 26.9 \\ \hline 26.7 \\ \hline 26.8 \\ \hline 26.8 \\ \hline 26.8 \\ \hline AW/DG \\ \hline \end{array} $	Volur Redox (mV) - 2 0 8 - 2 7 3 - 26 0 - 247 - 247 - 247	Dissolve (%) Groundwate	d Oxygen (mg/L) 0·7/ 0·24 0·18 0·18 0·12 0·22	Bore Depth (end) NAPL Present (If yes thickness)	inther c
Time Sta Time Stop Comm Tield Analyses Time Time 1% 54 15: 23 15: 23 15: 33 15: 44 Sampling Sampling Met Time Sta	hod rted ped ents Vol Removed (L) 40 $6^{\circ}$ $8^{\circ}$ $10^{\circ}$ Date: hod $15^{\circ}:45$	(uS/cm) 1026 3410 3820 3820 3870 3890	Purge Depth SWL (start) SWL (end) pH $c \cdot o o$ $5 \cdot c q$ $g \cdot g \cdot g$ $4 \cdot g \cdot g \cdot g$ Done by: Sampling Depth SWL (start)	Т (C) 26.9 26.7 26.8 26.8 26.8 26.8 26.8	Volur Redox (mV) - 2 0 8 - 2 7 3 - 2 4 6 - 2 4 7 - 2 4 7 - 2 4 7 - 2 4 7 - 2 4 7	Dissolve (%)	d Oxygen (mg/L) 0 · 7/ 0 · 24 0 · 18 0 · 12 0 · 22	Bore Depth (end) NAPL Present (If yes thickness)	inther c
Time Sta Time Stop Comm Tield Analyses Time Time 11454 15:23 15:23 15:33 15:44 ampling Sampling Met Time Sta	hod rted ped ents Vol Removed (L) 40 60 60 Date: hod rted $15^{2}45$ ped $15^{2}49$	(uS/cm) 1026 3410 3820 3820 3870 3890	Purge Depth SWL (start) SWL (end) pH $c \cdot o o$ $5 \cdot c q$ $g \cdot g \cdot g$ $4 \cdot g \cdot g \cdot g$ Done by: Sampling Depth SWL (start)	T (C) 26.9 26.9 26.7 26.8 26.8 26.8 26.8 26.8 26.8	Volur Redox (mV) - 2 0 8 - 2 7 3 - 2 4 6 - 2 4 7 - 2 4 7 - 2 4 7 - 2 4 7 - 2 4 7	Dissolve (%) Groundwate	d Oxygen (mg/L) 0·7/ 0·24 0·18 0·18 0·12 0·22	Bore Depth (end) NAPL Present (If yes thickness)	inther c

Bore Development, Purging and Groundwater Sampling Data Sheet

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Development	Date:		Done by:							
Development Metho	bd									
Time Starte					Volur	ne Removed		Bore Depth (start)		
Time Stoppe			SWL (end)		Dis	scharge Rate		Bore Depth (start) Bore Depth (end)		
Commen	its							NAPL Present		<u>.</u>
								(If yes thickness)		
`ield Analyses Development								1		
Time	Vol Removed	EC	pH	T	Redox	Dissolvo	d Oxygen	Comments	٦	
	(L)	(uS/cm)	P	(Č)	(mV)	(%)	(mg/L)	(Color, turbidity)		
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			,					,,, _,		
				· · · · · · · · · · · · · · · · · · ·			]			
urging	Date:		Done by:	AW/DG						
	Date:		Done by:	AW/DG	1464)					
Purge Metho	 Dd		Purge Depth			)	1.7/			7 en er
Purge Metho Time Starto	od		Purge Depth SWL (start)	13.67	o B	Bore Volume	1.7.1	Bore Depth (start)		385
Purge Metho	od ed		Purge Depth	13.67	o E Volun	Bore Volume ne Removed	1.7./	Bore Depth (end)		385
Purge Metho Time Starto Time Stoppo	od ed		Purge Depth SWL (start)	13.67	o B Volun	Bore Volume ne Removed	1.7./	Bore Depth (end) NAPL Present	· · · · · · · · · · · · · · · · · · ·	385
Purge Metho Time Starto Time Stoppo Commen ield Analyses	od ed		Purge Depth SWL (start)	13.67	o B Volun	Bore Volume ne Removed	1.7./	Bore Depth (end)	· · · · · · · · · · · · · · · · · · ·	385
Purge Metho Time Starto Time Stoppo Commen ield Analyses urging	2d 2d 2d ts		Purge Depth SWL (start) SWL (end)	13.67	o B Volun	ne Removed		Bore Depth (end) NAPL Present	· · · · · · · · · · · · · · · · · · ·	385
Purge Metho Time Starto Time Stoppo Commen ield Analyses	vd ed ed ts Vol Removed	EC	Purge Depth SWL (start)	13.67 T	Redox	ne Removed Dissolve	I.7. /	Bore Depth (end) NAPL Present	· · · · · · · · · · · · · · · · · · ·	385
Purge Metho Time Starto Time Stoppo Commen Tield Analyses urging Time	vd ed ed ts Vol Removed (L)	(uS/cm)	Purge Depth SWL (start) SWL (end)	13.67 T (C)	Redox (mV)	ne Removed		Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	]	
Purge Metho Time Starto Time Stoppo Commen Tield Analyses Time	Vol Removed (L)	(uS/cm) 346	Purge Depth SWL (start) SWL (end)	13.67 T (C) 7(.*	Redox (mV) - 151	ne Removed Dissolve	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	]	
Purge Metho Time Starto Time Stoppo Commen ield Analyses urging Time	Vol Removed (L) <b>2</b> . <b>7</b> <b>5</b> . 9	(uS/cm) 346 345	Purge Depth SWL (start) SWL (end)	T (C) 25.7	Redox (mV) - <i>i \$ 1</i> ~ <i>i \$ 2</i>	ne Removed Dissolve	d Oxygen (mg/L)	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Park 5-29 born	]	
Purge Metho Time Starto Time Stoppo Commen Tield Analyses urging Time	Vol Removed (L)	(uS/cm) 346	Purge Depth SWL (start) SWL (end)	13.67 T (C) 7(.*	Redox (mV) - 151	ne Removed Dissolve	d Oxygen (mg/L) / · 3 6	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	]	
Time Starte Time Stoppe Commen Tield Analyses Purging Time 15:10 15:15 16:20	vd ed ts Vol Removed (L) 27.7 5.9 7.5	(uS/cm) 346 345	Purge Depth SWL (start) SWL (end) pH 5.15 4.87 4.76	T (C) 2(.+ 2.5.7 25.6	Redox (mV) - <i>i \$ 1</i> ~ <i>i \$ 2</i>	ne Removed Dissolve	d Oxygen (mg/L) [·36 / <b>3</b> 2	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Park 5-cy 5-cm	50-2	
Purge Metho Time Starto Time Stoppo Commen ield Analyses urging Time i 5:10 15:15 15:20	Vol Removed (L) <b>2</b> . <b>7</b> <b>5</b> . 9	(uS/cm) 346 345	Purge Depth SWL (start) SWL (end)	T (C) 2(.+ 2.5.7 25.6	Redox (mV) - <i>i \$ 1</i> ~ <i>i \$ 2</i>	ne Removed Dissolve	d Oxygen (mg/L) [·36 / <b>3</b> 2	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Park 5-cy 5-cm	50-2	
Purge Metho Time Starto Time Stoppo Commen ield Analyses urging Time 15:10 15:15 16:20 ampling Sampling Metho	$\frac{\sqrt{1}}{\sqrt{1}}$	(uS/cm) 346 345 35 <b>4</b>	Purge Depth SWL (start) SWL (end) PH 5.15 4.87 4.87 4.76 Done by: 4 ampling Depth	T (C) 2ζ.τ 2ζ.τ 2ζ.τ Δ.ζ	Redox (mV) - i\$1 ~i\$2 -149	Dissolve (%)	d Oxygen (mg/L) [·36 / <b>3</b> 2	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Roch 5-22 b-200 i	5 or e .	
Purge Metho Time Starto Time Stoppo Commen ield Analyses urging Time ising ising ising Time ising Sampling Metho Time Starto	od	(uS/cm) 346 345 35 <b>4</b>	Purge Depth SWL (start) SWL (end) PH So 15 4 . 87 La - 76 Done by: ampling Depth SWL (start)	T (C) 2.5.7 2.5.7 2.5.7 2.5.7 λW/DG	$ \begin{array}{c} \text{Redox} \\ (mV) \\ -151 \\ \sim 152 \\ -146 \\ \hline \end{array} $	Dissolve (%)	d Oxygen (mg/L) [·36 [·32 6.4	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Park 5-cy born	5 or e .	
Purge Metho Time Starto Time Stoppo Commen Field Analyses Purging Time 15:10 15:15 16:20 ampling Sampling Metho	od	(uS/cm) 346 345 35 <b>4</b>	Purge Depth SWL (start) SWL (end) PH 5.15 4.87 4.87 4.76 Done by: 4 ampling Depth	T (C) 2.5.7 2.5.7 2.5.7 2.5.7 λW/DG		Dissolve (%) Groundwate	d Oxygen (mg/L) [·36 ]·32 & 4 r Disposal R	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Roch 5-22 b-222 i	5 or e .	

Bore Development, Purging and Groundwater Sampling Data Sheet

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BORE No: PZ OFS

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 EC рН Т Dissolved Oxygen Redox Comments (L) (uS/cm) (C) (mV) (%) (mg/L)(Color, turbidity) Date: 9/9/08 Purging Done by: AW/DG Purge Method AP2 Pump Purge Depth Time Started 10:3 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 EC pН Τ Dissolved Oxygen Redox Comments (uS/cm) (L) (C) (mV)(%) (mg/L)(Color, turbidity) 11:01 109 26 1.01 0.63 Clear, black and Spandeling 12:00 40 -263 064 11 11 Sulla 60 167 8 0.47 11 11 13:08 80 1075 8 -268 7. 0.05 11 11 Sampling Date: Done by: AW/DG Sampling Method Sampling Depth **Groundwater Disposal Record** Time Started 13:09 SWL (start) Date Litres Disposal method Time Stopped 3 SWL (end) 68.29 devmt Comments purging Bore Development, Purging and Groundwater Sampling Data Sheet Page 1 of 1 10/9/08 SWL 38.2m Checked By:....

BORE No:  $f_2 05$ 

BORE No: P2 09

Project N	No 42626162	Project Name	BMA Caval I	Ridge Groundw	ater			
Development	Date:		Done by:					
Development Metho	od							
Time Start			SWL (start)	••••	Volu	me Removed	l	Bore Depth (start)
Time Stopp			SWL (end)		D	ischarge Rate		Bore Depth (end)
Commer	nts							NAPL Present
Field Analyses					····			(If yes thickness)
Development								
Time	Vol Removed	EC	рН	Т	Redox	Discolus	d Oxygen	
	(L)	(uS/cm)	PIL	(C)	(mV)	(%)	(mig/L)	Comments (Color, turbidity)
		(422)			(11.4)	(70)	(112/15)	
			······		10 Mart 1997 1997 1997 1997 1997 1997 1997 199			
			······································		***************************************			
·								
Purging	Date:	8/9/08	Done by:	AW/DG				······································
Commer Field Analyses	ed 16:36 cd 17:39 nts			23.050 m	γ Volu	me Removed		Bore Depth (end) NAPL Present (If yes thickness)
Purging								
Time	Vol Removed	EC	pН	Т	Redox	Dissolve	d Oxygen	Comments
16:40		(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)
17:02		_1013	7.60	27.5	-308		0.62	Clear Strong Sullar
12.77	40	7640	7.28	27.8	-280		0.49	· · · · · · · · · · · · · · · · · · ·
17.31					-229		0.24	
17 :38	90	12 480	7.15	27.8	-22 8 -234		0.27	
Sampling	Date:		Done by:		<u> </u>			<u> </u>
	-							
a								
Sampling Metho		Sa	mpling Depth	<u> </u>	Ŧ	Groundwate		
Time Starte	ed 17:39	Sa	SWL (start)	23.050 m	Ī.	Groundwate Date	r Disposal Ro Litres	cord Disposal method
Time Starte Time Stoppe	ed 17:39 ed 17:41	Sa	SWL (start)	23.050 m 23.050 m	devmt			
Time Starte	ed 17:39 ed 17:41	Sa	SWL (start)	23.050 m 23.050 m	Ī.			
Time Starte Time Stoppe	ed 17:39 ed 17:41	Sa	SWL (start)	23.050 m 23.050 m	devmt			

Bore Development, Purging and Groundwater Sampling Data Sheet

Project ] Development	Data		e BMA Caval		······································			Language and the set of the descent set of the set of t
			Done by:		-			
Development Meth								
Time Star			SWL (start)		Volu	ne Removed	J	Bore Depth (start)
Time Stopp			SWL (end)		Di	scharge Rate	>	Bore Depth (end)
Comme	nts							NAPL Present
ield Analyses	~							(If yes thickness)
Development								
Time	Vol Removed	EC	pН	Т	Redox	Dissolve	d Oxygen	Comments
	(L)	(uS/cm)	P · · ·	(C)	(mV)	(%)	(mg/L)	(Color, turbidity)
						(/0)	(((1)))	(Color, this duty)
					-		-	
,,,,,,,								·····
		- 1 - 2						
'urging	Date:	8/9/08	Done by:	AW/DG				
				AW/DO				
Dunga Math					-			
Purge Meth			Purge Depth		-			
Purge Meth Time Start Time Storn	od <u>AP2</u> Pur od 14-22		Purge Depth		- - F	Bore Volume		Bore Depth (start) 58.135 m
Time Stopp	od <u>AP2 Pux</u> cd <u>14-22</u> cd		Purge Depth		- E Volut	Bore Volume ne Removed	;	Bore Depth (end)
Purge Meth Time Start Time Stopp Commen	od <u>AP2 Pux</u> cd <u>14-22</u> cd		Purge Depth		- E Volur	Bore Volume ne Removed	;	Bore Depth (end) NAPL Present
Time Stopp	od <u>AP2 Pux</u> cd <u>14-22</u> cd		Purge Depth		E Volut	Bore Volume ne Removec	·	Bore Depth (end)
Time Stopp Commen Field Analyses Purging	od <u>AP2 Puz</u> cd <u>14 22</u> cd nts	np	Purge Depth		- - H - Volut	Bore Volume ne Removed	·	Bore Depth (end) NAPL Present
Time Stopp Comme	od $AP2 Puz$ ed $14 - 22$ cd	EC	Purge Depth	<u>11.997</u> 28.60 м т	- E Volur Redox	ne Removed	d Oxygen	Bore Depth (end) NAPL Present
Time Stopp Commen Field Analyses Purging Time	od $\underline{AP2} \underline{Pux}$ ed $\underline{14 - 22}$ cd $\underline{14 - 22}$ its $\underline{}$ Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	<u>11.997</u> 28.60 м Т (С)	Redox (mV)	ne Removed		Bore Depth (end) NAPL Present (If yes thickness)
Time Stopp Commen Field Analyses Purging Time	od <u>AP2</u> <u>Pur</u> ed <u>14 22</u> ed nts Vol Removed (L) <u>O15</u>	EC (uS/cm) 3120	Purge Depth SWL (start) SWL (end) pH 7.28	11.997 m 28.60 m T (C) 27.2	Redox (mV) -298	Dissolve	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness)
Time Stopp Commen Field Analyses Purging Time 14 : 24	od <u>AP2</u> <u>Pur</u> ed <u>14-22</u> ed nts Vol Removed (L) <u>0.5</u> <del>2.0</del>	EC (uS/cm) 3120 3760	Purge Depth SWL (start) SWL (end) pH 7.28 7.35	<u>11.997 </u> 28.60 м Т (С) 27.2 27.2	Redox (mV) -298 -307	Dissolve	d Oxygen (mg/L) 0.71 0.17	Bore Depth (end) NAPL Present (If yes thickness)
Time Stopp Commen Field Analyses Purging Time 14 : 24 14 : 24 14 : 43	od $AP2$ $Pux$ ed $14 - 22$ ed its Vol Removed (L) 0.5 20 40	EC (uS/cm) 3/20 3760 3200	Purge Depth SWL (start) SWL (end) pH 7.28 7.35 7.35 7.54	11.997 m 28.60 m (C) 27.2 27.0 2.1.1	Redox (mV) -298 -307 -314	Dissolve	d Oxygen (mg/L) 0.71 0.17 0.05	Bore Depth (end) NAPL Present (If yes thickness)
Time Stopp Commen Field Analyses Purging Time 14 : 24 14 : 24 14 : 43	od $AP2$ $Pux$ ed $14 - 22$ cd its Vol Removed (L) 0.5 20 40 80	EC (uS/cm) 3120 3760 3200 7040	Purge Depth SWL (start) SWL (end) pH 7.28 7.35 7.56	T 28.60 m T (C) 27.7 27.0 2.1.1 2.7.3	Redox (mV) 298 307 314 309	Dissolve	d Oxygen (mg/L) 0.71 0.17 0.06 0.08	Bore Depth (end) NAPL Present (If yes thickness)
Time Stopp Commen Field Analyses Purging Time 14:24 14:24 14:24 14:3 15:14 15:31	od $AP2$ $Pux$ ed $14 - 22$ cd $14 - 22$ otherwork (L) 0.5 20 40 80 100	EC (uS/cm) 3/20 3760 3200	Purge Depth SWL (start) SWL (end) PH 7.28 7.35 7.56 7.56 7.62	11.997 m 28.60 m Т (С) 27.2 27.0 2.1.1 2.7.3 2.7.5	Redox (mV) -298 -307 -314	Dissolve	d Oxygen (mg/L) 0.71 0.17 0.06 0.08 0.08	Bore Depth (end) NAPL Present (If yes thickness)
Time Stopp Commen Field Analyses Purging Time 14 : 24 14 : 24 14 : 43	od $AP2$ $Pux$ ed $14 - 22$ cd its Vol Removed (L) 0.5 20 40 80	EC (uS/cm) 3120 3760 3200 7040 8650	Purge Depth SWL (start) SWL (end) pH 7.28 7.35 7.56	11.997 m 28.60 m Т (С) 27.2 27.0 2.1.1 2.7.3 2.7.5	Redox (mV) 298 307 314 309	Dissolve	d Oxygen (mg/L) 0.71 0.17 0.06 0.08	Comments (Color, turbidity) Clear Sulfur oclour dur & 1 Clear Sulfur oclour
Time Stopp Commen Field Analyses Purging Time 14:24 14:24 14:24 14:24 15:14 15:31 Sampling	od $AP2$ $Pux$ ed $14 - 22$ ed its Vol Removed (L) 0.5 20 40 80 100 Date:	EC (uS/cm) 3120 3760 3200 7040 8650 8650	Purge Depth SWL (start) SWL (end) PH 7.28 7.35 7.35 7.56 7.56 7.62 Done by:	11.997щ 28.60 м 28.60 м (C) 27.2 27.2 27.5 2.3.1 27.3 27.5 АW/DG	Redox (mV) -298 -307 -307 -309 -309 -261	Dissolve (%)	d Oxygen (mg/L) 0.71 0.17 0.08 0.08 0.08 0.01 0.90	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clear Sulfer oclour Clear, Sulfer oclour Clear, Sulfer oclour, bubbles on 11 1 1 1 1 1 1 1 1
Time Stopp Commen Field Analyses Purging Time 14 : 24 14 : 24 14 : 24 14 : 24 14 : 24 15 : 14 15 : 14 15 : 3 15 Sampling Sampling Meth	od $AP2$ $Pux$ ed $14 - 22$ ed $22$ ed $14 - 22$ ed	EC (uS/cm) 3120 3760 3200 7040 8650 8650	Purge Depth SWL (start) SWL (end) pH 7.28 7.35 7.56	11.997щ 28.60 м 28.60 м (C) 27.2 27.0 2.1.1 27.3 27.5 АW/DG	Redox (mV) -298 -307 -307 -309 -309 -261	Dissolve (%)	d Oxygen (mg/L) 0.71 0.17 0.08 0.08 0.08 0.01 0.90 r Disposal R	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clear Sulfur ordow clear, & 1 4 no ordow 11 11 2 ccord
Time Stopp Commen Field Analyses Purging Time 14:24 14:24 14:24 14:24 14:3 15:14 15:3] Sampling Sampling Meth Time Start	od $AP2$ $Pux$ ed $14 - 22$ ed $14 - 22$ ed $15 - 22$ Vol Removed (L) 0.5 2.0 4.0 80 100 Date: ed $15 : 31$	EC (uS/cm) 3120 3760 3200 7040 8650 8650	Purge Depth SWL (start) SWL (end) pH 7.28 7.35 7.56	<u>11.997</u> 28.60 м 28.60 м (С) 27.7 27.0 2.7.0 2.7.3 27.5 ЛW/DG	Redox (mV) -298 -307 -307 -309 -261	Dissolve (%)	d Oxygen (mg/L) 0.71 0.17 0.08 0.08 0.08 0.01 0.90	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clear Sulfer oclour Clear, Sulfer oclour Clear, Sulfer oclour, bubbles on 11 1 1 1 1 1 1 1 1
Time Stopp Commen Field Analyses Purging Time 14:24 14:24 14:24 15:14 15:31 Sampling Sampling Meth Time Start Time Stopp	od $AP2$ $Puz$ ed $14 - 22$ ed $14 - 22$ ed $15 - 22$ Vol Removed (L) 0.5 20 40 80 100 Date: od ed $15:31$ ed $15:35$	EC (uS/cm) 3120 3760 3200 7040 8650 8620 Si	Purge Depth SWL (start) SWL (end) PH 7-28 7-35 7-56 7-56 7-62 Done by: ampling Depth SWL (start) SWL (end)	<u>Т</u> (C) 27.7 27.7 27.3 27.5 АW/DG 28.60 m 28.640 m	$ \begin{array}{c}     Redox \\     (mV) \\     -298 \\     -307 \\     -307 \\     -309 \\     -261 \\     \\     devmt \end{array} $	Dissolve (%)	d Oxygen (mg/L) 0.71 0.17 0.08 0.08 0.08 0.01 0.90 r Disposal R	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clear Sulfur ordow clear, & 1 4 no ordow 11 11 2 ccord
Time Stopp Commen Field Analyses Purging Time 14:24 14:24 14:24 14:24 14:3 15:14 15:3] Sampling Sampling Meth Time Start	od $AP2$ $Pux$ ed $14 - 22$ ed its Vol Removed (L) 0.5 20 40 30 100 Date: od ed $15:31$ ed $15:35$	EC (uS/cm) 3120 3760 3200 7040 8650 8620 Si	Purge Depth SWL (start) SWL (end) pH 7.28 7.35 7.56	<u>Т</u> (C) 27.7 27.7 27.3 27.5 АW/DG 28.60 m 28.640 m	Redox (mV) -298 -307 -307 -309 -261	Dissolve (%)	d Oxygen (mg/L) 0.71 0.17 0.08 0.08 0.08 0.01 0.90 r Disposal R	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clear Sulfur ordow clear, & 1 4 no ordow 11 11 2 ccord

Bore Development, Purging and Groundwater Sampling Data Sheet

Page 1 of 1

Checked By:....

BORE No: Pz11-D

Project No	0 42626162	Project Name	BMA Caval	Ridge Ground					
Development						<u>. 1997 (m. 1997)</u>			
Development Method Time Started	1		- SWL (start)			me Removed	11	Bore Depth (start)	
Time Stopped Comments		n mit,	SWL (end)		Di	scharge Rate	e	Bore Depth (end) NAPL Present	
Field Analyses Development								(If yes thickness)	
Time	Vol Removed (L)	EC (uS/cm)	рН	T (C)	Redox (mV)	Dissolvo (%)	ed Oxygen (mg/L)	Comments (Color, turbidity)	
								-	·
Purging	Date:	8/9/08	Done by:	AW/DG	•••••				
Purge Method Time Started Time Stopped Comments Field Analyses			Purge Depth SWL (start) SWL (end)	Dry	I	Bore Volume me Removee		Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)	•
Purging									
Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolve (%)	ed Oxygen (mg/L)	Comments (Color, turbidity)	
								· · · · · · · · · · · · · · · · · · ·	
Sampling	Date:		Done by:	AW/DG					
Sampling Method		Sa	mpling Depth	·····		Groundwate	er Disposal R	ecord	
Time Started Time Stopped Comments			SWL (start)			Date	Litres	Disposal method	
					· · · · · · · · · · · · · · · · · · ·				

Bore Development, Purging and Groundwater Sampling Data Sheet

Checked By:....

BORE No: Pz11-5

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BORE No:Pz 10

(AntidayAdda

Development	Date:		Done by:							
Development Method										
Time Started			SWL (start)	)	Volu	me Removed	đ	Bore Depth (start)		
Time Stopped			SWL (end)	)		scharge Rat		Bore Depth (end)		
Comments	s					-		NAPL Present		
ield Analyses								(If yes thickness)		
evelopment										
Time	Vol Removed	EC	pH	Т	Redox	Dissolve	ed Oxygen	Comments	1	
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)		
	······································									
								· · · · · · · · · · · · · · · · · · ·		
		////////							J	
troing	Date	C14/08	Done by:	AW/DC						
urging	Date:	8/4/08	Done by:	AW/DG						
Purge Method	AP2 par	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Purge Depth	1			·			
Purge Methoo Time Started	AP2 pma	γ.	Purge Depth	1	I	Bore Volum		Bore Depth (start)	86.6.	
Purge Method Time Started Time Stopped	AP2 pma 11:47 13:03	γ.	Purge Depth		_ I Volu	Bore Volume me Remove		Bore Depth (start) Bore Depth (end)		
Purge Methoo Time Started	AP2 pma 11:47 13:03	γ.	Purge Depth	1	I Volu			Bore Depth (end) NAPL Present		
Purge Method Time Started Time Stopped Comments	AP2 pma 11:47 13:03	γ.	Purge Depth	1	I Volu			Bore Depth (end)		
Purge Method Time Started Time Stopped Comments	AP2 pma 11:47 13:03	γ.	Purge Depth	1	I Volu			Bore Depth (end) NAPL Present		
Purge Method Time Started Time Stopped Comments	AP2 pma 11:47 13:03	γ.	Purge Depth SWL (start SWL (end)	1		me Removed	]	Bore Depth (end) NAPL Present (If yes thickness)		
Purge Method Time Started Time Stopped Comments ield Analyses urging Time	AP2 pm 11:47 13:03 Vol Removed (L)	Υ·· EC (uS/cm)	Purge Depth	T (C)	Redox (mV)	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments		
Purge Method Time Started Time Stopped Comments ield Analyses urging Time		¥ · EC (uS/cm) 986	Purge Depth SWL (start SWL (end)	1 <b>41.858</b> · <b>43.41</b>	Redox (mV)	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)		orlow
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 12:00 12:19	$ \frac{AP2}{11:47} $ $ \frac{11:47}{13:03} $ Vol Removed (L) $ \frac{10}{20} $	EC (uS/cm) 986 1013	Purge Depth SWL (start) SWL (end) pH	T T T (C) 29.0	Redox (mV) 246	me Removed	d Oxygen (mg/L) 0.52	Bore Depth (end) NAPL Present (If yes thickness) Comments		odour hie
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 12:00 12:19		EC (uS/cm) 986 1013	Purge Depth SWL (start SWL (end) pH	T (C) 28.7 28.7	Redox (mV) 246 249 238	me Removed	d Oxygen (mg/L) 0-5-2 0-29	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)		oclour i bu
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 12:00 12:19 12:29 2		EC (uS/cm) 986 1013	Purge Depth SWL (start SWL (end) pH 7.45 7.44 7.44 7.23	T (C) 28.7 28.8	Redox (mV) 246 249 238	me Removed	ed Oxygen (mg/L) 0.52 0.29 0.30	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clear, black particl 11 11 4	et, sulfar,	ÔN
Purge Method Time Started Time Stopped Comments eld Analyses irging Time 12:00 12:19		EC (uS/cm) 986 1013	Purge Depth SWL (start SWL (end) pH 7.45 7.44 7.44	T (C) 28.7 28.7	Redox (mV) 246 249	me Removed	d Oxygen (mg/L) 0-5-2 0-29	Bore Depth (end)         NAPL Present         (If yes thickness)         Comments         (Color, turbidity)         Clear, black particle         11         11         11         11		odour on
Purge Method Time Started Time Stopped Comments eld Analyses arging Time 12:00 12:92 12:47 12:47 13:03		EC (uS/cm) 986 1013	Purge Depth SWL (start SWL (end) pH 7.45 7.44 7.44 7.23	T (C) 28.7 28.8 28.7	Redox (mV) 246 249 238	me Removed	ed Oxygen (mg/L) 0.52 0.29 0.30	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clear, black particl 11 11 L 4	et, sulfar,	ÔN
Purge Method Time Started Time Stopped Comments eld Analyses arging Time 12:00 12:19 12:47 12:47 13:03 umpling		EC (uS/cm) 986 1013 98-030 9190 9190 9090	Purge Depth SWL (start, SWL (end) pH 7.45 7.44 $\overline{7.23}$ 7.24 Done by:	T (C) 28.7 28.7 28.7 28.7 AW/DG	Redox (mV) 246 249 238 232 233	Dissolve (%)	d Oxygen (mg/L) 0.52 0.29 0.27 0.24	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clear, black particle 11 11 L 4 L 4 L 11	et, Sulfar,	ÔN
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 12.00 12.19 12.92 12.47 12.47 13.03 umpling Sampling Method		EC (uS/cm) 986 1013 98-030 9190 9190 9090	Purge Depth SWL (start SWL (end) pH 7.45 7.44 7.23 7.24 Done by: ampling Depth	T (C) 29.0 28.7 28.7 28.8 28.7 AW/DG	Redox (mV) 246 249 238 232 233	Dissolva (%) Groundwat	ed Oxygen (mg/L) 0.52 0.29 0.30 0.27 0.24 er Disposal R	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clar, black particle 11 11 L 4 L 4 L 11	et, Sulfar,	ÔN
Purge Method Time Started Time Stopped Comments eld Analyses urging Time 12:00 12:19 12:32 12:47 13:33 umpling Sampling Method Time Started		FC (uS/cm) 986 1013 88-030 9190 9090 9090 58	Purge Depth SWL (start) SWL (end) pH 7.45 7.44 7.24 7.24 Done by: ampling Depth SWL (start)	T 41.858. 43.41 T (C) 29.0 28.7 28.7 28.7 AW/DG	Redox (mV) 246 249 232 232 233	Dissolve (%)	d Oxygen (mg/L) 0.52 0.29 0.27 0.24	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clear, black particle 11 11 L 4 L 4 L 11	et, Sulfar,	ÔN
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 12:00 12:19 12:92 12:47 13:03 ampling Sampling Method	$ \begin{array}{c}                                     $	FC (uS/cm) 986 1013 88-030 9190 9090 9090 58	Purge Depth SWL (start SWL (end) pH 7.45 7.44 7.23 7.24 Done by: ampling Depth	T 41.858. 43.41 T (C) 29.0 28.7 28.7 28.7 AW/DG	Redox (mV) 246 249 238 232 233	Dissolva (%) Groundwat	ed Oxygen (mg/L) 0.52 0.29 0.30 0.27 0.24 er Disposal R	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) Clar, black particle 11 11 L 4 L 4 L 11	et, Sulfar,	ÔN

Bore Development, Purging and Groundwater Sampling Data Sheet

1 10

Development	Date:		Done by:						
Development Method					· .				
Time Started			- SWL (start)		Volu	me Removed		Bora Depth (stort	•
Time Stopped			SWL (end)		Di	scharge Rate	·	Bore Depth (start Bore Depth (end	·)
Comments								NAPL Presen	
							·	(If yes thickness	
Field Analyses						~		(11 yes therefores	Ŋ
Development									
Time	Vol Removed	EC	pН	Т	Redox	Dissolve	d Oxygen	Comments	7
	(L)	(uS/cm)			(mV)	(%)	(mg/L)	(Color, turbidity)	
				- 					-
		····							
vvv				·					
				· · · · · ·					
	I	n-1.1.							
Purging	Date:	27/2/09	Done by:	AW/SS					
Time Stopped Comments			SWL (end)	29.997, 30.51 W	Volui	me Removed	·, ·	NAPL Presen	t
Comments Field Analyses			SWL (end)	30.51 m		me Removed		Bore Depth (start Bore Depth (end NAPL Presen (If yes thickness	t
Comments Field Analyses Purging		EC	SWL (end)	30.5 W	L Volu			NAPL Presen (If yes thickness	t
Comments Field Analyses	Vol Removed	EC (11S/cm)	SWL (end)	<u>30.5</u> W	Volui	Dissolve	d Oxygen	NAPL Presen (If yes thickness Comments	t
Comments Field Analyses Purging Time	Vol Removed (L)	(uS/cm)	SWL (end)	<u>30.5</u> W	Volui Redox (mV)	Dissolve (%)	d Oxygen (mg/L)	Comments (Color, turbidity)	t )
Comments Field Analyses Purging Time 17:16:39 -> 50	Vol Removed (L) 30 35	(uS/cm) 1900	SWL (end)	<u>30.5</u> (C) 27.0	Kedox         (mV)           - 182         - 182	Dissolve	d Oxygen (mg/L) Q• <b>55</b>	Comments (Color, turbidity)	t )
Comments Field Analyses Purging Time 17:16:39 -> 50 17:33	Vol Removed (L) 30 35 60	(uS/cm) 1900 1871	pH 6.67 6.84		Redox         (mV)           ~ 182         ~ 149	Dissolve (%)	d Oxygen (mg/L) 0.55 0.37	Comments (Color, turbidity) (LUGAZ SUGHT TURBID - SUCCOM	t ) e. f. STE CE alerine care
Comments Field Analyses Purging $17:16:39 \rightarrow 50$ 17:33 17:56	Vol Removed (L) <u>30</u> 35 60 GO	(uS/cm) 1900 1871 1842	pH 6.67 6.84 6^94	30.5 W	Redox (mV)           - 182           ~ 149           - 140	Dissolve (%)	d Oxygen (mg/L) 0.55 0.37 0.45	NAPL Presen (If yes thickness Comments (Color, turbidity) UBAZ SUGHT TUABID - SuccessCLEAR SUGHT TUBID - SuccessCLEAR SUGHT TUBID - Success	t STECE STECE
Comments Field Analyses Purging Time 17:16:39 -> 50 17:33	Vol Removed (L) 30 35 60	(uS/cm) 1900 1871	pH 6.67 6.84		Redox         (mV)           ~ 182         ~ 149	Dissolve (%)	d Oxygen (mg/L) 0.55 0.37	Comments (Color, turbidity) (LUGAZ SUGHT TURBID - SUCCOM	t ) e. f. STE CE alerine care
Comments Field Analyses Purging $17:16:39 \rightarrow 50$ 17:33 17:56	Vol Removed (L) 300 35 60 60 123	(uS/cm) 1900 1871 1842	SWL (end) pH 6.67 6.84 6^94	T       (C)       27.0       26.8       26.3       25.9	Redox (mV)           - 182           ~ 149           - 140	Dissolve (%)	d Oxygen (mg/L) 0.55 0.37 0.45	NAPL Presen (If yes thickness Comments (Color, turbidity) UBAZ SUGHT TUABID - SuccessCLEAR SUGHT TUBID - SuccessCLEAR SUGHT TUBID - Success	t STECE STECE
Comments Field Analyses Purging Time $17:16:39 \rightarrow 50$ 17:33 17:36 18:22:14 Sampling	Vol Removed (L) <u>\$0</u> 35 60 GO 123 Date: 2	(US/0m) 1900 1871 1842 1813 1813	SWL (end) pH 6.67 6.84 6.84 6.89 Done by:	T       (C)       27.0       26.3       25.9	Redox (mV)           ~ 182           ~ 149           ~ 149           ~ 149           ~ 143	Dissolver (%)	d Oxygen (mg/L) O·55 O·37 O·45 O·30	NAPL Presen (If yes thickness Comments (Color, turbidity) UBA SUGHT TURBID - Success (LEAR SUGHT TURBID - Success II II II II CLEAR USS TURBID	t STECE STECE
Comments Field Analyses Purging Time $17:16:39 \rightarrow 50$ 17:33 17:33 17:34 17:35 17:34 17:35	Vol Removed (L) 30 35 60 90 123 Date: 2	(US/0m) 1900 1871 1842 1813 1813	SWL (end) pH 6.67 6.84 6.84 6.89 Done by: ampling Depth	30.5 ₩ (C) 27.0 26.3 25.9 AW/SS	Redox (mV)           ~ 182           ~ 149           ~ 149           ~ 149           ~ 143	Dissolved (%)	d Oxygen (mg/L) O·55 O·37 O·45 O·30 r Disposal R	NAPL Presen (If yes thickness Comments (Color, turbidity) LLEAR SUGHT TURBID - SUCCE (LEAR SUGHT TURBID - SUCCE USS TURBID CLEAR USS TURBID	t STECE STECE
Comments Field Analyses Purging Time $17:16:39 \rightarrow 50$ 17:33 17:33 17:34 17:35	Vol Removed (L) 30 35 60 GO 123 Date: 2	(US/0m) 1900 1871 1842 1813 1813	SWL (end) pH 6.67 6.84 6.94 6.89 Done by: ampling Depth SWL (start)	Jo     Jo       T     (C)       27.0     26.8       26.3     25.9       AW/SS	Redox (mV)           ~ 182           ~ 149           ~ 149           ~ 149           ~ 149           ~ 140	Dissolver (%)	d Oxygen (mg/L) O·55 O·37 O·45 O·30 r Disposal R	Comments (Color, turbidity) (Color, turbidity) (Col	t STECE STECE
Comments Field Analyses Purging Time $17:16:39 \rightarrow 50$ 17:33 17:33 17:34 17:35 17:34 17:35	Vol Removed (L) 30 35 60 GO 123 Date: 2	(US/0m) 1900 1871 1842 1813 1813	SWL (end) pH 6.67 6.84 6.84 6.89 Done by: ampling Depth	Jo     Jo       T     (C)       27.0     26.8       26.3     25.9       AW/SS	Redox (mV)           ~ 182           ~ 149           ~ 149           ~ 149           ~ 149           ~ 149           ~ 140           ~ 132	Dissolved (%)	d Oxygen (mg/L) O·55 O·37 O·45 O·30 r Disposal R	NAPL Presen (If yes thickness Comments (Color, turbidity) LLEAR SUGHT TURBID - SUCCE (LEAR SUGHT TURBID - SUCCE USS TURBID CLEAR USS TURBID	t STECE STECE
Comments Field Analyses Purging Time $17:16:39 \rightarrow 50$ $17:16:39 \rightarrow 50$	Vol Removed (L) 30 35 60 GO 123 Date: 2	(US/0m) 1900 1871 1842 1813 1813	SWL (end) pH 6.67 6.84 6.94 6.89 Done by: ampling Depth SWL (start)	Jo     Jo       T     (C)       27.0     26.8       26.3     25.9       AW/SS	Redox (mV)           ~ 182           ~ 149           ~ 149           ~ 149           ~ 149           ~ 140	Dissolved (%)	d Oxygen (mg/L) O·55 O·37 O·45 O·30 r Disposal R	Comments (Color, turbidity) (Color, turbidity) (Col	t STECE STECE
Comments Field Analyses Purging Time $17:16:39 \rightarrow 50$ $17:16:39 \rightarrow 50$	Vol Removed (L) 30 35 60 GO 123 Date: 2	(US/0m) 1900 1871 1842 1813 1813	SWL (end) pH 6.67 6.84 6.94 6.89 Done by: ampling Depth SWL (start)	Jo     Jo       T     (C)       27.0     26.8       26.3     25.9       AW/SS	Redox (mV)           ~ 182           ~ 149           ~ 149           ~ 149           ~ 149           ~ 149           ~ 140           ~ 132	Dissolved (%)	d Oxygen (mg/L) O·55 O·37 O·45 O·30 r Disposal R	Comments (Color, turbidity) (Color, turbidity) (Col	t STECE STECE
Comments Field Analyses Purging Time $17:16:39 \rightarrow 50$ $17:16:39 \rightarrow 50$	Vol Removed (L) 30 35 60 GO 123 Date: 2	(uS/om) 1900 1871 1842 1813 27-02-09 Si	SWL (end) pH 6.67 6.84 6.94 6.89 Done by: ampling Depth SWL (start)	Jo     Jo       T     (C)       27.0     26.8       26.3     25.9       AW/SS	$ \begin{array}{c c}                                    $	Dissolved (%)	d Oxygen (mg/L) O·55 O·37 O·45 O·30 r Disposal R	Comments (If yes thickness (Color, turbidity) (Color, turbidity) (Colo	t STECE STECE

BORE No:  $P_206 - D$ 

Development	Date:		Done by:							
Development Method			_							
Time Started			SWL (start)		Volu	ne Removed		Bore Depth (start)		
Time Stopped			SWL (end)		Di	scharge Rate	· · · · · · · · · · · · · · · · · · ·	Bore Depth (end)		
Comments				·				NAPL Present		
		i						(If yes thickness)		
Field Analyses Development										
Time	Vol Removed	EC	pH	Т	Redox	Dissolve	d Oxygen	Comments	1	
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)		
			•				<u></u>	(10,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,		
		·							· · · ·	
	<u> </u>									
urging Purge Method Time Started Time Stopped		27/2/0	Purge Depth SWL (start)	76914		Bore Volume	6.1	Bore Depth (start)	2.29.40M	
Purge Method Time Started Time Stopped Comments	Bailer	27/2/0	Purge Depth SWL (start)		<u>n</u> I <u>N</u> Volu	Bore Volume me Removed	<b>8</b> 6, 1	Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)		
Purge Method Time Started Time Stopped Comments Field Analyses Purging	Bailer		Purge Depth SWL (start)	76914	<u>n</u> I <u>N</u> Volu	Bore Volume me Removed	6.1	Bore Depth (end) NAPL Present		
Purge Method Time Started Time Stopped Comments Field Analyses	Bailer	EC	Purge Depth SWL (start)	26.214 r 26.28 r	n I M Volu Redox	me Removed		Bore Depth (end) NAPL Present (If yes thickness)		
Time Started Time Stopped Comments Field Analyses Purging Time	Bailer	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	26.214 m 26.28 m T (C)	Redox (mV)	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness)	· · · · · · · · · · · · · · · · · · ·	
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Bailer Vol Removed	EC	, Purge Depth SWL (start) SWL (end)	26.214 r 26.28 r	M Volu Redox	me Removed	d Oxygen (mg/L) 2 55	Bore Depth (end) NAPL Present (If yes thickness)	· · · · · · · · · · · · · · · · · · ·	НСо
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)	EC (uS/cm) 1703 1780	Purge Depth SWL (start) SWL (end)	26.214 r 26.28 r 7 (C) 25-3 25-2	Redox (mV)	Dissolve (%)	d Oxygen (mg/L) 255	Comments (Color, turbidity)	· · · · · · · · · · · · · · · · · · ·	НСо
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Bailer Vol Removed	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	26.214 m 26.28 m T (C)	Redox (mV)	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness)	· · · · · · · · · · · · · · · · · · ·	НСо
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)	EC (uS/cm) 1703 1780	Purge Depth SWL (start) SWL (end) pH 7.61 7.60 7.67	26.214 r 26.28 r 7 (C) 25-3 25-2	Redox (mV)	Dissolve (%)	d Oxygen (mg/L) 255	Comments (Color, turbidity)	· · · · · · · · · · · · · · · · · · ·	НCо
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 17-47 18-08 18-19	Bailer Vol Removed (L) . 6, 1 12, 2 18.3	EC (uS/cm) 1703 1780	Purge Depth SWL (start) SWL (end) pH 7.61 7.60 7.67	7 6.214 r 26.28 r (C) 25.3 25.2 25.1	Redox (mV)	Dissolve (%)	d Oxygen (mg/L) 255	Comments (Color, turbidity)	· · · · · · · · · · · · · · · · · · ·	HCo
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)	EC (uS/cm) 1703 1780	Purge Depth SWL (start) SWL (end) pH 7.61 7.60 7.67	7 6.214 r 26.28 r (C) 25.3 25.2 25.1	Redox (mV)	Dissolve (%)	d Oxygen (mg/L) 255	Comments (Color, turbidity)	· · · · · · · · · · · · · · · · · · ·	НCо
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 17-47 18-08 18-19	Bailer Vol Removed (L) , 6, 1 12, 2 13.3 Date:	EC (uS/cm) 1703 1790 1688	Purge Depth SWL (start) SWL (end) pH 7.61 7.60 7.67 Done by:	7.6.214 / 2.6.28 / (C) 2.5.3 2.5.2 2.5.2 2.5.1	Redox (mV) 84 51 33	Dissolve (%)	d Oxygen (mg/L) 2,55 4,03 4,-39	Comments (Color, turbidity) Light Gray Light (1)	· · · · · · · · · · · · · · · · · · ·	НСс
Purge Method Time Started Time Stopped Comments Field Analyses Furging Time 17-47 18-08 18-19 Fampling Sampling Method	Bailer Vol Removed (L) . 6, 1 12, 2 18.3 Date:	EC (uS/cm) 1703 1790 1688	Purge Depth SWL (start) SWL (end) pH 7.61 7.67 7.67 Done by:	76.214 26.28 n 26.28 n C 25.3 25.2 25.2 25.2 25.1	Redox (mV) 84 51 33	Dissolve (%) Groundwate	d Oxygen (mg/L) 2 55 4 - 37 4 - 39 r Disposal R	Comments (Color, turbidity) L-ğlut Gray, Luglit 11 1	· · · · · · · · · · · · · · · · · · ·	НС¢
Purge Method Time Started Time Stopped Comments Tield Analyses Time Time 17-47 18-08 18-19 ampling Sampling Method Time Started	Bailer Vol Removed (L) , 6, 1 12, 2 18.3 Date:	EC (uS/cm) 1703 1790 1688	Purge Depth SWL (start) SWL (end) pH 7.61 7.62 7.67 Done by: ampling Depth SWL (start)	76.214 r 26.28 r 26.28 r (C) 25.3 25.2 25.2 25.1	Redox (mV) 84 51 33	Dissolve (%) Groundwate Date	d Oxygen (mg/L) 2,55 4,03 4,-39	Comments (Color, turbidity) Light Groy, Light	· · · · · · · · · · · · · · · · · · ·	HCC
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 17-47 18-08 18-19 ampling Sampling Method	Bailer Vol Removed (L) , 6, 1 12:2 18.3 Date:	EC (uS/cm) 1703 1790 1688	Purge Depth SWL (start) SWL (end) pH 7.61 7.67 7.67 Done by:	76.214 r 26.28 r 26.28 r (C) 25.3 25.2 25.2 25.1	Redox (mV) 84 51 33	Dissolve (%) Groundwate	d Oxygen (mg/L) 2 55 4 - 37 4 - 39 r Disposal R	Comments (Color, turbidity) L-ğlut Gray, Luglit 11 1	· · · · · · · · · · · · · · · · · · ·	HCC

Bore Development, Purging and Groundwater Sampling Data Sheet

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Checked By:....

BORE No: 1206-5

Project N	0 42626162	Project Name	BMA Caval	Ridge Groundv	vater					
Development	Date:		Done by:							
Development Method				•						
Time Started			SWL (start		Volur	ne Removed	1	Bore Depth (start)		
Time Stopped			SWL (end	)		scharge Rate		Bore Depth (end)		
Comment	s							NAPL Present	********	
Field Analyses			,					(If yes thickness)		
Development										
Time	Vol Removed	EC	pH	Т	Redox	Dissolve	d Oxygen	Comments	1	
	(L)	(uS/cm)	1	(C)	(mV)	(%)	(mg/L)	(Color, turbidity)		
				· · · · · · · · · · · · · · · · · · ·			(118/13)	(color, turbidity)		
				· ·			·······	**************************************		
			-				·······	······		
			····							· .
Purge Method Time Started Time Stopped	AP2 pum 8:35	2.8/2/09 P	Purge Depth	h	- M E M Volur	Bore Volume		Bore Depth (start) Bore Depth (end)		2 M
Purge Method Time Started Time Stopped Comments	AP2 pum 8:35	/ / '	Purge Depth		- M E M Volur			Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)		2 M
Purge Method Time Started Time Stopped Comment	AP2 pum 8:35	/ / '	Purge Depth	h	- M E M Volur			Bore Depth (end) NAPL Present		9 M
Purge Method Time Started Time Stopped Comment	AP2 pum = <u>8:35</u> = =	ρ΄΄. 	Purge Depth SWL (start SWL (end	) <u>25.288</u> ) <u>31.40</u>		ne Removed		Bore Depth (end) NAPL Present (If yes thickness)		) n/
Purge Method Time Started Time Stopped Comments Field Analyses Furging Time	AP2 pum = 8:35 =	ms EC (us/cm)	Purge Depth	h ) <u>25.288</u> ) <u>31.40</u> т	Redox	ne Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness)		2 M
Purge Method Time Started Time Stopped Comments ield Analyses urging Time	4 AP 2 pum 4	m <sub>s</sub> EC	Purge Depth SWL (start SWL (end)	h ) <u>75.288</u> ) <u>31.40</u> T (C)	Redox (mV)	ne Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)		
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 9:00 am 5:25 pm	$\frac{AP2}{8^{2}35}$	ms EC ( <del>US</del> /cm) 10.93 10.63	Purge Depth SWL (start SWL (end) pH <u>6.73</u> 6.75	$\begin{array}{c} 1 \\ 1 \\ 1 \\ 2 \\ 3 \\ 3 \\ 3 \\ 4 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7$	Redox	ne Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)		
Time Started Time Stopped Comment: Field Analyses Furging Time 9:00 am 6:25 am 9:49 am	$\frac{AP2}{8^{2}35}$ $\frac{Vol Removed}{(L)}$ $\frac{30}{60}$	ms EC (as/cm) 10.93 10.63 11.18	Purge Depth SWL (start SWL (end) pH <u>6.73</u> <u>6.75</u> 6.78	$\begin{array}{c} 1 \\ 1 \\ 1 \\ 1 \\ 2 \\ 3 \\ 3 \\ 1 \\ 4 \\ 0 \\ 3 \\ 1 \\ 4 \\ 0 \\ 7 \\ 7 \\ 1 \\ 2 \\ 8 \\ 5 \\ 3 \\ 8 \\ 4 \end{array}$	Redox (mV) -ZI	ne Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)		
Purge Method Time Started Time Stopped Comments field Analyses furging Time 9:00 am 9:00 am 9:05 am 9:09 am	$\frac{AP2}{8:35}$ $\frac{Vol Removed}{(L)}$ $\frac{36}{60}$ $\frac{60}{105}$	p ( <del>(uS/cm)</del> ) 10.93 10.63 11.18 11.28	Purge Depth SWL (start SWL (end) pH 6.72 6.75 6.78 6.76	$\begin{array}{c} 1 \\ \hline 1 \\ \hline 2 \\ \hline 5 \\ \hline 2 \\ \hline 3 \\ \hline 4 \\ \hline 4 \\ \hline 0 \\ \hline \end{array}$	Redox (mV) -21 -32 -30 -44	ne Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)		
Purge Method Time Started Time Stopped Comments Field Analyses Furging Time 9:00 am 6:25 am 9:49 am	$\frac{AP2}{8^{2}35}$ $\frac{Vol Removed}{(L)}$ $\frac{30}{60}$	ms EC (as/cm) 10.93 10.63 11.18	Purge Depth SWL (start SWL (end) pH <u>6.73</u> <u>6.75</u> 6.78	$\begin{array}{c} 1 \\ 1 \\ 1 \\ 2 \\ 3 \\ 3 \\ 3 \\ 4 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7$	Redox (mV) -21 -32 -30	ne Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)		
Purge Method Time Started Time Stopped Comments Field Analyses Furging Time 9:00 am 9:00 am 9:05 am 9:09 am	$ \frac{AP2}{35}  p_{0}M \\ \frac{AP2}{35}  p_{0}M$	p ( <del>(uS/cm)</del> ) 10.93 10.63 11.18 11.28	Purge Depth SWL (start SWL (end) pH 6.72 6.75 6.78 6.76	$\begin{array}{c} 1 \\ 1 \\ 2 \\ 5 \\ 7 \\ 3 \\ 3 \\ - 3 \\ - 4 \\ 0 \\ - 3 \\ - 4 \\ 0 \\ 0 \\ - 4 \\ 0 \\ - 4 \\ 0 \\ - 4 \\ 0 \\ - 4 \\ 0 \\ - 4 \\ 0 \\ - 4 \\ 0 \\ - 4 \\ 0 \\ 0 \\ - 4 \\ 0 \\ 0$	Redox (mV) -21 -32 -30 -44	ne Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)		
Purge Method Time Started Time Stopped Comment: ield Analyses urging Time 9:00  am 9:25  am 9:25  am 10:00  am 10:15 ampling	$\frac{AP2}{8^{2}35}$ Vol Removed (L) $\frac{C}{60}$ $\frac{60}{105}$ $120$ Date: $\frac{2}{60}$	m3 EC (155/cm) 10.93 10.63 11.18 11:28 11:38 13.602.09	Purge Depth SWL (start SWL (end) pH $6 \cdot 72$ $6 \cdot 75$ $6 \cdot 75$ $6 \cdot 76$ $6 \cdot 83$ Done by:	$\begin{array}{c} T \\ 7 5.288 \\ \hline 7 5.288$	Redox (mV) -21 -32 -30 -44 -69	Dissolve (%)	d Oxygen (mg/L) 1 · 21/pm 0 · 65 0 · 58 0 · 62 0 · 21	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) TUPBID, AND BUBBBLES, PA LESS TUPBID -> AIR BUBB TUPBID -> CLEAR -> LESS AND CLEAR S.TUPBID -> LESS AND CLEAR S.TUPBID -> LESS AND		
Purge Method Time Started Time Stopped Comment: ield Analyses urging Time 9:00 am 9:00 am 9:00 am 9:00 am 10:00 am 10:00 am 10:15 ampling Sampling Method	$\frac{AP2}{8^{2}35}$ Vol Removed (L) $\frac{36}{60}$ $\frac{60}{105}$ Date: $\frac{2}{60}$ $\frac{105}{120}$ Date: $\frac{2}{60}$	m3 EC (155/cm) 10.93 10.63 11.18 11:28 11:38 13.602.09	Purge Depth SWL (start SWL (end) pH 6.73 6.75 6.78 6.76 6.83 Done by: ampling Depth	$\begin{array}{c} 1 \\ 1 \\ 2 \\ 3 \\ 3 \\ 3 \\ 3 \\ 4 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7$	Redox (mV) -21 -32 -30 -44 -69	Dissolve (%)	d Oxygen (mg/L) 1 · 21,ppm 0 · 65 0 · 38 0 · 62 0 · 21	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) TUPBID, AND BUBBBLES, PA LESS TURBID -> AIR BUBB TURBID -> CLEAR -> " AIR BUBB CLEAR S.TURBID -> LESS AN CLEAR S.TURBID -> LESS AN CLEAR S.TURBID -> LESS AN		
Purge Method Time Started Time Stopped Comment: ield Analyses urging Time 9:00  am 9:00  am 9:00  am 10:00  am 10:15 ampling	$\frac{AP2}{8^{2}35}$ Vol Removed (L) $\frac{OO}{60}$ $\frac{OO}{60}$ $\frac{OO}{105}$ Date: $\frac{OO}{105}$ $\frac{OO}{100}$ Date: $\frac{OO}{100}$ $\frac{OO}{100}$	my EC (155/cm) 10.93 10.63 11.28 11:28 11:38 18-02-09 MP Si	Purge Depth SWL (start SWL (end) pH $6 \cdot 72$ $6 \cdot 75$ $6 \cdot 75$ $6 \cdot 76$ $6 \cdot 83$ Done by:	$\begin{array}{c} 1 \\ 1 \\ 2 \\ 3 \\ 3 \\ 3 \\ 3 \\ 4 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7$	Redox (mV) -21 -32 -30 -44 -69	Dissolve (%)	d Oxygen (mg/L) 1 · 21/pm 0 · 65 0 · 58 0 · 62 0 · 21	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) TUPBID, AND BUBBBLES, PA LESS TUPBID -> AIR BUBB TUPBID -> CLEAR -> LESS AND CLEAR S.TUPBID -> LESS AND CLEAR S.TUPBID -> LESS AND		

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Project No. 422.02       Project Name BMA Caval Ridge Groundwater         Development       Date:       Done by:         Development Method       SWL (dur)       Volume Removed       Bore Depth (start)	BORE DEVELO	UN		GROUNDY	VALEK SA	WUPLING D	PATA SHI	CET	BORE No:	P208-5	
Development       Date:       Done hy:         Development Method       SWL (start)       Volume Removed       Bore Depth (start)         Time Stopped       SWL (start)       Volume Removed       Bore Depth (start)         Comments       NAPL Present       NAPL Present         ried Analyses       (If yes thickness)         veclopment       Volume Removed       Comments         Time       Vol Removed       EC       (Inv)         (L)       (us/em)       IC       Redox       Dissolved Oxygen         urging       Date:       2.5/2/07       Done by: AW/SS       Bore Depth (start)       15.532 m         Purge Method       big lex       Purge Depth       SWL (start)       3.770 m       Bore Volume       4.5 L       Bore Depth (start)       15.532 m         Time Stopped       71.55       SWL (start)       3.3 3 m       Volume Removed       Kf yes thickness)         wrging       Date:       2.9/2/07       Done by: AW/SS       Bore Depth (start)       15.532 m         Time Stopped       71.55       2.97       2.70       177       3.50       11       11         Yeid Analyses       (us/em)       13.33 m       Yolume Removed       Comments       11       11	Project N	No 42626162	Project Name	BMA Caval J	Ridge Ground	water	u date de l'eque d' prime i prime de la composition de la c				
Time Stopped       SWL (start)       Volume Removed       Bore Depth (start)         Time Stopped       SWL (end)       Discharge Rate       Bore Depth (end)         NAPL Present       NAPL Present         Time       Vol Removed       EC       pH         Time Storped       Comments       NAPL Present         Vol Removed       EC       mgt PH       T         Redox       Dissolved Oxygen       Comments         Vol Removed       EC       mgt PH       T         Redox       Dissolved Oxygen       Comments         Vol Removed       EC       mgt PH       T         Redox       Mrgs       Date:       28/2/07       Done by: AW/SS         Purge Method       Date       28/2/07       Done by: AW/SS       Bore Depth (start)       15. 532 m         Time Stopped       71.65       SWL (end)       IS 2 70 m       Bore Volume 4:51       Bore Depth (start)       15. 532 m         Time Stopped       71.65       SWL (end)       IS 2 70 m       Bore Volume 4:51       Bore Depth (start)       15. 532 m         Voluments       SWL (end)       IS 2 70 m       Bore Depth (start)       15. 532 m       164 Andbree         Vol Removed       EC       PH	Development	Date:				· · · · · · · · · · · · · · · · · · ·		······································			
Time Stopped     SWL (end)     Volume Removed     Bore Depth (start)       Time Stopped     SWL (end)     Discharge Rate     NAPL Present       Time Vol Removed     EC     pH     T     Redox     Dissolved Oxygen       Time Vol Removed     EC     pH     T     Redox     Dissolved Oxygen       urging     Date:     2.8/2/07     Done by: AW/SS   Purge Method Bail Bac     Purge Depth       Started     9:00     SWL (end)     Bore Volume     H: 5 L     Bore Depth (start)       Time Started     9:02     SWL (start)     TS: 2.70 m     Bore Volume     Bore Depth (start)       Time Started     9:02     SWL (end)     SWL (end)     SWL (start)     TS: 5.53.2 m       Volume Removed     NAPL Present     Under Removed     Bore Depth (start)     15: 5.53.2 m       Volume Removed     SWL (end)     SWL (end)     Started     15: 5.53.2 m       Volume Removed     NAPL Present     NAPL Present     NAPL Present       Time Started     9:02     Started     15: 5.53.2 m     16: 5.53.2 m       Volume Removed     NAPL Present     NAPL Present     NAPL Present       Time Started     9:02     17: 4.5     17: 5.53.2 m     17: 17: 17: 17: 17: 17: 17: 17: 17: 17:	Development Metho	bd									
Time Stopped       SWL (end)       Discharge Rate       Bort Depth (and)         ield Analyses       (If yes thickness)         iverclopment       (If yes thickness)         imaging       Date: $2S/2/2/7$ Date: $2S/2/2/7$ Date: $2S/2/2/7$ ield Analyses       (If yes thickness)       Comments         urging       Date: $2S/2/2/7$ Date: $2S/2/7$ Purge Method       Bair [ex- 2/2/2]       Purge Depth       SWL (start)       TS. 2.70 m       Bore Volume       Bore Depth (start)       15. 5.32 m         Time Stopped       9:02       SWL (end)       IS. 2.70 m       Bore Volume       Hore Depth (start)       15. 5.32 m         Time Stopped       9:02       SWL (end)       IS. 3.3 m       Volume Removed       Bore Depth (start)       15. 5.32 m         Id Analyses       (If yes thickness)       (If yes thickness)       15. 7.32 m       16.9 m         9:13       4:5       19:1       17.7 7.7 m       17.7 7.7 m       17.7 7.7 m       17.7 7.7 m         9:14.5       13:15       11.1 7.7 7.7 m       13:12 7.7 7.7 m       17.7 7.7 m       17.7 7.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7	Time Starte	ed		SWL (start)		Valu	Domosio	4			
Comments       Bord Depth (Shid)         Nordpament         Time       Vol Removed       EC       pH       T       Redox       Dissolved Oxygen       Comments         Time       Vol Removed       EC       pH       T       Redox       Dissolved Oxygen       Comments         Turging       Date: $2.3/2/07$ Done by: AW/SS       AW/SS         Purge Method       Goi / EC       Purge Doph       SWL (start)       13::270 m       Bore Volume       H · 5 L       Bore Depth (start)       15::532 m         Time Started       97::45       SWL (start)       13::70 m       Bore Noture       H · 5 L       Bore Depth (start)       15::532 m         Time Started       97::45       SWL (cad)       13::33 m       Volume Removed       Bore Depth (start)       15::532 m         Time Vol Removed       EC       pH       T       Redox       Dissolved Oxygen       Comments         Time       Vol Removed       EC       pH       T       Redox       Dissolved Oxygen       Comments         Time Stopped       13::5       12::70       13::70       13::50       14::10       11::11       11::11         14::14:14       13::33 m       Volum											
(If yes thickness)         (If yes thickness)         Time       Vol Removed       EC       (If yes thickness)         Time       Vol Removed       EC       If T       Comments         Urging       Date:       28/4/07       Done by: AW/SS         Purge Method       Bor:       Date:       28/4/07       Done by: AW/SS         Purge Method       Bor:       Date:       28/4/07       Done by: AW/SS         Purge Method       Bor:       Date:       28/4/07       Done by: AW/SS         Time Started       7: 65       SWL (start)       I3.2.70       Molume Removed       Bore Depth (start)       15.5.32.m         Time Started       7: 65       Subt (start)       IS.2.70       Comments         Time Started       F       Display Method       Subt (start)       IS.2.72       IS.2       Comments         <	Commen	ts	-		·	D	isonarge Rat	۰ 			
Development       Time       Vol Removed       EC       pH       T       Redox       Dissolved Oxygen       Comments         1       (L)       (uS/cm)       (C)       (mV)       (%)       (mg/L)       (Color, turbidity)         1       (L)       (uS/cm)       (C)       (mV)       (%)       (mg/L)       (Color, turbidity)         1       (L)       (uS/cm)       (U)       (US/cm)       (C)       (mV)       (%)         1       (L)       (uS/cm)       (U)       (W/SS       (U)       (U)       (U)       (U)         1       (I)       (I)       (I)       (I)       (I)       (I)       (I)       (I)         1       (I)       (I)       (I)       (I)       (I)       (I)       (I)       (I)         1       (I)							·······				
TimeVol RemovedECpHTRedoxDissolved OxygenComments(L)(uS/em)(C)(mV)(%)(mg/L)(Color, turbidity)'urgingDate: $28/2/07$ Done by: AW/SSPurge MethodBai [exPurge DepthSWL (start)13.270 mBore Volume4.5 LTime Storped7:45SWL (start)13.33 mVolume RemovedBore Depth (start)15.532 mTime Storped7:45SWL (end)13.33 mVolume RemovedNAPL PresentTimeVol RemovedECpHTRedoxDissolved Oxygen(L)(uS/em)pHC)(mV)(?s)(mg/L)(U)(uS/em)pHTRedoxDissolved OxygenComments'idd Analyses(L)(uS/em)pHTRedoxDissolved OxygenComments'if meVol RemovedECpHTRedoxDissolved OxygenComments'if in(uS/em)pHC)(mV)(?s)(mg/L)(Color, turbidity)'if is2.1277.0312.7133.591111'if is2.1277.0312.7133.591111'if is2.1277.032.77133.591111'if is13.52.1277.34.83.061111'if is5.00Sampling DepthCroundwater Disposal Record1111'if is5									(If yes thickness)		
(L)       (uS/cm)       P       (C)       (Columny of the construction of the construle of the construction of the construction of the con											
Image: Constraint of the start of the	Time			pН	Т	Redox	Dissolvo	d Oxygen	Commonts	1	
Purging       Date: $23/2/07$ Done by:       AW/SS         Purge Method       Bailler       Purge Depth       SWL (start)       IS. 270 m       Bore Volume       H.5 L       Bore Depth (start)       IS. 532 m         Time Started       9.02       SWL (start)       IS. 270 m       Bore Volume       H.5 L       Bore Depth (start)       IS. 532 m         Time Storped       9.02       SWL (start)       IS. 270 m       Bore Volume Removed       Bore Depth (end)         Comments       SWL (start)       IS. 270 m       Bore Volume Removed       Bore Depth (end)         ridd Analyses       Will (start)       IS. 270 m       Bore Volume Removed       Bore Depth (end)         Time       Vol Removed       EC       pH       T       Redox       Dissolved Oxygen       Comments         'idd Analyses       (fy est thickness)       (fy est thickness)       Iso 277       27.0       -9       4.92       11       11         'idd Analyses       13.5       2191       C.977       27.0       -9       4.92       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11       11		(L)	(uS/cm)		(C)						
Purge Method Time StartedBailer 9:01Purge Depth SWL (start)Bore Volume $4:5L$ Bore VolumeBore Depth (start) $15.532$ mSWL (start) $13.33$ mVolume Removed $4:5L$ Bore Depth (start)Bore Depth (start) $15.532$ mield Analyses urgingTimeVol Removed $EC$ (uS/em)pHT CORedox (mV)Dissolved Oxygen 								- <u></u>			
Purge Method Time Started Comments $Purge DepthSWL (start)Purge DepthSWL (start)Bore VolumeIS.270 mWolume RemovedHore Depth (start)Bore Depth (start)I5.532 mIS.532 mield AnalysesurgingVolume RemovedBore Volume RemovedBore Depth (start)NAPL Present(If yes thickness)TimeY = 17Vol RemovedEC(uS/cm)pHCOTRedoxRedox(mV)Dissolved Oxygen(Color, turbidity)TimeY = 17Vol RemovedEC(uS/cm)pHCOT(CORedox(mV)Overge(%)Comments(Color, turbidity)TimeY = 17Vol RemovedEC(uS/cm)pHCOT(CORedox(mV)Overge(%)Comments(Color, turbidity)TimeY = 17Vol RemovedEC(uS/cm)pHCOT(CORedox(mV)Overge(%)Comments(Color, turbidity)TimeY = 17Vol RemovedEC(uS/cm)pHCOT(CORedox(mV)Overge(%)Comments(Color, turbidity)TimeY = 1717.77.03(17.7)27.213(13.5)3.55Nully(11Nully(11)TimeY = 13.5Done by:SupposedAW/SSAuAuAuSampling MethodTime Storped(10:03)Sampling DepthSWL (start)Groundwater Disposal RecordDateDateDisposal method$											
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$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Comment		······	SWL (end)	13.33	11) Volu	me Removed		Bore Depth (end) NAPL Present		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		· ·	······································						(If yes thickness)		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $											
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Time	1 1		pН	Т	Redox	Dissolve	d Oxygen	Comments		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		(L)	(uS/cm)		(C)	(mV)			(Color turbidity)		
Sampling     Date:     Done by:     AW/SS       Sampling Method     Sampling Depth     Groundwater Disposal Record       Time Started     7:50     SWL (start)       Time Stopped     10:03     SWL (end)	- <u></u>	4.5	291	6.97	27.0	1 1 1		2.91		1.11. +. 1.00	000
Sampling     Date:     Done by:     AW/SS       Sampling Method     Sampling Depth     Groundwater Disposal Record       Time Started     7:50     SWL (start)       Time Stopped     10:03     SWL (end)	- 4:33		277	7.03	27.2	13'		3.59	Crunge - Grown	nyng word	/ L
Sampling     Date:     Done by:     AW/SS       Sampling Method     Sampling Depth     Groundwater Disposal Record       Time Started     7:50     SWL (start)       Time Stopped     10:03     SWL (end)	7.45		2129	6,79	27.3	48		3.06	11 11	1 1	$\omega$
Sampling Method     Sampling Depth     Groundwater Disposal Record       Time Started     7:50     SWL (start)     Date     Litres     Disposal method       Time Stopped     10:03     SWL (end)     devmt     devmt     devmt		13.2			•					'	,
Sampling Method     Sampling Depth     Groundwater Disposal Record       Time Started     7:50     SWL (start)     Date     Litres     Disposal method       Time Stopped     10:03     SWL (end)     devmt     devmt	ampling	Date:		Done by: /	\W/SS						
Time Started     7:50     SWL (start)     Date     Litres     Disposal method       Time Stopped     10:03     SWL (end)     devmt     devmt     devmt	Compline Mathe	.t									
Time started     9.30     SWL (start)       Time Stopped     10:03     SWL (end)         Comments     Date     Litres			San				Groundwate	r Disposal Re	ecord		
				SWL (start)							
purging				SWL (end)							
	Common	o				purging				······································	

Bore Development, Purging and Groundwater Sampling Data Sheet

evelopment	Date:		Done by:		·••.				
Development Method									
Time Started			SWL (start)		_ Volur	ne Removed		_ Bore Depth (start)	
Time Stopped			SWL (end)		Dis	scharge Rate		Bore Depth (end)	
Comments	·····							NAPL Present	
								(If yes thickness)	
ield Analyses									
evelopment		50			T				1
Time	Vol Removed	EC	рН	Т	Redox	Dissolved		Comments	
1	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	
****									
					-	·			
///////		·					<i></i>		
		00/01-					<u> </u>		
•	Datas	1219 104	Dana hru	A 117/CC					
Purge Method Time Started	APa pump 12-10	28/2/09	Purge Depth			Bore Volume	- <b>-</b> * 94	Bore Depth (start)	44.55 m
Purge Method	AP2 PUMP 12-10 13:24		Purge Depth		] E [ Volut	Bore Volume ne Removed		Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)	Pool
Purge Method Time Started Time Stopped Comments ield Analyses	AP2 PUMP 12-10 13:24		Purge Depth		] F [ Volut	ne Removed		Bore Depth (end)	Pool
Purge Method Time Started Time Stopped Comments ield Analyses	AP2 PUMP 12-10 13:24	nt EC	Purge Depth		/ F Volur Redox	ne Removed		Bore Depth (end) NAPL Present (If yes thickness)	Pool
Purge Method Time Started Time Stopped Comments Field Analyses Furging Time	AP2 PUMP 12-10 13:24 Vol Removed (L)	ر لتي(حm)	Purge Depth SWL (start) SWL (end)	14,270 n 14,412 m 14,612 m		ne Removed	d Oxygen	Bore Depth (end) NAPL Present	Pool
Purge Method Time Started Time Stopped Comments ield Analyses urging Time	AP2 PUMP 13-10 13:24 Vol Removed (L) 30 L	ریج EC (کالاردm) نوب Oy	Purge Depth SWL (start) SWL (end) pH 7 · 08	14,270 n 14,412 m 14,412 m	Redox (mV) - 105	ne Removed	J Oxygen (mg/L) 0. 76	Bore Depth (end) NAPL Present (If yes thickness) Comments	·
Purge Method Time Started Time Stopped Comments Field Analyses Time Time 12 · 34	AP2 PUMP 13-10 13:24 Vol Removed (L) 30 L 60 L	n,5 EC (155/cm) 4 · O4 3 · 8)	Purge Depth SWL (start) SWL (end) pH <del>7.08</del> 7.15	14.270 n 14.412 m 14.412 m C) 30.4 28.8	Redox (mV) -105 -127	ne Removed	)   (mg/L)   0 ~ 76   0 ~ 64	Comments (Color, turbidity)	l Gran
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 12 · 34 12 · 49 13 · 04	AP2 PUMP 13-10 13:24 Vol Removed (L) 30 L 60 L	nt EC (DS/cm) 4.04 3.81 3.96	Purge Depth SWL (start) SWL (end) pH 7.08 7.15 7.15	14.270 n 14.412 m 14.412 m (C) 36.4 28.8 28.8	Redox (mV) -105 -127 -140	ne Removed	J Oxygen (mg/L) 0 · 76 0 · 64 0 · 48	Comments (Color, turbidity) (LEAL, SUGHT SUCH (CEAL, SUGHT SUCH	l Gran n coan in coan
Purge Method Time Started Time Stopped Comments Field Analyses Time Time 12 · 34	AP2 PUMP 13-10 13:24 Vol Removed (L) 30 L 60 L	n,5 EC (155/cm) 4 · O4 3 · 8)	Purge Depth SWL (start) SWL (end) pH <del>7.08</del> 7.15	14.270 n 14.412 m 14.412 m C) 30.4 28.8	Redox (mV) -105 -127	ne Removed	)   (mg/L)   0 ~ 76   0 ~ 64	Comments (Color, turbidity)	l Gran n coan in coan
Time Started Time Stopped Comments Field Analyses Furging Time 12 · 34 12 · 49 13 · 04	AP2 PUMP 13-10 13:24 Vol Removed (L) 30 L 60 L	nt EC (DS/cm) 4.04 3.81 3.96	Purge Depth SWL (start) SWL (end) pH 7.08 7.15 7.15	14.270 n 14.412 m 14.412 m (C) 36.4 28.8 28.8	Redox (mV) -105 -127 -140	ne Removed	J Oxygen (mg/L) 0 · 76 0 · 64 0 · 48	Comments (Color, turbidity) (LEAL, SUGHT SUCH (CEAL, SUGHT SUCH	l Gran n coan in coan
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 12.34 12.49 13.04	AP2 PUMP 13-10 13:24 Vol Removed (L) 30 L 60 L	nt EC (DS/cm) 4.04 3.81 3.96	Purge Depth SWL (start) SWL (end) pH $\overline{7} \cdot 08$ $\overline{7} \cdot 15$ $\overline{7} \cdot 15$ $\overline{7} \cdot 15$	T (C) 26.4 28.8 28.8 28.8	Redox (mV) -105 -127 -140	ne Removed	J Oxygen (mg/L) 0 · 76 0 · 64 0 · 48	Comments (Color, turbidity) (LEAL, SUGHT SUCH (CEAL, SUGHT SUCH	l Gran n coan in coan
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 12 · 34 12 · 49 13 · 04 13 - 04 13 - 24	$\begin{array}{c c} APa & PumP \\ \hline 13 & 10 \\ \hline 13 & 24 \\ \hline \\ Vol Removed \\ (L) \\ \hline \\ 30 \\ L \\ \hline \\ 60 \\ L \\ \hline \\ 105 \\ L \\ \hline \\ Date: \\ \end{array}$	nt EC (DS/cm) 4.04 3.81 3.96 3.96	Purge Depth SWL (start) SWL (end) pH $\overline{7} \cdot 08$ $\overline{7} \cdot 15$ $\overline{7} \cdot 15$ $\overline{7} \cdot 15$ $\overline{7} \cdot 15$ Done by:	T (C) 26.4 28.8 28.8 28.8 28.8 28.8	Redox (mV) -105 -127 -140	ne Removed	J Oxygen (mg/L) 0 · 76 0 · 64 0 · 48	Comments (Color, turbidity) (LEAL, SUGHT SUCH (CEAL, SUGHT SUCH	l Gran n coan in coan
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 12 · 34 12 · 49 13 · 04 13 - 04 13 - 04 3 - 04 13 - 04	$\frac{APa}{13 \cdot 10} \frac{PumP}{13 \cdot 24}$ Vol Removed (L) $\frac{30}{60} L$ $\frac{60}{10} L$ Date: $\frac{13}{13} \cdot APa$	NS EC (DS/cm) 4.04 3.81 3.96 3.96 3.96 3.96	Purge Depth SWL (start) SWL (end) pH $\frac{7 \cdot 08}{7 \cdot 15}$ $\frac{7 \cdot 15}{7 \cdot 15}$ Done by:	T (C) 26.4 28.8 28.8 28.8 28.8 28.8	Redox (mV) -105 -127 -140 -143	ne Removed Dissolved (%)	J Oxygen (mg/L) 0 · 76 0 · 64 0 · 48	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAR, SUGHT SULPH CLEAR, SUGHT SULPH CLEAR, SUGHT SULPH	l Gran n coan in coan
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 12 · 34 12 · 49 13 · 04 13 - 04 13 - 24 ampling Sampling Method Time Started	$\begin{array}{c c} AP_{\partial} & PumP \\ \hline 13 & 10 \\ \hline 13 & 24 \\ \hline \\ Vol Removed \\ (L) \\ \hline \\ 30 \ L \\ \hline \\ 60 \ L \\ \hline \\ 105 \ L \\ \hline \\ \hline \\ 105 \ L \\ \hline \\ \hline \\ Date: \\ \hline \\ \hline \\ \hline \\ 13 & 25 \\ \hline \end{array}$	NS EC (DS/cm) 4.04 3.81 3.96 3.96 3.96 3.96	Purge Depth SWL (start) SWL (end) pH $\overline{7 \cdot 08}$ $\overline{7 \cdot 15}$ $\overline{7 \cdot 15}$ $\overline{7 \cdot 15}$ Done by: uppling Depth SWL (start)	14.270 n 14.412 m 14.412 m C) 36.4 28.8 28.8 28.8 28.8	Redox (mV) -105 -127 -140 -143	ne Removed Dissolved (%)	0 (mg/L) 0 46 0 64 0 48 0 15	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAR, SUGHT SULPH CLEAR, SUGHT SULPH CLEAR, SUGHT SULPH	l Gran n coan in coan
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 12 · 34 12 · 49 13 · 04 13 - 04 13 - 24 ampling Sampling Method Time Started Time Stopped	$   \begin{array}{c}         AP_{2} & PUMP \\         I_{3} & 10 \\         I_{3} & 24 \\         Vol Removed \\         (L) \\         3O L \\         6o L \\         105 L \\         Io5 L \\         Io5 L \\         Io5 L \\         I3 & 33   \end{array} $	NS EC (DS/cm) 4.04 3.81 3.96 3.96 3.96 3.96	Purge Depth SWL (start) SWL (end) pH $\overline{7 \cdot 08}$ $\overline{7 \cdot 15}$ $\overline{7 \cdot 15}$ $\overline{7 \cdot 15}$ Done by: uppling Depth SWL (start)	T (C) 26.4 28.8 28.8 28.8 28.8 28.8	Redox (mV) -105 -127 -140 -143	Dissolve (%)	I Oxygen (mg/L) 0 • 96 0 • 64 0 • 48 0 • 15 r Disposal R	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) (LEDL SUGH CREPS CUERL, SUGHT SUCH (LERL, SUGHT SUCH CLERL, SUGHT SUCH	l Gran n coan in coan
Purge Method Time Started Time Stopped Comments Field Analyses Time Time 12 · 34 12 · 49 13 · 04 13 - 24 ampling Sampling Method Time Started	$   \begin{array}{r} AP_{2} & PumP \\     \hline 13 & 24 \\   \end{array}   \\     \hline     Vol Removed      (L)      30 L      60 C      105 L    \hline     Date:      +3 - AP_{2}      13 : 25      13 : 33   \end{array} $	NS EC (DS/cm) 4.04 3.81 3.96 3.96 3.96 3.96	Purge Depth SWL (start) SWL (end) pH 7 · 08 7 · 15 7 · 15 7 · 15 7 · 15 7 · 15 SWL (start) SWL (end)	T (C) 36.4 28.8 28.8 28.8 28.8 28.8	Redox (mV) - 105 - 127 - 140 - 143	Dissolve (%)	I Oxygen (mg/L) 0 • 96 0 • 64 0 • 48 0 • 15 r Disposal R	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) (LEDL SUGH CREAN CLEAR, SUGHT SUCH (LEAR, SUGHT SUCH CLEAR, SUGHT SUCH	l Gran n coan in coan

BORE No: 1207-D

Bore Develop

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BORE No: \$207-5

Development	Date:		Done by:		_					
Development Method		• .								
Time Started			- SWL (start)		Volu	me Removed		Bore Depth (start)		
Time Stopped	······		SWL (end)		Di	ischarge Rate		Bore Depth (start)		
Comments			, , ,					NAPL Present		
								(If yes thickness)		
ield Analyses evelopment										
Time	Vol Removed	EC	pН	Т	Redox	Dissolved	1 Oxygen	Comments		
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)		
		····								
·			·				Polon			
				·						
	<u></u>		L							
Purge Method Time Started Time Stopped	13:02	28/2/07	Done by: Purge Depth SWL (start) SWL (end)	13.6744	n I 1 Volu	Bore Volume me Removed			15, 368 m	ł
Purge Method Time Started Time Stopped Comments	Bailer 13:02 13:23	28/2/07	Purge Depth SWL (start)		n I g Volu	me Removed		Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)		•
Purge Method Time Started Time Stopped Comments	Bailer 13:02 13:23	28/2/07	Purge Depth SWL (start)	13.6744	n I a Volu	me Removed	- ///	Bore Depth (end) NAPL Present		ł
Purge Method Time Started Time Stopped Comments ield Analyses urging	Bailer 13:02 13:23	/ / 	Purge Depth SWL (start) SWL (end)	3.674n  3.6801	g Volu	me Removed		Bore Depth (end) NAPL Present (If yes thickness)		9
Purge Method Time Started Time Stopped Comments ield Analyses	Bailer 13:02 13:23	EC	Purge Depth SWL (start)	13.674n 13.680i T	Volu     Redox	me Removed	i Oxygen	Bore Depth (end) NAPL Present (If yes thickness)		ŀ
Time Started Time Stopped Comments Tield Analyses Turging	Bailer 13:02 13:23	/ / 	Purge Depth SWL (start) SWL (end)	13.674n 13.680 T (C)	g Volu	me Removed	≠ I Oxygen (mg/L)	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) black		
Purge Method Time Started Time Stopped Comments Field Analyses Time	Bailer 13:02 13:23 Vol Removed (L) 3.5	EC	Purge Depth SWL (start) SWL (end) pH	13.674n 13.6801 T (C) 26.3	Volu Redox (mV)	me Removed	1 Oxygen (mg/L) Ø- <b>78</b>	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) black		, ag
Purge Method Time Started Time Stopped Comments Field Analyses Time	Bailer 13:02 13:23 Vol Removed (L) 3.5	EC (uS/cm) 422	Purge Depth SWL (start) SWL (end)	13.674n 13.680 T (C)	Redox (mV)	me Removed	1 Oxygen (mg/L) O- 78 O- 34	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) p black Dark grey, highly the		, org
Purge Method Time Started Time Stopped Comments Field Analyses Time	Bailer 13:02 13:23 Vol Removed (L)	EC (uS/cm) 422	Purge Depth SWL (start) SWL (end) pH 6, 67 6, 53 6, 51	13.674m 3.680 T (C) 26.3 26.5	Redox (mV) → 77 → 86	me Removed Dissolved (%)	1 Oxygen (mg/L) Ø- <b>78</b>	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) black		g
Purge Method Time Started Time Stopped Comments ield Analyses urging Time	Bailer 13:02 13:23 Vol Removed (L) 3.5	EC (uS/cm) 422	Purge Depth SWL (start) SWL (end) pH 6,67 6,53 6,51	13.674 3.680 1 (C) 26.3 26.5 26.5	Redox (mV) → 77 → 86	me Removed	1 Oxygen (mg/L) O- 78 O- 34	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) p black Dark grey, highly the		i ag
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 73 : 11 13 - 17 13 - 23	Bailer 13:02 13:23 Vol Removed (L) 3.5 7 10.5 Date:	EC (uS/cm) 422	Purge Depth SWL (start) SWL (end) pH 6,67 6,53 6,51	13.674 3.680 1 (C) 26.3 26.5 26.5	Redox (mV) → 77 → 86	me Removed Dissolved (%)	1 Oxygen (mg/L) O- 78 O- 34	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) p black Dark grey, highly the		, org
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 13 - 17 13 - 23 ampling	Bailer 13:02 13:23 3:23 Vol Removed (L) 3:5 7 10:5 Date:	EC (uS/cm) 422 436 443	Purge Depth SWL (start) SWL (end) pH 6,67 6,53 6,51 Done by:	3.674и  3.680;  3.680; Т (С) 26.3 26.5 26.5 Д.6.5	Redox (mV) → 77 → 86 → 77	me Removed	→ (mg/L) Ø-78 Ø-34 Ø,61	Bore Depth (end) NAPL Present (If yes thickness)		, org
Purge Method Time Started Time Stopped Comments ield Analyses urging Time 13 - 17 13 - 23 ampling Sampling Method	Bailer 13:02 13:23 3:23 Vol Removed (L) 3.5 7 10.5 Date: Bailes	EC (uS/cm) 422 436 443	Purge Depth SWL (start) SWL (end) pH 6,67 6,53 6,51 Done by:	3.674и  3.680;  3.680; Т (С) 26.3 26.5 26.5 26.5	Redox (mV) → 77 → 86 → 77	me Removed Dissolved (%) Groundwate	1 Oxygen (mg/L) O- 78 O- 34 O- 34 O, 61	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) black Dark grey highly the 11 11	bid, voots	org
Purge Method Time Started Time Stopped Comments eld Analyses irging Time 13 - 17 13 - 17 13 - 23 impling Sampling Method Time Started	Bailer 13:02 13:23 3:23 Vol Removed (L) 3.5 7 10,5 Date: Bailes 14:00	EC (uS/cm) 422 436 443	Purge Depth SWL (start) SWL (end) pH 6,67 6,53 6,51 Done by: ampling Depth SWL (start)	3.674и  3.680;  3.680;  3.680; С) 26.3 26.5 26.5 26.5	Redox (mV) -77 -86 -77	me Removed	→ (mg/L) Ø-78 Ø-34 Ø,61	Bore Depth (end) NAPL Present (If yes thickness)	bid, voots	org
Purge Method Time Started Time Stopped Comments acid Analyses arging Time 13 - 17 13 - 17 13 - 23 ampling Sampling Method	Bailer 13:02 13:23 J3:23 Vol Removed (L) 3.5 7 10.5 Date: Bailes 14:00 14:00	EC (uS/cm) 422 436 443	Purge Depth SWL (start) SWL (end) pH 6,67 6,53 6,51 Done by:	<u>Т</u> (C) 26,3 26,5 26,5	Redox (mV) → 77 → 86 → 77	me Removed Dissolved (%) Groundwate	1 Oxygen (mg/L) O- 78 O- 34 O- 34 O, 61	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) black Dark grey highly the 11 11	bid, voots	j org

Bore Development, Purging and Groundwater Sampling Data Sheet

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		or mining or		GROUND	WATER SA	MPLING D	ATA SHE	ET	BORE No:	1205
	Projec	et No 42626162	Project Name	BMA Caval	Ridge Grown	lwatar		د میں ایک		
	Development									
	Development Me								· · ·	
	Time Sta			SWL (start)	)	Volu	ne Removed	I		·
	Time Stop	pped			)		scharge Rate		Bore Depth (start)	
	Comm	nents		~ ~ ~ (ena)			senarge Rate	·	Bore Depth (end)	
									NAPL Present	
	Field Analyses Development				-/				(If yes thickness)	
	Time	Vol Removed	EC	pH	T	Redox	Dissolve	d Oxygen	Comments	1
		(L)	(uS/cm)	·	(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	· ·
	· · · · · · · · · · · · · · · · · · ·	·····	······································	·						
				-				· · · · · · · · · · · · · · · · · · ·	s	
					-					
	Purge Met Time Sta Time Stop	urted 16:37	mp (	Purge Depth SWL (start) SWL (end)	37.688	<u>3</u> m E	Bore Volume		Bore Depth (start)	
	· Time Sta	oped	mp /	Purge Depth SWL (start) SWL (end)	37.688 59.37	3 m E 5 W Volur	Bore Volume ne Removed		Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)	
	Time Sta Time Stop Comm Field Analyses Purging	oped		Purge Depth SWL (start) SWL (end)	37.688 -59.37.	3 m E 5 W Volur			Bore Depth (end) NAPL Present	
	Time Sta Time Stop Comm	vol Removed	EC	Purge Depth SWL (start) SWL (end)	37.688 -59. 37.	3 m E 5 W Volur	ne Removed		Bore Depth (end) NAPL Present (If yes thickness)	
	Time Sta Time Stop Comm Field Analyses Purging Time	Vol Removed (L)	EC (uS/cm)	SWL (start) SWL (end)	37.688 -59.37.	Redox (mV)	ne Removed		Bore Depth (end) NAPL Present (If yes thickness)	
	Time Sta Time Stop Comm Field Analyses Purging Time	Vol Removed (L) 30	EC (uS/cm) 1461 <i>V</i> 5	SWL (start) SWL (end) pH 7.52	37.688 -59.37.	Redox (mV) - 187	nc Removed	d Oxygen 7 (mg/L)	Bore Depth (end) NAPL Present (If yes thickness)	
	Time Sta Time Stop Comm Field Analyses Purging Time 17:03 17:35	Vol Removed (L) 6.32	EC (uS/cm) 1461 US 2364 US	SWL (start) SWL (end) pH 7.52 7.42	37.688 59.37. (C) 29.2 27.1	Redox (mV) - 187 - 215	nc Removed Dissolve (%)	d Oxygen → (mg/L) → 43 ○ 60	Comments (Color, turbidity) CLEAR SUGUATION	SULPHIL ODOUR, SUSPENDED DOUR ORGANIC SUDGE EN
	Time Sta Time Stop Comm Field Analyses Purging Time 17:03 17:35 18:14	Vol Removed (L) 30 60 90	EC (uS/cm) 1461 US 2364 US 7100 US	SWL (start) SWL (end) pH 7.52 7.47 7.33	37.688 -59.37. (C) 29.2 27.1 26.4	Redox (mV) - 187 - 215 - 212	nc Removed Dissolve (%)	D Oxygen → (mg/L) → 43 ○ 60 ○ 26	Comments (Color, turbidity) CLEAR SLIGHT TURBID ABUN CLEAR SLIGHT TURBID ABUN CLEAR SLIGHT TURBID ABUN CLEAR SLIGHT TURBID ABUN	SULPHU QOUR, SUSPENDED DOUT BREAME SUDGE EN BUBBLES IN FLOW CEL
	Time Sta Time Stop Comm Field Analyses Purging Time 17:03 17:35 18:14 18:19	Vol Removed (L) 30 60 90 93	EC (uS/cm) 1461 US 2364 US 7100 US 11260 US	SWL (start) SWL (end) PH 7.52 7.47 7.33 7.21	37.688 -59.37. (C) 29.2 27.1 26.4 25.9	Redox (mV) - 187 - 215 - 212 - 221	nc Removed Dissolve (%)	$\frac{1}{2}$ Oxygen $\frac{1}{2}$ (mg/L) $\frac{1}{2}$ O·60 O·26 O·37	Comments (Color, turbidity) CLEAR SLIGHT TURBID ABUN CLEAR SLIGHT TURBID ABUN CLEAR, NO INSELT MATTER	SULPHUR OBOUR, SUSPENDED DOUT ORGANIC SUDGE EN BUBBLES IN FLOW CELL OR ORGANIC SUM, 5
	Time Sta Time Stop Comm Field Analyses Purging Time 17:03 17:35 18:14 18:19 18:25	Vol Removed (L) 30 60 90 93 95	EC (uS/cm) 1461 US 2364 US 7100 US 11260 US 13200 US	SWL (start) SWL (end) pH 7.52 7.47 7.33	37.688 -59.37. (C) 29.2 27.1 26.4	Redox (mV) - 187 - 215 - 212	nc Removed Dissolve (%)	D Oxygen → (mg/L) → 43 ○ 60 ○ 26	Comments (Color, turbidity) CLEAR SLIGHT TURBID ABUN CLEAR SLIGHT TURBID ABUN CLEAR SLIGHT TURBID ABUN CLEAR SLIGHT TURBID ABUN	SULPHUL OBOUR, SUSPENDED DANT ORGANIC SUDGE, EN BUBBLES IN FLOW CEL
6.6	Time Sta Time Stop Comm Field Analyses Purging Time 17:03 17:35 18:14 18:19 18:25 Sampling	Vol Removed (L) 30 60 90 93 95 93 95 93 95	EC (uS/cm) 1461 US 2364 US 7100 US 11260 US 13200 US 28 02 09 0 13630 VS	SWL (start) SWL (end) 7.52 7.47 7.33 7.21 7.19 Done by: 7.21	37.688 -59.37. (C) 29.2 27.1 26.4 25.9 26.0 AW/SS 25.7	Redox (mV) - 187 - 215 - 212 - 212 - 221 - 232 - 232	Dissolve (%) O.45	Doxygen 7 (mg/L) 0.60 0.37 0.01 0.06	Comments (Color, turbidity) CLEAR SUCURY TURBID ABUN CLEAR SUCURY TURBID ABUN CLEAR, NO INSECT MATTER II II II	SULPHUR OBOUR, SUSPENDED DOUT ORGANIC SUDGE EN BUBBLES IN FLOW CELL OR ORGANIC SUM, 5
S. (	Time Sta Time Stop Comm Field Analyses Purging Time 17:03 17:35 18:14 18:19 18:25 Sampling 18:25 Sampling Met Time Sta	thod $APa Parts$	EC (uS/cm) 1461 US 2364 US 7100 US 11260 US 13200 US 28 02 09 0 13630 VS	SWL (start) SWL (end) 7.52 7.47 7.33 7.21 7.19 Done by: 7.21 unpling Depth	37.688 -59.37. (C) 29.2 27.1 26.4 25.9 26.0 AW/SS 23.7	Redox (mV) - 187 - 215 - 212 - 212 - 221 - 232 - 232	Dissolve (%) O.45 Groundwate	d Oxygen 7 (mg/L) 0-43 0-60 0-26 0-37 0-01 0-06 r Disposal R	Comments (Color, turbidity) CLEAR SLIGHT TURBID ABUN CLEAR SLIGHT TURBID ABUN CLEAR SLIGHT TURBID ABUN CLEAR SLIGHT TURBID ABUN CLEAR NO INSEET MATTER """"	SULPHUR OBOUR, SUSPENDED DOUT ORGANIC SUDGE EN BUBBLES IN FLOW CELL OR ORGANIC SUM, 5
6. (	Time Sta Time Stop Comm Field Analyses Purging Time 17:03 17:35 18:14 18:19 18:25 Sampling 18:33 Sampling Met Time Star Time Star	thod $16.32$ Vol Removed (L) 30 60 90 93 95 Hod $18:28$ 18:31	EC (uS/cm) 1461 US 2364 US 7100 US 11260 US 13200 US 28 02 09 0 13630 VS	SWL (start) SWL (end) pH $7 \cdot 52$ $7 \cdot 47$ $7 \cdot 33$ $7 \cdot 21$ $7 \cdot 19$ Done by: $7 \cdot 21$ $7 \cdot 19$ bone by: $7 \cdot 21$ SWL (start)	37.688 -59.37. (C) 29.3 27.1 26.4 25.9 26.0 AW/SS 25.7	Redox (mV) - 187 - 215 - 212 - 221 - 232 - 232	Dissolve (%) O.45	Doxygen 7 (mg/L) 0.60 0.37 0.01 0.06	Comments (Color, turbidity) CLEAR SUCURY TURBID ABUN CLEAR SUCURY TURBID ABUN CLEAR, NO INSECT MATTER II II II	SULPHUR OBOUR, SUSPENDED DOUT ORGANIC SUDGE EN BUBBLES IN FLOW CELL OR ORGANIC SUM, 5
NG . (	Time Sta Time Stop Comm Field Analyses Purging Time 17:03 17:35 18:14 18:19 18:25 Sampling 18:25 Sampling Met Time Sta	thod $16.32$ Vol Removed (L) 30 60 90 93 95 Hod $18:28$ 18:31	EC (uS/cm) 1461 US 2364 US 7100 US 11260 US 13200 US 28 02 09 0 13630 VS	SWL (start) SWL (end) 7.52 7.47 7.33 7.21 7.19 Done by: 7.21 unpling Depth	37.688 -59.37. (C) 29.3 27.1 26.4 25.9 26.0 AW/SS 25.7	Redox (mV) - 187 - 215 - 212 - 212 - 221 - 232 - 232	Dissolve (%) O.45 Groundwate	d Oxygen 7 (mg/L) 0-43 0-60 0-26 0-37 0-01 0-06 r Disposal R	Comments (Color, turbidity) CLEAR SLIGHT TURBID ABUN CLEAR SLIGHT TURBID ABUN CLEAR SLIGHT TURBID ABUN CLEAR SLIGHT TURBID ABUN CLEAR NO INSEET MATTER """"	SULPHUR OBOUR, SUSPENDED DOUT ORGANIC SUDGE EN BUBBLES IN FLOW CELL OR ORGANIC SUM, 5

BORE DEVELC	PrmEN1, PUK		GROUND	WATER SAN			unnu jt, st s	BORE NO:	<u>P209</u>	
Project	No 42626162	Project Name	BMA Caval	Ridge Groundw	ater					
Development		-				<u> </u>				
Development Meth	hod			X.						
Time Star			- SWL (start)		Volun	ne Removed	1	Bono Donth (start)		
Time Stop	ped		SWL (end)		Dis	charge Rate		Bore Depth (start Bore Depth (end		
Comme	ents		· · ·		- 1010	ionai go i can		NAPL Present		
								(If yes thickness)		
Field Analyses					N.			(ii yes unekness)		
Development	······									· *
Time	Vol Removed	EC	рН	Τ	Redox	Dissolve	ed Oxygen	Comments	1	
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)		
						······			-	
		14 P							-	- wi
									-	
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									- 74	
Purging	Date:	2/3/09	Done by:	AW/SS						
	Date:		Done by:	AW/SS	· · · · · · · · · · · · · · · · · · ·					. •
Purge Meth	nod APZ Pu	/ / /	Purge Depth	· · · · · · · · · · · · · · · · · · ·	· .					. •
Purge Meth Time Star	nod <u>AP2</u> Pu ted 12:50	/ / /	Purge Depth	· · · · · · · · · · · · · · · · · · ·	B	ore Volume	3	Bore Denth (start)	a 78.10	) wa
Purge Meth Time Star Time Stopp	nod <u>AP2</u> Pu ted <u>12:50</u> ped	/ / /	Purge Depth	· · · · · · · · · · · · · · · · · · ·	B Volun	ore Volume	s	Bore Depth (start)	<u>~ 78.</u> 10	) m
Purge Meth Time Star	nod <u>AP2</u> Pu ted <u>12:50</u> ped	/ / /	Purge Depth		B Volun	ore Volume	2 1	Bore Depth (end)	)	DM
Purge Meth Time Star Time Stopp Comme	nod <u>AP2</u> Pu ted <u>12:50</u> ped	/ / /	Purge Depth	· · · · · · · · · · · · · · · · · · ·	B Volum	ore Volume	\$ 1	Bore Depth (end) NAPL Present	)	) m
Purge Meth Time Star Time Stopp Comme Field Analyses	nod <u>AP2</u> Pu ted <u>12:50</u> ped	/ / /	Purge Depth	· · · · · · · · · · · · · · · · · · ·	B Volum	ore Volume ne Removed	3	Bore Depth (end)	)	) M
Purge Meth Time Star Time Stopp Comme Field Analyses Purging	hod <u>AP2 Pu</u> ted <u>12:50</u> pod	rnp	Purge Depth	· · · · · · · · · · · · · · · · · · ·	B Volun	ore Volume ne Removed	3	Bore Depth (end) NAPL Present	)	) M
Purge Meth Time Star Time Stopp Comme Field Analyses	hod <u>AP2 Po</u> ted <u>12:50</u> ped mts Vol Removed	EC	Purge Depth	· · · · · · · · · · · · · · · · · · ·	B Volum Redox		1	Bore Depth (end) NAPL Present (If yes thickness)	)	) <i>M</i> J
Purge Meth Time Star Time Stopp Comme Field Analyses Purging Time	hod <u>AP2</u> Po ted <u>J2:50</u> ped mts Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	19.872 m	Redox (mV)		d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments	)	) <i>M</i> J
Purge Meth Time Star Time Stopp Comme Field Analyses Purging Time	$\frac{AP2}{DC} = \frac{12150}{12150}$	EC (uS/cm) 9590	Purge Depth SWL (start) SWL (end) pH 7.26	19.872 m	Redox (mV)	Dissolve	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	]	
Purge Meth Time Star Time Stopp Comme Field Analyses Purging Time 13 : 21 13 : 49	AP2         Point           12:50         point           Vol Removed         (L)           30         60	EC (uS/cm) 9590 9660	Purge Depth SWL (start) SWL (end) pH 7.26 7.25	19.872 m	Redox (mV) 	Dissolve	d Oxygen (mg/L) (0.38 ().55	Comments	probes 51	
Purge Meth Time Star Time Stopp Comme Field Analyses Purging Time 13:21 13:49	$\frac{AP2}{DOC} = \frac{PO}{DOC}$ $\frac{PO}{DOC} = \frac{PO}{DOC}$ $\frac{Vol Removed}{(L)}$ $\frac{BO}{60}$ $\frac{PO}{90}$	EC (uS/cm) 9590 9666 9770	Purge Depth SWL (start) SWL (end) pH 7.26 1.25 1.25 1.23	19.872 m T (C) 31.7 31.5 31.2	Redox	Dissolve	d Oxygen (mg/L) 0.38	Comments (Color, turbidity) Cuever, bullles ov	prober St	ight sull
Purge Meth Time Star Time Stopp Comme Field Analyses Purging Time 13: 21 13: 49 14: 18 14: 18	$\frac{AP2}{DOC} = \frac{PO}{DOC}$ $\frac{PO}{DOC} = \frac{PO}{DOC}$ $\frac{Vol Removed}{(L)}$ $\frac{AP2}{DOC} = \frac{PO}{DOC}$ $\frac{PO}{PO}$ $1 aO$	EC (uS/cm) 9590 9660 9770 9810	Purge Depth SWL (start) SWL (end) pH 7.26 7.25 7.25 7.23 7.24	19.872 m T (C) 31.7 31.5 31.2	Redox (mV) 	Dissolve	d Oxygen (mg/L) 0.38 0.55 0.46	Comments (Color, turbidity) Cuever, bullles ov	prober St	ight sull
Purge Meth Time Star Time Stopp Comme Field Analyses Purging Time 13:21 13:49	$\frac{AP2}{DOC} = \frac{PO}{DOC}$ $\frac{PO}{DOC} = \frac{PO}{DOC}$ $\frac{Vol Removed}{(L)}$ $\frac{BO}{60}$ $\frac{PO}{90}$	EC (uS/cm) 9590 9666 9770	Purge Depth SWL (start) SWL (end) pH 7.26 1.25 1.25 1.23	19.872 m T (C) 31.7 31.5 31.2	Redox (mV) 	Dissolve	d Oxygen (mg/L) 0.55 0.46 0.36	Comments (Color, turbidity) Cuever, bullles ov	prober St	ight sul
Purge Meth Time Star Time Stopp Comme Field Analyses Purging Time 13: 49 14: 18 14: 18 14: 46 14: 52	hod $AP2$ Pure points Vol Removed (L) AO	EC (uS/cm) 9590 9666 9770 9810 9798	Purge Depth SWL (start) SWL (end) PH 7.26 7.25 7.25 7.25 7.24 7.24 7.36	T (C) 31.7 31.5 31.2 31.2 31.2 31.3	Redox (mV) 	Dissolve (%)	d Oxygen (mg/L) 0.38 0.55 0.46 0.36 0.13	Comments (Color, turbidity) Clear, bulbles or CLEAR, NO BUBBLES, SUCHT CLEAR, NO BUBBLES, SUCHT CLEAR, NO BUBBLES, SUCHT	prober St	ight sull
Purge Meth Time Star Time Stopp Comme Field Analyses Purging Time 13: 21 13: 49 14: 18 14: 18 14: 46 14: 52 Sampling	hod $\underline{AP2}$ Points $\underline{AP2}$ Points $\underline{P2} : 50$ $\underline{P2} : 50$ P2	EC (uS/cm) 9590 9666 9770 9810 9810 9790	Purge Depth SWL (start) SWL (end) pH 7.26 7.25 7.25 7.23 7.24	T (C) 31.7 31.5 31.2 31.2 31.2 31.3	Redox (mV) 	Dissolve (%)	d Oxygen (mg/L) 0.55 0.46 0.36	Comments (Color, turbidity) Clear, bulbles or CLEAR, NO BUBBLES, SUCHT CLEAR, NO BUBBLES, SUCHT CLEAR, NO BUBBLES, SUCHT	prober St	ight sull
Purge Meth Time Star Time Stopp Comme Field Analyses Purging Time 13: 49 14: 18 14: 18 14: 46 14: 52 Sampling Sampling Meth	hod $AP2$ Purposed ped $12:50$ ped $(L)$ 30 60 90 120 120 120 124 Date: Composed	EC (uS/cm) 9590 9666 9770 9810 9790 9790	Purge Depth SWL (start) SWL (end) PH 7.26 7.25 7.25 7.25 7.25 7.24 7.24 7.36 Done by:	T (C) 31.7 31.5 31.2 31.2 31.2 31.3 AW/SS	Redox (mV) 144 138 135 137 141	Dissolve (%) P2.09	d Oxygen (mg/L) 0.38 0.55 0.46 0.36 0.13 = QC	Comments (Color, turbidity) C (Legr, bubble) or CLEAR, NO BUBBLES, SUCHT CLEAR, NO BUBBLES, SUCHT CLEAR, NO BUBBLES, SUCHT (LEGR, NO BUBBLES, SUCHT	prober St	ight sull
Purge Meth Time Star Time Stopp Comme Field Analyses Purging Time 13: 49 14: 18 14: 18 14: 46 14: 52 Sampling Sampling Meth	hod $\underline{AP2}$ Points $\underline{AP2}$ Points $\underline{P2} : 50$ $\underline{P0}$ $\underline{P0}$ $\underline{P1} : 50$ $\underline{P1} : 50$	EC (uS/cm) 9590 9666 9770 9810 9790 9790	Purge Depth SWL (start) SWL (end) pH 7.26 7.25 7.25 7.25 7.24 7.24 7.26	Т (C) 31.5 31.5 31.2 31.2 31.2 31.2 31.2 31.2 31.3	Redox (mV) 144 138 135 137 141	Dissolve (%) P209 Froundwate	d Oxygen (mg/L) 0.38 0.55 0.46 0.36 0.13 = 0.13 er Disposal R	Comments (If yes thickness) Comments (Color, turbidity) Clear, bulbles a clear, NO BUBBLES, SLEAR CLEAR, NO BUBBLES, SLEAR	prober St	ight sul
Purge Meth Time Star Time Stopp Comme Field Analyses Purging Time 13: 49 14: 18 14: 18 14: 18 14: 52 Sampling Sampling Meth Time Star	hod $AP2$ Purposed ped $12:50$ ped $(L)$ 30 60 90 120 120 120 124 Date: Composed	EC (uS/cm) 9590 9666 9770 9810 9790 9790	Purge Depth SWL (start) SWL (end) pH 7.26 7.26 7.25 7.25 7.24 7.24 7.24 7.26 20 0 Done by: ampling Depth SWL (start)	Т (C) 31.7 31.5 31.2 31.2 31.2 31.2 31.2 31.3 ЛW/SS	Redox (mV) 144 138 135 137 141	Dissolve (%) P2.09	d Oxygen (mg/L) 0.38 0.55 0.46 0.36 0.13 = QC	Comments (Color, turbidity) C (Legr, bubble) or CLEAR, NO BUBBLES, SUCHT CLEAR, NO BUBBLES, SUCHT CLEAR, NO BUBBLES, SUCHT (LEGR, NO BUBBLES, SUCHT	prober St	ight sull
Purge Meth Time Star Time Stopp Comme Field Analyses Purging Time 13: 49 14: 18 14: 18 14: 18 14: 52 Sampling Sampling Meth Time Star	hod $AP2$ Points Vol Removed (L) 30 60 90 1250 60 90 1200 1200 1200	EC (uS/cm) 9590 9666 9770 9810 9790 9790	Purge Depth SWL (start) SWL (end) pH 7.26 7.25 7.25 7.25 7.24 7.24 7.26	Т (C) 31.7 31.5 31.2 31.2 31.2 31.2 31.2 31.3 ЛW/SS	Redox (mV) 	Dissolve (%) P209 Froundwate	d Oxygen (mg/L) 0.38 0.55 0.46 0.36 0.13 = 0.13 er Disposal R	Comments (If yes thickness) Comments (Color, turbidity) Clear, bulbles a clear, NO BUBBLES, SLEAR CLEAR, NO BUBBLES, SLEAR	prober St	ight sull
Purge Meth Time Star Time Stopp Comme Field Analyses Purging Time 13: 49 14: 18 14: 18 14: 46 14: 52 Sampling Sampling Meth Time Star Time Stopp	hod $AP2$ Points Vol Removed (L) 30 60 90 1250 60 90 1200 1200 1200	EC (uS/cm) 9590 9666 9770 9810 9790 9790	Purge Depth SWL (start) SWL (end) pH 7.26 7.26 7.25 7.25 7.24 7.24 7.24 7.26 20 0 Done by: ampling Depth SWL (start)	Т (C) 31.7 31.5 31.2 31.2 31.2 31.2 31.2 31.3 ЛW/SS	Redox (mV) 144 138 135 137 141	Dissolve (%) P209 Froundwate	d Oxygen (mg/L) 0.38 0.55 0.46 0.36 0.13 = 0.13 er Disposal R	Comments (If yes thickness) Comments (Color, turbidity) Clear, bulbles a clear, NO BUBBLES, SLEAR CLEAR, NO BUBBLES, SLEAR	prober St	ight sull

Bore Development, Purging and Groundwater Sampling Data Sheet

Page 1 of 1

levelopment	Date:		Done by:		_			
Development Method	1							
Time Started					Volur	ne Removed	l	Bore Depth (start)
Time Stopped			SWL (end)		Dis		;	Bore Depth (start)
Comment	5		-			•		NAPL Present
								(If yes thickness)
ield Analyses evelopment		· .						
Time	Vol Removed	EC	pH	Т	Redox	Dissolve	d Oxygen	Comments
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)
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	-  -					·····		
urging	Date:	2/3/09	Done by:	AW/SS				
					- 7 - 110			
Purge Methoo Time Starteo			Purge Depth			/		
Time Stopped	and the second of the second se		SWL (start)	_Dry		Bore Volume		Bore Depth (start)
Comment			SWL (end)		Volur	ne Removed		Bore Depth (end)
Common	•	·	· · · · · · · · · · · · · · · · · · ·			A		NAPL Present
ield Analyses			······				·······	(If yes thickness)
urging					·			·
Time	Vol Removed	EC	pH	Т	Redox	Dissolve	d Oxygen	Comments
	(L)	(uS/cm)	-	(C)	(mV)	(%)	(mg/L)	(Color, turbidity)
				······································		<u>}</u>	<u> </u>	
			_					
		<i></i>					-	
			Done by:	AW/SS				
ampling	Date:		Done by.					
Sampling Method		S	ampling Depth		(	Groundwate	r Disposal R	ecord
Sampling Method Time Started	 	S	ampling Depth SWL (start)			Groundwate Date	er Disposal R Litres	
Sampling Method	] ] ]	S	ampling Depth SWL (start)					ecord Disposal method

Checked By:....

BORE No: P211-5

BORE No:  $f_{z} | l - D$ 

evelopment	Date:		Done by:						
Development Method									
Time Started			SWL (start)	)	Volur	ne Removed		Bora Donth (start)	
Time Stopped			SWL (end)	)	Dis	scharge Rate		Bore Depth (start) Bore Depth (end)	
Comments	7. TV-1	· ·						NAPL Present	
-			·	``	· · · · · · · · · · · · · · · · · · ·	,	·	(If yes thickness)	
eld Analyses				· · · · ·					· · · · · · · · · · · · · · · · · · ·
evelopment									
Time	Vol Removed	EC	pH	Т	Redox	Dissolve	d Oxygen	Comments	
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	
7.0.9 ···································									
· · · · · · · · · · · · · · · · · · ·			·						
		-1040							
						·			
······									
Purge Method Time Started	AP2 pum	2/3/69 P	Done by: Purge Depth SWL (start)	12.201		Bore Volume		Bore Depth (start)	2 58,2m
Purge Method Time Started Time Stopped Comments	AP2 pum 16:36	/	Purge Depth	12.201		Bore Volume ne Removec	· · · · · · · · · · · · · · · · · · ·	Bore Depth (start) _: Bore Depth (end) NAPL Present (If yes thickness)	
Purge Method Time Started Time Stopped	AP2 pum 16:36	/	Purge Depth SWL (start)	12.201		Bore Volume ne Removec	· · · · · · · · · · · · · · · · · · ·	Bore Depth (end) NAPL Present	
Purge Method Time Started Time Stopped Comments eld Analyses urging	AP2 pum 16:36	/	Purge Depth SWL (start)	12.201	Volur	ne Removed		Bore Depth (end) NAPL Present (If yes thickness)	
Purge Method Time Started Time Stopped Comments eld Analyses arging Time	AP2 pum 16:36 Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	) <u>12.20</u> T (C)		ne Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments	
Purge Method Time Started Time Stopped Comments eld Analyses urging Time	AP2 pum 16:36 Vol Removed (L) 30	EC (uS/cm) 7/80	Purge Depth SWL (start) SWL (end) pH 7.38	) 12.201 ) (C) 28.9	Volur	Dissolve	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity)	
Purge Method Time Started Time Stopped Comments eld Analyses urging Time /6:55 / 7:14	AP2 pum 16:36 Vol Removed (L) 30 60	EC (uS/cm) 7/80 7190	Purge Depth SWL (start) SWL (end) pH 7.38 7.42	T (C) 28.9 28.7	Volur 	Dissolve	d Oxygen (mg/L) <b>C·94</b>	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) <i>MEDium GREV, EXTREMELY, THR</i>	BID, HIGH SULPHUR ODER
Purge Method Time Started Time Stopped Comments eld Analyses arging Time 16:55 17:14	AP2_pum 16:36 Vol Removed (L) 30 60 40	EC (uS/cm) 7/80 7190 7230	Purge Depth SWL (start) SWL (end) pH 7.38 7.42 7.42	T (C) 28.9 28.7 28.7 28.0	Redox (mV) -168 -161 -143	Dissolve	d Oxygen (mg/L) 0. <b>94</b> 0.31	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) <i>MEDium GREV, EXTREMELY TUR</i> <i>MEDIUM GREV, III II</i>	1 11 11 11 11 11
Purge Method Time Started Time Stopped Comments eld Analyses urging Time /6:55 / 7:14	AP2 pum 16:36 Vol Removed (L) 30 60	EC (uS/cm) 7/80 7190	Purge Depth SWL (start) SWL (end) pH 7.38 7.42	T (C) 28.9 28.7	Volur 	Dissolve	d Oxygen (mg/L) 0. <b>94</b> 0.31 0.64	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) <i>MEDium GREV, EXTREMELY TUR</i> <i>MEDIUM GREV, III II</i>	1 11 11 11 11 11 11
Purge Method Time Started Time Stopped Comments eld Analyses arging Time 16:55 17:14	AP2_pum 16:36 Vol Removed (L) 30 60 40	EC (uS/cm) 7/80 7190 7230	Purge Depth SWL (start) SWL (end) pH 7.38 7.42 7.42	T (C) 28.9 28.7 28.7 28.0	Redox (mV) -168 -161 -143	Dissolve	d Oxygen (mg/L) 0. <b>94</b> 0.31	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) <i>MEDium GREV, EXTREMELY TUR</i> <i>MEDIUM GREV, III II</i>	1 11 11 11 11 11 11
Purge Method Time Started Time Stopped Comments eld Analyses arging Time 16:55 17:14	AP2 pum 16:36 Vol Removed (L) 30 60 90 120	EC (uS/cm) 7/80 7190 7230 7290	Purge Depth SWL (start) SWL (end) pH 7.38 7.43 7.43 7.43	Т (C) 28.9 28.9 28.9 28.0 28.0 27.6	Redox (mV) -168 -161 -143	Dissolve	d Oxygen (mg/L) 0. <b>94</b> 0.31 0.64	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) <i>MEDium GREV, EXTREMELY, THR</i>	1 11 11 11 11 11 11
Purge Method Time Started Time Stopped Comments eld Analyses irging Time /6:55 /7:14 17:34 17:34	$\begin{array}{c} A P & P & P & P \\ \hline 16 & 36 \\ \hline \\ Vol Removed \\ (L) \\ \hline 30 \\ \hline 60 \\ \hline 90 \\ \hline 120 \\ \hline \\ Date: \end{array}$	EC (uS/cm) 7/80 7190 7230 720 720 720	Purge Depth SWL (start) SWL (end) pH 7.38 7.42 7.42 7.43 7.43 7.43	Т (C) 28.9 28.9 28.0 28.0 27.6	Redox (mV) -168 -161 -143	Dissolve	d Oxygen (mg/L) 0. <b>94</b> 0.31 0.64	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) <i>MEDium GREV, EXTREMELY TUR</i> <i>MEDIUM GREV, III II</i>	1 11 11 11 11 11 11
Purge Method Time Started Time Stopped Comments eld Analyses arging Time 76:55 77:14 17:34 17:34 17:54	AP2 pum 16:36 Vol Removed (L) 30 60 90 120 Date: AP2 ANN	EC (uS/cm) 7/80 7190 7230 720 720 720	Purge Depth SWL (start) SWL (end) pH 7.38 7.42 7.42 7.42 7.42 7.42 7.42 7.42 7.42	T (C) 28.9 28.7 28.7 28.0 27.6 AW/SS	Volur Redox (mV) -168 -143 -141	Dissolve (%)	d Oxygen (mg/L) 0.94 0.31 0.64 0.38	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) MEDIUM GREV, EXTREMELY THE MEDIUM GREY, """" LIGHT " MEDIUM > SUG HT VERT LIGHT GREY, V. SUGHT T	1 11 11 11 11 11 11
Purge Method Time Started Time Stopped Comments eld Analyses arging Time 76:55 77:14 17:54 17:54 mpling Sampling Method Time Started	AP2 pum 16:36 Vol Removed (L) 30 60 90 120 Date: AP2 PUM 17:57	EC (uS/cm) 7/80 7190 7230 720 720 720	Purge Depth SWL (start) SWL (end) pH 7.38 7.42 7.42 7.42 7.42 7.43 Done by: ampling Depth SWL (start)	T (C) 28.9 28.9 28.0 27.6 AW/SS	Volur Redox (mV) -168 -143 -141	Dissolve (%)	d Oxygen (mg/L) 0. <b>94</b> 0.31 0.64	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) MEDIUM GREV, EXTREMELY THE MEDIUM GREY, """" LIGHT " MEDIUM > SUG HT VERT LIGHT GREY, V. SUGHT T	1 11 11 11 11 11 11
Purge Method Time Started Time Stopped Comments eld Analyses arging Time 76:55 77:14 17:34 17:34 17:54	AP2 pum 16:36 Vol Removed (L) 30 60 90 120 Date: AP2 PUM 17:57	EC (uS/cm) 7/80 7190 7230 720 720 720	Purge Depth SWL (start) SWL (end) pH 7.38 7.42 7.42 7.42 7.42 7.42 7.42 7.42 7.42	T (C) 28.9 28.9 28.0 28.0 27.6 AW/SS	Volur Redox (mV) -168 -143 -141	Dissolve (%)	d Oxygen (mg/L) 0.94 0.31 0.64 0.28 r Disposal R	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) <i>MEDNAM GREV, EXTREMELY THR</i> <i>MEDNAM GREY, """</i> LIGHT " <i>MEDNAM SOLG</i> W WRY LIGHT OPEN, V. SUGHT TH	1 11 11 11 11 11 11

Bore Development, Purging and Groundwater Sampling Data Sheet

Project N	lo <u>42626162</u>	Project Name	BMA Court	Didas C					
Development					ater	<u>alt direkterinist</u>	<u> 위치 동안 한 동안</u> 문었다. 19		
Development Metho				-					
	Time Started		- SWL (start)		Volu	ma Pamova	1	Data Dauth (11.1)	
Time Stoppe	Time Stopped		SWL (end)		Volume Removed Discharge Rate			Bore Depth (start) Bore Depth (end)	
Comment	Comments					oona go raa	· · · · · · · · · · · · · · · · · · ·	NAPL Present	
						···-		(If yes thickness)	
Field Analyses Development								(11 905 (110(11033)_	
Time	Vol Removed	EC	pH	Т	Redox	Dissolve	d Oxygen	Comments	
	(L)	(uS/cm)		(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	
					·····				
					····				
		2171 -							
Purging Purge Metho	Date:	3/3/09	Done by:						
Purge Metho Time Starte Time Stoppe Comment	od <b>8</b> : AP2 od <b>8</b> : 40 od	3 <i> 3 09</i> Ртр	– Purge Depth SWL (start)		I Volu	Bore Volume me Removed		Bore Depth (end) NAPL Present	
Purge Metho Time Starte Time Stoppe Comment Field Analyses	od <b>8</b> : AP2 od <b>8</b> : 40 od	3 <i>/3/09</i> ,Рипр	– Purge Depth SWL (start)	8.207m	I Volu			Bore Depth (end)	
Purge Metho Time Starte Time Stoppe Comment Field Analyses	od <b>8</b> : AP2 od <b>8</b> : 40 od	3 <i>/3/09</i> Ртр	Purge Depth SWL (start) SWL (end)	8.207 m 9.94 m	Volu	me Removed		Bore Depth (end) NAPL Present (If yes thickness)	
Purge Metho Time Starte Time Stoppe Comment Field Analyses Purging Time	vd 772 vd 7742 vd 7742 vd 7742 vd 7742 Vol Removed (L)	Рипр	– Purge Depth SWL (start)	8.207 m 9.94 m T	Volu Redox	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Metho Time Starte Time Stoppe Comment Field Analyses Purging Time G: 244	vd 87492 vd 8746 ts Vol Removed (L) 30 L	Рипр	Purge Depth SWL (start) SWL (end) pH 6.85	8.207 m 9.94 m	Volu	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Metho Time Starte Time Stoppe Comment Field Analyses Purging Time 9:24 10:13	$\frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{\sqrt{2}} + \frac{\sqrt{2}}{\sqrt{2}}$	EC (uS/cm) /2490 13260	Purge Depth SWL (start) SWL (end) pH 6.85	8.207 m 9,94 m (C) 36.1 28.9	Volu Redox (mV) - 100 - 124	me Removed	d Oxygen (mg/L) /· 20	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Metho Time Starte Time Stoppe Comment Field Analyses Purging Time 9: 24 10: 13 0: 41	$\frac{\sqrt{2}}{\sqrt{2}} \frac{\sqrt{2}}{\sqrt{2}} $	Рипр EC (uS/cm) 12490 15260 15690	Purge Depth SWL (start) SWL (end) pH 6.85	8.207 m 9,94 m (C) 36.1 28.9	Volu Redox (mV) - 100 - 124	me Removed	d Oxygen	Bore Depth (end) NAPL Present (If yes thickness)	ON SIDE OF FLOW CELL LOW SULPHILE SMELL PARTICLES, SULPHILE SMELL
Purge Metho Time Starte Time Stoppe Comment Field Analyses Purging Time 9:24 10:13	$\frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{\sqrt{2}} + \frac{\sqrt{2}}{\sqrt{2}}$	EC (uS/cm) /2490 13260	Purge Depth SWL (start) SWL (end)	8.207 m 9,94 m (C) 36.1	Volu Redox (mV) 100	me Removed	d Oxygen (mg/L) /· 20 6·43	Bore Depth (end) NAPL Present (If yes thickness)	en SIDE OF FLOW CECC LOW SULPHUR SMCM PARTICLES, SULPHUR OF "SIGNIE
Purge Metho Time Starte Time Stoppe Comment Field Analyses Purging Time 9:24 10:13 0:41 11:16	$ \frac{d}{dt} = \frac{AP2}{ST4c} $ $ \frac{d}{dt} = \frac{ST4c}{Vol \text{ Removed}} $ $ \frac{Vol \text{ Removed}}{(L)} $ $ \frac{3OL}{75L} $ $ \frac{105L}{135L} $	Рипр EC (uS/cm) 12490 15690 15610	Purge Depth SWL (start) SWL (end) pH 6.85 6.85 6.85 6.85	B. 20'7 m 9,94 m (C) 36.1 28.9 29.1 24.5	Volu Redox (mV) - 100 - 124	me Removed	d Oxygen (mg/L) /· 20 6·43 Ø.60	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAE SMALL AIE BUDDET VEEY CLEAE, SMALL BUDDET VEEY CLEAE, 11 11	ON SIDE OF FLOW CECC LOW SULPHUR SMER PARTICLES, SULPHUR OF "SIGNIE,
Purge Metho Time Starte Time Stoppe Comment Field Analyses Purging Time 9: 24 10: 13 0: 41	$ \frac{d}{dt} = \frac{AP2}{ST4c} $ $ \frac{d}{dt} = \frac{ST4c}{Vol \text{ Removed}} $ $ \frac{Vol \text{ Removed}}{(L)} $ $ \frac{3OL}{75L} $ $ \frac{105L}{135L} $	Рипр EC (uS/cm) 12490 15260 15690	Purge Depth SWL (start) SWL (end) pH 6.85	B. 20'7 m 9,94 m (C) 36.1 28.9 29.1 24.5	Volu Redox (mV) - 100 - 124	me Removed	d Oxygen (mg/L) /· 20 6·43 Ø.60	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAE SMALL AIE BUDDET VEEY CLEAE, SMALL BUDDET VEEY CLEAE, 11 11	ON SIDE OF FLOW CECC LOW SULPHUR SMER PARTICLES, SULPHUR OF "SIGNIFIC
Purge Metho Time Starte Time Stoppe Comment Field Analyses Purging Time 9:24 10:13 0:41 11:16 Sampling	$\frac{4P_2}{8} = \frac{4P_2}{8}$ $\frac{2}{8} = \frac{2}{4}$ $\frac{2}{8} = \frac{2}{4}$ $\frac{2}{8} = \frac{2}{4}$ $\frac{105 L}{105 L}$ $\frac{105 L}{135 L}$ $Date: C$	EC (uS/cm) 12490 15260 15690 15610	Purge Depth SWL (start) SWL (end) pH 6.85 6.85 6.85 6.87 6.84 Done by:	B. 20'7 m 9,94 m (C) 36.1 28.9 29.1 24.5	Volut Redox (mV) - 100 - 124 - 96 - 89	Dissolve (%)	d Oxygen (mg/L) /· 20 6·43 0.60 0.64	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAE SMAL AIE BANDLET VEEY CLEAE, SMAL BLACK VEEY CLEAE, 11 11	ON SIDE OF FLOW CECC LOW SULPHUR SMER PARTICLES, SULPHUR OF "SIGNIFIC
Purge Metho Time Starte Time Stoppe Comment Field Analyses Purging Time 9:24 10:13 0:41 11:16 Sampling Sampling Metho	$\frac{d}{d} = \frac{AP2}{8740}$ $\frac{d}{d} = \frac{3740}{8740}$ $\frac{Vol \text{ Removed}}{(L)}$ $\frac{30L}{75L}$ $105L$ $135L$ $Date: C$ $d AP2 PW$	EC (uS/cm) 12490 15260 15690 15610	Purge Depth SWL (start) SWL (end) pH 6.85 6.85 6.85 6.84 Done by: ampling Depth	8.207 m 9,94 m (C) 36.1 28.9 29.1 24.5 AW/SS	Volut Redox (mV) - 100 - 124 - 96 - 89	Dissolve (%) Groundwate	d Oxygen (mg/L) /· 20 6·43 0.60 0.64 0.64	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAE SMALL AIE BUSKET VEEY CLEAE, SMALL BUSKET VEEY CLEAE, 11 11 11 11 11 11 11 11 11 11 11 11 11	ON SIDE OF FLOW CECC LOW SULPHUR SMER PARTICLES, SULPHUR OF "SIGNIFIC
Purge Metho Time Starte Time Stoppe Comment Field Analyses Purging Time 9:24 10:13 0:41 11:16 Sampling Sampling Metho Time Starte	$\frac{Vol \text{ Removed}}{CL}$ $\frac{Vol \text{ Removed}}{SCL}$ $\frac{Vol \text{ Removed}}{SCL}$ $\frac{3OL}{75L}$ $105L$ $135L$ $Date: CC$ $\frac{AP2}{C} PW$	EC (uS/cm) 12490 15260 15690 15610	Purge Depth SWL (start) SWL (end) pH <u>6.85</u> <u>6.85</u> <u>6.85</u> <u>6.85</u> <u>6.87</u> Done by: ampling Depth SWL (start)	8.207 m 9,94 m (C) 36.1 28.9 29.1 29.5	Volut Redox (mV) - 100 - 124 - 96 - 89	Dissolve (%)	d Oxygen (mg/L) /· 20 6·43 0.60 0.64	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAE SMAL AIE BANDLET VEEY CLEAE, SMAL BLACK VEEY CLEAE, 11 11	ON SIDE OF FLOW CECC LOW SULPHUR SMER PARTICLES, SULPHUR OF "SIGNIFIC
Purge Metho Time Starte Time Stoppe Comment Field Analyses Purging Time 9:24 10:13 0:41 11:16 Sampling Sampling Metho	$\frac{2}{2} \frac{AP2}{S;4}$ $\frac{2}{2} \frac{S;4}{S;4}$ $\frac{Vol Removed}{(L)}$ $\frac{3OL}{75L}$ $\frac{105L}{135L}$ Date: C $\frac{AP2}{Date: C}$	EC (uS/cm) 12490 15260 15690 15610	Purge Depth SWL (start) SWL (end) pH 6.85 6.85 6.85 6.84 Done by: ampling Depth	8.207 m 9,94 m (C) 36.1 28.9 29.1 29.5	Volut Redox (mV) - 100 - 124 - 96 - 89	Dissolve (%) Groundwate	d Oxygen (mg/L) /· 20 6·43 0.60 0.64 0.64	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAE SMALL AIE BUSKET VEEY CLEAE, SMALL BUSKET VEEY CLEAE, 11 11 11 11 11 11 11 11 11 11 11 11 11	ON SIDE OF FLOW CECC LOW SULPHUR SMER PARTICLES, SULPHUR OF "SIGNIFIC

Bore Development, Purging and Groundwater Sampling Data Sheet

Project No	42020102	i rojeet i taine	DIMA Caval						
Development	Date:		Done by:						
Development Method	1								
Time Started	1		SWL (start)		Volu	me Removed	3	Bore Depth (start)	
Time Stopped	1		SWL (end)	·	Di	scharge Rate	9	Bore Depth (end)	
Comments	6							NAPL Present	
							• .	(If yes thickness)	
Field Analyses Development						i.			
Time	Vol Removed	EC	pH	Т	Dadau	Dissel	10		
Tune	(L)	(uS/cm)		(C)	Redox (mV)	0%)	ed Oxygen (mg/L)	Comments (Color, turbidity)	
							· · · · · · · · · · · · · · · · · · ·		
				1					
Purge Method	AP2 PU	3/3/09 MP	Done by: Purge Depth SWL (start)	·····		Bore Volum		Bore Depth (start)	2 42. 70 m
Purge Method Time Started Time Stopped Comments		,	- Durse Donth		M M Volu	Bore Volum me Removed		Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)	
Purge Method Time Started Time Stopped Comments Field Analyses	1 <u>AP2</u> PU 12:40 11:09	,	- Durse Donth	·····	M M Volu			Bore Depth (end) NAPL Present	
Purge Method Time Started Time Stopped Comments Field Analyses	1 <u>AP2</u> PU 12:40 11:09	,	Purge Depth SWL (start) SWL (end)	·····	M M Redox	me Removed	<u>.</u>	Bore Depth (end) NAPL Present (If yes thickness)	
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)	ec (uS/cm)	Purge Depth SWL (start) SWL (end)	31.758 3.750 T (C)	Redox (mV)	me Removed		Bore Depth (end) NAPL Present (If yes thickness)	
Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L) 32	EC (uS/cm) 1493Ο	Purge Depth SWL (start) SWL (end) pH 6.73	31.758 31.750 750 T (C) AWV1-28.6	Redox (mV) 108	me Removed	d Oxygen (mg/L)	Comments (Color, turbidity)	MODERATE SULPHUZ OF
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 13:06 13:28	Vol Removed (L) 32 64	EC (uS/cm) 14930 13950	Purge Depth SWL (start) SWL (end) pH 6.73 6.81	31.758 3.750 T (C) 8WV1-28.6 28.2	Redox (mV) 108	me Removed	d Oxygen   (mg/L)   Ø·30   Ø·24	Comments (Color, turbidity)	MODERATE SULPHUZ OF
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 13:06 13:28 13:49	Vol Removed (L) 32 64	EC (uS/cm) 14930 15950	Purge Depth SWL (start) SWL (end) pH 6.73 6.81 6.78	31.758 3.750 T (C) 8WV1-28.6 28.2	Redox (mV) -108 -93 -94	me Removed	d Oxygen (mg/L) ○·30 ○·24 ○·22	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAL, SUGHT TURBIDITY, CLEAL, V. LOW TUBIDITY II	MODERATE SULPHINZ OF O, MODERATE SULPHINZ 1, CARLE
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 13:06 13:28	Vol Removed (L) 32	EC (uS/cm) 14930 13950	Purge Depth SWL (start) SWL (end) pH 6.73 6.81	31.758 31.750 750 T (C) AWV1-28.6	Redox (mV) 108	me Removed	d Oxygen   (mg/L)   Ø·30   Ø·24	Comments (Color, turbidity)	MODERATE SULPHINZ OF O, MODERATE SULPHINZ 1, CARLE
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 13:06 13:28 13:49 14:09 Sampling		EC (uS/cm) 14930 15950 15890 16570 03.03.66	Purge Depth SWL (start) SWL (end) 6.73 6.78 6.79	T (C) 80.4 28.4 28.4	Redox (mV) 108 93 97 82	me Removed Dissolve (%)	d Oxygen (mg/L) 0·30 0·24 0·22 1:3/	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAR, SUGHT TURBIDITY (LEAR, V. LOW TURBIDITY II II II II CLEAR, MODERTE SULAN	MODERATE SULPHINZ OF O, MODERATE SULPHINZ 11 OPAR
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 13:06 13:28 13:49 14:09 Sampling		EC (uS/cm) 14930 15950 15890 16570 03.03.06	Purge Depth SWL (start) SWL (end) pH 6.73 6.81 6.78 6.72 Done by:	T (C) 38.4 28.4 28.4 28.4 28.4	Redox (mV) -108 -93 -94 -82	Dissolva (%) P2-03	d Oxygen  (mg/L) 0.30 0.24 0.22 1.31 -7 = 0.0	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAR, SUGHT TURBIDITJ, CLEAR, V. LOW TREBIDITJ, CLEAR, WORRATE SULAH	MODERATE SULPHINZ OF O, MODERATE SULPHINZ 11 OPAR
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time [3:06 [3:06 [3:28 [3:49] [4:09] Sampling Sampling Method	$ \begin{array}{c}                                     $	EC (uS/cm) 14930 15950 15890 16570 03.03.06	Purge Depth SWL (start) SWL (end) pH 6.73 6.81 6.78 6.75 Done by: ampling Depth	3).758 3).758 3).750 1 (С) 0 0 0 0 0 0 1 2 8.4 2 8.4 2 8.4 2 8.4 2 8.4	Redox (mV) -108 -93 -94 -82	Dissolva (%) P2-03 Groundwat	ed Oxygen $(mg/L)$ $O \cdot 3O$ $O \cdot 24$ $O \cdot 22$ $I:3I$ $-\nabla = O \cdot C$ er Disposal R	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAR, SUGHT TURBIDITY, CLEAR, V. LOW TURBIDITY, CLEAR, MODERATE SULAN COUL	MODERATE SULPHINZ OF O, MODERATE SULPHINZ 11 OPAR
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 13:06 13:28 13:49 14:09 Sampling Sampling Method Time Started	$\frac{AP2}{12:40}$ $\frac{12:40}{12:40}$ $\frac{12:40}{12:40}$ $\frac{12:40}{12:40}$ $\frac{12:40}{12:40}$ $\frac{14:09}{12:40}$ $\frac{12:40}{12:40}$ $Date:$ $\frac{14:09}{12:40}$ $Date:$ $\frac{14:09}{12:40}$	EC (uS/cm) 14930 15950 15890 16570 03.03.06	Purge Depth SWL (start) SWL (end) pH 6.73 6.81 6.78 6.79 Done by: ampling Depth SWL (start)	3).758 3).758 3).7501 С) Эмл 28.6 28.2 28.4 28.4 28.4	Redox (mV) 108 97 97 82	Dissolva (%) P2-03	d Oxygen  (mg/L) 0.30 0.24 0.22 1.31 -7 = 0.0	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAR, SUGHT TURBIDITJ, CLEAR, V. LOW TREBIDITJ, CLEAR, WORRATE SULAH	MODERATE SULPHINZ OF O, MODERATE SULPHINZ 1, CARLE
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 13:06 13:28 13:49 14:09 Sampling Sampling Method		EC (uS/cm) 14930 15890 16570 03.03.06 St	Purge Depth SWL (start) SWL (end) pH 6.73 6.81 6.78 6.75 Done by: ampling Depth	3).758 3).758 3).7501 С) Эмл 28.6 28.2 28.4 28.4 28.4	Redox (mV) -108 -93 -94 -82	Dissolva (%) P2-03 Groundwat	ed Oxygen $(mg/L)$ $O \cdot 3O$ $O \cdot 24$ $O \cdot 22$ $I:3I$ $-\nabla = O \cdot C$ er Disposal R	Bore Depth (end) NAPL Present (If yes thickness) Comments (Color, turbidity) CLEAR, SUGHT TURBIDITY, CLEAR, V. LOW TURBIDITY, CLEAR, MODERATE SULAN COUL	MODERATE SULPHUZ OF O, MODERATE SULPHUZ 1, CARLE

Bore Develop

Project No									
Development	Date: _		Done by:						1
Development Metho									
Time Started			SWL (start)		Volur	ne Removed	l	Bore Depth (star	t)
Time Stopped			SWL (end)		Dis	scharge Rate	e	Bore Depth (end	
Comment	s					C		NAPL Prese	
								(If yes thicknes	
Field Analyses Development									-7
Time	Vol Removed	EC	pН	Т	Redox	Dissolve	ed Oxygen	Comments	
	(L)	(uS/cm)	_	(C)	(mV)	(%)	(mg/L)	(Color, turbidity)	
									···
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<b>Purging</b> Purge Methor Time Starter Time Stopper	d	3/3/09	Done by: Purge Depth SWL (start) SWL (end)	-	- m Volut	Bore Volume	<u>• 3.14</u>	Bore Depth (star	t) <u>5</u> , 27.
Time Starter Time Stoppe Comment	d d d	3/3/09	Purge Depth		m? E D_m Volur	Bore Volumo ne Removed	e 3.14	Bore Depth (star Bore Depth (en NAPL Prese (If yes thicknes	d) nt
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Purge Methor Time Starter Time Stopper Comment Field Analyses	d d d	3/3/09 EC	Purge Depth	-	- wi Volur m Volur Redox	ne Removed	d	Bore Depth (en NAPL Prese (If yes thicknes	d) nt
Purge Method Time Started Time Stopped Comment Field Analyses Purging Time	d d s Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	25.573 25.570 T (C)		ne Removed	ded Oxygen	Bore Depth (en NAPL Prese (If yes thicknes	d) nt
Purge Methou Time Started Time Stopped Comment Field Analyses Purging Time	d d 	EC (uS/cm) 9460	Purge Depth SWL (start) SWL (end)	25.573 25.570 T (C) 30.0	Redox	ne Removed	d ed Oxygen   (mg/L)	Bore Depth (en NAPL Prese (If yes thicknes Comments (Color, turbidity)	d) nt s)
Purge Metho Time Starte Time Stoppe Comment Field Analyses Purging Time 13:03 13:26	d d 	EC (uS/cm) 9460	Purge Depth SWL (start) SWL (end) pH 6, <u>98</u> 6, 92	25.573 25.570 T (C) 30.0	Redox (mV) -16 -8	Dissolve	d ed Oxygen (mg/L) 2.044-	Bore Depth (en NAPL Prese (If yes thicknes Comments (Color, turbidity)	d) nt s)
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Purge Metho Time Starte Time Stoppe Comment Field Analyses Purging Time 13:03 13:26	d d 	EC (uS/cm) 9460	Purge Depth SWL (start) SWL (end)	25.573 25.570 T (C)	Redox (mV)	Dissolve	d ed Oxygen (mg/L) 2.044-	Bore Depth (en NAPL Prese (If yes thicknes Comments (Color, turbidity)	d) nt s)
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Purge Method Time Started Time Stopped Comment Field Analyses Purging Time 13:03 13:26 13:37	d d d s Vol Removed (L) 3, 1 6, 2 9, 3 Date:	EC (uS/cm) 9460 1040 10930	Purge Depth SWL (start) SWL (end) pH 6, 98 6, 92 6, 92 6, 96 Done by:	25.573 25.570 T (C) 30.0 26.8 27.3 AW/SS	$\begin{array}{c} \text{Redox} \\ (mV) \\ \hline -16 \\ \hline -3 \\ \hline 14 \\ \hline \end{array}$	Dissolve (%)	d ed Oxygen (mg/L) 2.04 2.23 2.88	Bore Depth (en NAPL Prese (If yes thicknes Comments (Color, turbidity)	d) nt s)
Purge Methor Time Starter Time Stopper Comment Field Analyses Purging Time 13:03 13:26 13:39 Sampling Sampling Methor	d d d s vol Removed (L) 3.1 6.2 9.3 Date: d	EC (uS/cm) 9460 1040 10930	Purge Depth SWL (start) SWL (end) pH 6, 98 6, 92 6, 96 Done by:	25.573 25.570 T (C) 30.0 26.8 27.3 AW/SS	$\begin{array}{c} \text{Redox} \\ (mV) \\ \hline -16 \\ \hline -3 \\ \hline 14 \\ \hline \end{array}$	Dissolve (%)	d ed Oxygen (mg/L) 2,04 2,23 2,88 2,88	Bore Depth (en NAPL Prese (If yes thicknes Comments (Color, turbidity) Uglat Drown - grey 1	d) nt s)
Purge Methor Time Starter Time Stopper Comment Field Analyses Purging Time 13:03 13:26 13:37 Sampling Sampling Methor Time Starter	d d d s vol Removed (L) 3, 1 6, 2 9, 3 Date: d d	EC (uS/cm) 9460 1040 10930	Purge Depth SWL (start) SWL (end) pH 6, 98 6, 92 6, 92 6, 96 Done by: ampling Depth SWL (start)	25.573 25.570 T (C) 30.0 26.8 27.3 AW/SS	Redox (mV) -16 -3 14	Dissolve (%)	d ed Oxygen (mg/L) 2.04 2.23 2.88	Bore Depth (en NAPL Prese (If yes thicknes Comments (Color, turbidity)	d) nt s)
Purge Methor Time Starter Time Stopper Comment Field Analyses Purging Time 13:03 13:26 13:39 Sampling Sampling Methor	d d d s s Vol Removed (L) 3. 1 6.2 9.3 7.3 Date: d d	EC (uS/cm) 9460 10930 Sa	Purge Depth SWL (start) SWL (end) pH 6, 98 6, 92 6, 96 Done by:	25.573 25.570 T (C) 30.0 26.8 27.3 AW/SS	$\begin{array}{c} \text{Redox} \\ (mV) \\ \hline -16 \\ \hline -3 \\ \hline 14 \\ \hline \end{array}$	Dissolve (%)	d ed Oxygen (mg/L) 2,04 2,23 2,88 2,88	Bore Depth (en NAPL Prese (If yes thicknes Comments (Color, turbidity) Uglat Drown - grey 1	d) nt s)

Bore Development, Purging and Groundwater Sampling Data Sheet

Checked By:....

BORE No: 1203-5

Project Name BMA Caval Ridge Groundwater Project No 42626162 Development Done by: Date: 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 EC Time Vol Removed pН Т Dissolved Oxygen Redox Comments (uS/cm) (L) (C) (mV) (%)(mg/L)(Color, turbidity) Date: 3/3/09 Purging Done by: AW/SS Purge Method AP2 Pump Purge Depth Time Started 15:44 SWL (start) 25.693 M Bore Depth (start) 35,110 m Bore Volume Time Stopped 16:50 SWL (end) Volume Removed Bore Depth (end) Comments Dienne chis allowed 50 Vecore-NAPL Present (If yes thickness) **Field Analyses** Purging Time Vol Removed EC pН Т Redox Dissolved Oxygen Comments (uS/cm) (L)(C) (mV)(%) (mg/L)(Color, turbidity) 6:05 30 509 57 clear-slightly toubil, HC oden .54 0.43 16:25 1497 2180 7.84 60 165 0.35 27. Baile -> Recorder 7.87 ~166 27.5 2.42 10 11 Date: 03-03-09 Sampling Done by: AW/SS UMP Barler Sampling Method Sampling Depth **Groundwater Disposal Record** Time Started 17: SWL (start) 4.5 Date Litres Disposal method Time Stopped SWL (end) devmt Comments purging

Bore Development, Purging and Groundwater Sampling Data Sheet

Checked By:....

BORE No: P202

Development	Date:		Done by:	····						
Development Method										
Time Started			SWL (start)	 	Volur	ne Removed	l	Bore Depth (start)		
Time Stopped			SWL (end)		— Dis	scharge Rate		Bore Depth (end)		
Comments						<u> </u>		NAPL Present	·	
					·			(If yes thickness)		
field Analyses Development		<u>.</u>								
Time	Vol Removed	EC	pH	Т	Redox	Dissolve	d Oxygen	Comments		
	(L)	(uS/cm)		(C) ·	(mV)	(%)	(mg/L)	(Color, turbidity)		
	·									
		· ·····								
Purge Method Time Started	A	3/3/09	Purge Depth SWL (start)	67.48	<u>-</u> би в	Bore Volume	)	Bore Depth (start)	295.4	
Purge Method Time Started Time Stopped Comments	· ·	3/3/09		67.48	<mark>биј</mark> Е Volur	Bore Volume ne Removee	9 [	Bore Depth (start) Bore Depth (end) NAPL Present (If yes thickness)		
Purge Method Time Started Time Stopped Comments	· ·	3/3/09	Purge Depth SWL (start)	67.48	<u>с</u> м Е Votur	Bore Volume ne Removed	) 	Bore Depth (end) NAPL Present		
Purge Method Time Started Time Stopped Comments	· ·	EC	Purge Depth SWL (start)	67.48	Ung E Volur Redox			Bore Depth (end) NAPL Present (If yes thickness)		
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)		Purge Depth SWL (start) SWL (end)	б7.48 т (С)	Redox (mV)		d Oxygen	Bore Depth (end) NAPL Present (If yes thickness)		
Purge Method Time Started Time Stopped Comments Field Analyses Furging	Vol Removed	EC	Purge Depth SWL (start) SWL (end)	67.48 T	Redox	Dissolve	d Oxygen	Comments (Color, turbidity)		
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	б7.48 т (С)	Redox (mV)	Dissolve	d Oxygen	Comments (Color, turbidity)		
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	б7.48 т (С)	Redox (mV)	Dissolve	d Oxygen	Comments (Color, turbidity)		
Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L)	EC (uS/cm)	Purge Depth SWL (start) SWL (end)	б7.48 т (С)	Redox (mV)	Dissolve	d Oxygen	Comments (Color, turbidity)		
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time	Vol Removed (L) 1 L	EC (uS/cm) IIII	Purge Depth SWL (start) SWL (end)	т (C) 27.48	Redox (mV)	Dissolve	d Oxygen	Comments (Color, turbidity)		
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 18-49	Vol Removed (L) 1 L	EC (uS/cm) IIII	Purge Depth SWL (start) SWL (end) pH <u>6.66</u>	т (C) 27.48	Redox (mV)	Dissolve	d Oxygen	Comments (Color, turbidity)		
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 18.49	Vol Removed (L) 1 L Date:	EC (uS/cm) 1111 03-03- 6	Purge Depth SWL (start) SWL (end) pH 6.66	т (C) 27.48 Д. 27.48 АW/SS	Redox (mV) -151	Dissolve (%)	d Oxygen (mg/L) C·6Q	Comments (Color, turbidity) CLEAR, SIMPHWL OPPWL-		
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 18-49	Vol Removed (L) 1 L Date: BAVE2 - 66	EC (uS/cm) 1111 03-03- 6	Purge Depth SWL (start) SWL (end) pH 6.66	т (C) 27.49 АW/SS	Redox (mV) -151	Dissolve (%) Groundwate	d Oxygen (mg/L) C·6Q	Comments (Color, turbidity) CLER, Surput OPPU		
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 18.49	Vol Removed (L) <b>1</b> L Date: BAUER - 66 18.30	EC (uS/cm) 1111 03-03- 6	Purge Depth SWL (start) SWL (end) pH 6.66	т (C) дт.9 лw/ss	Redox (mV) - 151	Dissolve (%)	d Oxygen (mg/L) C·6Q	Comments (Color, turbidity) CLEAR, SIMPHWL OPPWL-		
Purge Method Time Started Time Stopped Comments Field Analyses Purging Time 18-49	Vol Removed (L) 1 L Date: BAVER - GE 18.30 18.50	EC (uS/cm) 1111 03-03- 6	Purge Depth SWL (start) SWL (end) pH 6.66	т (C) 27.48 Д. Д. Д. Д. Д. Д. Д. Д. Д. Д. Д. Д. Д.	Redox (mV) - 151	Dissolve (%) Groundwate	d Oxygen (mg/L) C·6Q	Comments (Color, turbidity) CLER, Surput OPPU		

Bore Development, Purging and Groundwater Sampling Data Sheet

Checked By:\_\_\_\_\_

BORE No: Pz04

CAVAL RIDGE GROUNDWATER IMPACT ASSESSMENT	
Groundwater Analytical Laboratory	
Documentation Ap	opendix F



			CHAIN O	CUSTODY FORM								s	heet lof	2
THIS COLUMN FOR LAB USE ONLY	FROM: URS (AUSTRALIA)		DATE:		TO: ALS						Size, Type, and Analysi ainer Identifi	S	•	
Job Code:	Level 14, 240 Quee BRISBANE QLD 4 PO Box 302, BBN	000		32 Shand St Stafford QLD 4053		Size Type*								
Due Date:	Ph: 07 3243 2111 Project No: 42626162 Project Manager:		Fax: 07 32 Sampler(s): AV	/BS			Preservative Code					0		
	Stephen Denner Agreement No:		Signature(s): Checked:	Environme Bri	en al Division sbane		Analytes	ינואינטינעי אסייפניי.	$\sim$	$\sim$				
Custody seal Intact?	Released for URS Date: $8/6/03$	by: AW Time: <b>B</b>	60	(/e wor EB0	en al Division sbane k Order 807578			L.N	N	2	M3	plt and		
Lab identification	Date Time	Matrix	Sample Nur	iber		;	Total no	Tick reguire	d analytes	/				
13	5/6/09 AM	Water	Pz06	<u>- D</u>		<u> </u>	2					$\checkmark$		
14	5/6/08 AM		P206	-5 Telephone :	+61-7-3243 7222	<u>P</u>	2	$\checkmark$					L	
15	5/6/08 PM		11601	- D Telephone		P	~	$\sim$	-			$\checkmark$		
16	5/6/08 PM	-	See VI	<u>-5</u>	1	F	2	$\mathcal{A}$	~~/			$\mathcal{I}$		
17	6/6/08 AM		FZ 08	- <u>D</u>		f	2	$\sim$						
18	6/6/08 AM		P208			<u> </u>	2	/	$-\sqrt{-}$	-		-		
19	6/6/08 AM		P210			<u> </u>	2							
20	6/6/68 PM		P2 09	N		<u> </u>	2	<u> </u>		<u> </u>				
<u> </u>	6/6/03 PM		PZ11- PZ03			r	2					$\overline{\checkmark}$		
23	7/6/08 FM		P203							- V /		$\overline{\mathcal{I}}$		
24	716108 FM	$\overline{\nabla}$	P202	e.,		0	22					-V V		
Remarks:	1/10/04 1111		<u> </u>			F		~	<u> </u>					
						TOTAL								
	* Container Type an Bottle; VC = Hydroc			leutral Plastic; N = Nitric S = Sulfuric	Acid Preserved; C = S	odium Hydroxid	e Preserved;	J = Solvent \	Washed Aci	d Rinsed Jai	r; S = Solver	t Washed A	cid Rinsed	Glass
Courier Job No: 052 788 98	Specify Turnaround Time:						N			CONTAIN D. IS SUBSTAI		;		

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				CHAIN OF	CUSTODY FORM								s	heet ${\mathcal Z}$ of	r 2
THIS COLUMN FOR LAB USE ONLY	FROM: URS (AU	STRALIA)		DATE:		TO: ALS						Size, Type, f and Analysia ainer Identific	5	)	
Job Code:	Level 14, BRISBAN					32 Shand St Stafford QLD 4053		Size							
	PO Box 3	02, BBN (	QLD 4001					Type* Preservative							
	Ph: 07			Fax: 07 3243 2199				Code							
Due Date:	Project No: 42626162 Project Mar Stephen Der Agreement	nager: nner		Sampler(s): AW/ Signature(s): Checked:	BS			Analytes					EC		
Custody seal Intact? VES NO Sample cold? VES NO			by: $Aw$ Time: $137$	60	Received for L	aboratory by: Time:			NT	NT2	NTS	WZ	p # and		
Lab identification	Date	Time	Matrix	Sample Num	iber	Comments		Total no	Tick require	d analytęs					- <b>1</b>
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5	5/1/08	PM		QCOL			P								
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7	616105			QC04			Ŷ	2		- Contraction -	: J. M.	_	Land		
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ğ	6/6/08			0.006			· p	1					Ĵ/		
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Remarks:	10/0/03	1 14/01													
							TOTAL								
	* Contain Bottle; VC	er Type ar C = Hydroc	d Preservative hloric Acid Pre	e Codes: P = N eserved Vial; VS	leutral Plastic; N = Nitric A S = Sulfuric	cid Preserved; C = Sodium	Hydroxid	e Preserved;	J = Solvent \	Vashed Aci	d Rinsed Jar	; S = Solver	it Washed A	cid Rinsed	Glass
Courier Job No: 05278898	Specify T	Turnaroun	d Time:						N		PLES MAY ( HAZARDOU				

## ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES

## Environmental Division



# SAMPLE RECEIPT NOTIFICATION (SRN)

**Comprehensive Report** 

: EB08	807578		
: MR ST : GPO E	EPHEN DENNER 30X 302	Laboratory Contact Address	<ul> <li>Environmental Division Brisbane</li> <li>Tim Kilmister</li> <li>32 Shand Street Stafford QLD Australia</li> <li>4053</li> </ul>
: +61 32	2432111	E-mail Telephone Facsimile	: Services.Brisbane@alsenviro.com : +61-7-3243 7222 : +61-7-3243 7218
: 42626	162	Page	: 1 of 3
:		Quote number	: ES2008URSQLD0041 (EN/001/08)
: AW/BS	5	QC Level	NEPM 1999 Schedule B(3) and A QCS3 requirement
	: 10-JUN-2008 : 17-JUN-2008	Issue Date Scheduled Reporti	∴ 11-JUN-2008 11:51 ng Date : <b>17-JUN-2008</b>
ils			
	: Carrier : 2 MEDIUM : Intact.	Temperature No. of samples rec No. of samples and	-
	: URS A : MR ST : GPO E BRISB : stephe : +61 32 : +61 07 : 42626 : :	ived : 10-JUN-2008 ie Date : 17-JUN-2008 ils : Carrier : 2 MEDIUM	: URS AUSTRALIA PTY LTD (QLD)       Laboratory         : MR STEPHEN DENNER       Contact         : GPO BOX 302       Address         BRISBANE QLD, AUSTRALIA 4001       E-mail         : stephen_denner@urscorp.com       E-mail         : +61 32432111       Telephone         : +61 07 32432199       Facsimile         : 42626162       Page         :       Quote number         :       Quote number         :       Quote number         :       Issue Date         : AW/BS       QC Level

#### **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

he determination asks, that are includ When date(s) an		tent and preparation nown bracketed, these	ER - EA005: pH	WATER - EA010P Conductivity (PC)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 (EB/PCT) Major Anions (Cl, SO4, Alkalinity)	WATER - NT-03 (EB) Anions: Minor - Nitrite as N, Nitrate as Fluoride, Reactive Phosphorous	WATER - W-03 13 Metals (NEPM Suite)	WATER - W-03T 13 Metals (Total) (NEPM)
ID	date / time		WATER pH	Cond	Majo	Majo	WATER Anions: N Fluoride,	MAT 13 M	MAT 13 M
EB0807578-001	08-JUN-2008 11:00	PZ04	✓	√	√	✓	✓	1	
EB0807578-002	08-JUN-2008 11:00	PZ01	✓	✓	✓	1	1	1	
EB0807578-003	08-JUN-2008 11:00	PZ05	✓	√	√	✓	✓	✓	
EB0807578-004	05-JUN-2008 11:00	QC01	✓	✓	✓	1	✓	1	
EB0807578-005	05-JUN-2008 15:00	QC02							✓
EB0807578-006	05-JUN-2008 15:00	QC03							1
EB0807578-007	06-JUN-2008 11:00	QC04	✓	√	√	1	1	✓	
EB0807578-008	06-JUN-2008 15:00	QC05							✓
EB0807578-009	06-JUN-2008 15:00	QC06							✓
EB0807578-010	07-JUN-2008 11:00	QC07	1	√	√	1	1	✓	
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	1	1	✓	✓	✓	✓	
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	✓	✓	✓	1	✓	✓	
EB0807578-022	07-JUN-2008 15:00	PZ03-D	✓	✓	✓	1	✓	✓	
EB0807578-023	07-JUN-2008 15:00	PZ03-S	1	✓	1	1	1	1	
EB0807578-024	07-JUN-2008 15:00	PZ02	1	✓	1	1	1	1	<u> </u>



### Requested Deliverables

#### ALL RESULTS BRISBANE

<ul> <li>*AU Certificate of Analysis - NATA</li> </ul>	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		
<ul> <li>*AU Certificate of Analysis - NATA</li> </ul>	Email	stephen_denner@urscorp.com
- A4 - AU Sample Receipt Notification - Environmental	Email	stephen_denner@urscorp.com
<ul> <li>AU Interpretive QC Report (Anon QCI Not Rep)</li> </ul>	Email	stephen_denner@urscorp.com
<ul> <li>AU QC Report (Anon QC Not Rep) - NATA</li> </ul>	Email	stephen_denner@urscorp.com
- Default - Chain of Custody	Email	stephen_denner@urscorp.com
- EDI Format - MRED	Email	stephen_denner@urscorp.com
MS LUCIA PIRES		
- A4 - AU Tax Invoice	Email	lucia_pires@urscorp.com

## Environmental Division



## **CERTIFICATE OF ANALYSIS**

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



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 preformed, results are reported on a dry weight basis.

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

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

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

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

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



Sub-Matrix: WATER		Clie	ent sample ID	PZ04	PZ01	PZ05	QC01	QC02
	CI	ient sampli	ng date / time	08-JUN-2008 11:00	08-JUN-2008 11:00	08-JUN-2008 11:00	05-JUN-2008 11:00	05-JUN-2008 15:00
Compound	CAS Number	LOR	Unit	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 <0.005	<0.01	<0.01 <0.005	<0.01	
	7440-66-6	0.005	mg/L	<0.000	<0.005	CUU.U2	0.016	
EG020T: Total Metals by ICP-MS	7140.00.0	0.001						10.001
Arsenic Beryllium	7440-38-2	0.001	mg/L mg/L					<0.001 <0.001
Barium	7440-41-7	0.001	mg/L					<0.001
Cadmium	7440-39-3 7440-43-9	0.0001	mg/L					0.0003
Chromium	7440-43-9	0.0001	mg/L					< 0.001
Cobalt	7440-47-3	0.001	mg/L					<0.001
	1440-40-4	0.001				I	I	-0.001



Sub-Matrix: WATER		Clie	ent sample ID	PZ04	PZ01	PZ05	QC01	QC02
	Cl	ient sampli	ng date / time	08-JUN-2008 11:00	08-JUN-2008 11:00	08-JUN-2008 11:00	05-JUN-2008 11:00	05-JUN-2008 15:00
Compound	CAS Number	LOR	Unit	EB0807578-001	EB0807578-002	EB0807578-003	EB0807578-004	EB0807578-005
EG020T: Total Metals by ICP-MS - Con	tinued							
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 (Di	ssolved)							
Reactive Phosphorus - Filtered		0.010	mg/L	0.023	<0.010	0.010	<0.010	



Sub-Matrix: WATER		Clie	ent sample ID	QC03	QC04	QC05	QC06	QC07
	Cl	ient sampli	ng date / time	05-JUN-2008 15:00	06-JUN-2008 11:00	06-JUN-2008 15:00	06-JUN-2008 15:00	07-JUN-2008 11:00
Compound	CAS Number	LOR	Unit	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			5					
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			J. J					-
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	



Sub-Matrix: WATER		Clie	ent sample ID	QC03	QC04	QC05	QC06	QC07
	Ci	ient sampli	ng date / time	05-JUN-2008 15:00	06-JUN-2008 11:00	06-JUN-2008 15:00	06-JUN-2008 15:00	07-JUN-2008 11:00
Compound	CAS Number	LOR	Unit	EB0807578-006	EB0807578-007	EB0807578-008	EB0807578-009	EB0807578-010
EG020T: Total Metals by ICP-MS - Conti	nued							
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 (Dis	solved)							
Reactive Phosphorus - Filtered		0.010	mg/L		<0.010			<0.010



Sub-Matrix: WATER		Clie	ent sample ID	QC08	QC10	PZ06-D	PZ06-S	PZ07-D
	Cl	ient sampliı	ng date / time	07-JUN-2008 11:00	08-JUN-2008 11:00	05-JUN-2008 11:00	05-JUN-2008 11:00	05-JUN-2008 15:00
Compound	CAS Number	LOR	Unit	EB0807578-011	EB0807578-012	EB0807578-013	EB0807578-014	EB0807578-015
EA005: pH								
pH Value		0.01	pH Unit		7.16	7.04	7.72	7.17
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C		1	µS/cm		3280	1840	1950	3480
ED037P: Alkalinity by PC Titrator			·					
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		350	474	494	489
Fotal 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
/anadium	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								



Sub-Matrix: WATER	Client sample ID			QC08	QC10	PZ06-D	PZ06-S	PZ07-D
	Cl	lient samplii	ng date / time	07-JUN-2008 11:00	08-JUN-2008 11:00	05-JUN-2008 11:00	05-JUN-2008 11:00	05-JUN-2008 15:00
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 (Disso	lved)							
Reactive Phosphorus - Filtered		0.010	mg/L		<0.010	<0.010	<0.010	<0.010



Sub-Matrix: WATER		Clie	ent sample ID	PZ07-S	PZ08-D	PZ08-S	PZ10	PZ09
	Cl	ient sampli	ng date / time	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								
oH 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
otal Alkalinity as CaCO3		1	mg/L	130	401	272	176	171
D040F: 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
_ead	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
/anadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
linc	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								



Sub-Matrix: WATER	Client sample ID			PZ07-S	PZ08-D	PZ08-S	PZ10	PZ09
	Cl	lient samplii	ng date / time	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 (Disso	olved)							
Reactive Phosphorus - Filtered		0.010	mg/L	<0.010	<0.010	0.011	<0.010	<0.010



Sub-Matrix: WATER		Clie	ent sample ID	PZ11-D	PZ03-D	PZ03-S	PZ02	
	Cl	lient samplii	ng 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	
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	7439-93-4	1	mg/L	507	3310	2100	243	
Potassium	7440-09-7	1	mg/L	7	28	14	4	
EG020F: Dissolved Metals by ICP-MS			3					
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			5			1	· · · · · · · · · · · · · · · · · · ·	



Sub-Matrix: WATER	Client sample ID			PZ11-D	PZ03-D	PZ03-S	PZ02	
	Cl	lient samplii	ng 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 (Disso	lved)							
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 Contact	: URS AUSTRALIA PTY LTD (QLD) : MR STEPHEN DENNER	Laboratory Contact	: Environmental Division Brisbane : Tim Kilmister
Address	GPO BOX 302	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	BRISBANE QLD, AUSTRALIA 4001 : stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone Facsimile	: +61 32432111 : +61 07 32432199	Telephone Facsimile	: +61-7-3243 7222 : +61-7-3243 7218
Project Site	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
C-O-C number Sampler	: : AW/BS	Date Samples Received Issue Date	: 10-JUN-2008 : 17-JUN-2008
Order number	:		
Quote number	: EN/001/08	No. of samples received No. of samples analysed	: 24 : 24

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

This Quality Control Report contains the following information:

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

ΝΑΤΑ	NATA Accredited Laboratory 825	Signatories This document has been electronically carried out in compliance with procedures sp		indicated below. Electronic signing has been			
NAIA	accordance with NATA	Signatories	Position	Accreditation Category			
	accreditation requirements.	Kim McCabe	Senior Inorganic Chemist	Inorganics			
WORLD RECOGNISED	Accredited for compliance with ISO/IEC 17025.	Phillip Kennedy	2IC Environmental Laboratory	Inorganics			
		Environmental Div	ision Brisbane				

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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 preformed, results are reported on a dry weight basis.

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

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

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

 CAS Number = Chemistry Abstract Services number

 LOR = Limit of reporting

 RPD = Relative Percentage Difference

# = Indicates failed QC



#### Laboratory Duplicate (DUP) Report

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

Sub-Matrix: WATER						Laboratory I	Duplicate (DUP) Report	t	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%
A005: 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%
A010P: Conductivi	ity 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%
D037P: Alkalinity b	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%
D040F: Dissolved I	Major Anions (QC Lot				_				
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%
D045P: Chloride by	y PC Titrator (QC Lot:				, in the second se				
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%
D193E: Dissolved I	Major Cations (QC Lot				0			1	
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
G020E: Dissolved	Metals by ICP-MS (QC				U U			1	
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

Page	: 4 of 11
Work Order	: EB0807578
Client	: URS AUSTRALIA PTY LTD (QLD)
Project	: 42626162



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

Page	5 of 11
Work Order	: EB0807578
Client	: URS AUSTRALIA PTY LTD (QLD)
Project	42626162



Sub-Matrix: WATER						Laboratory I	Duplicate (DUP) Repor	rt	
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 Meta	Is by ICP-MS (QC Lot:	677853)							
EB0807578-004	QC01	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.086	0.086	0.0	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.059	0.059	0.0	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.007	0.005	36.8	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB0807586-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Barium	7440-39-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Copper	7440-50-8	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Lead	7439-92-1	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous

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



Sub-Matrix: WATER			Γ			Laboratory L	Duplicate (DUP) Repor	t	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metal	Is by ICP-MS (QC Lot: 6	77853) - 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 L	ot: 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 I	Mercury by FIMS (QC L	ot: 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 Reco	overable Mercury by FIN	IS (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	y PC Titrator (QC Lot: 6	80381)							
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 I	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 I	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 Pho	osphorus as P (Dissolve	ed) (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)		Laboratory Control Spike (LCS	6) Report	
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005: pH (QCLot: 677701)								
EA005: pH Value		0.01	pH Unit		7.00 pH Unit	100	98.3	118
EA010P: Conductivity by PC Titrator (QCLot: 680379)								
EA010-P: Electrical Conductivity @ 25°C		1	μS/cm	<1	1412 µS/cm	100	90.3	108
ED037P: Alkalinity by PC Titrator (QCLot: 680378)								
ED037-P: Total Alkalinity as CaCO3		1	mg/L		200 mg/L	99.9	77.5	112
ED040F: Dissolved Major Anions (QCLot: 677877)								
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1				
ED045P: Chloride by PC Titrator (QCLot: 680380)								
ED045-P: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	99.8	88.4	110
ED093F: Dissolved Major Cations (QCLot: 677878)					-			
ED093F: Calcium	7440-70-2	1	mg/L	<1				
ED093F: Magnesium	7439-95-4	1	mg/L	<1				
ED093F: Sodium	7440-23-5	1	mg/L	<1				
ED093F: Potassium	7440-09-7	1	mg/L	<1				
EG020F: Dissolved Metals by ICP-MS (QCLot: 677936)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	106	70	130
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	109	70	130
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001				
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	97.2	70	130
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	104	70	130
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.100 mg/L	102	70	130
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	101	70	130
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	105	70	130
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.100 mg/L	103	70	130
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	99.6	70	130
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.100 mg/L	99.0	70	130
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	108	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 677937)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	102	70	130
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	107	70	130
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001				
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	99.5	70	130
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	106	70	130

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



Sub-Matrix: WATER				Method Blank (MB) Report		Laboratory Control Spike (LC		
				· ·	Spike	Spike Recovery (%)		Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 677937) - co	ontinued							
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

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Client	: URS AUSTRALIA PTY LTD (QLD)
Project	: 42626162



Sub-Matrix: WATER				Method Blank (MB)		Laboratory Control Spike (LC	S) Report	
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS(QCLot: 677853)- con	tinued							
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: 6	81681)							
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.

ub-Matrix: WATER					Matrix Spike (MS) Rep	port	
				Spike	Spike Recovery (%)	Recovery	Limits (%)
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
D045P: Chloride by	PC Titrator (QCLot: 680380)						
EB0807578-001	PZ04	ED045-P: Chloride	16887-00-6	80 mg/L	97.5	70	130
G020F: Dissolved M	Metals by ICP-MS (QCLot: 6779	336)		-			1
EB0807575-002	Anonymous	EG020A-F: Arsenic	7440-38-2	Anonymous	Anonymous	Anonymous	Anonymou
		EG020A-F: Beryllium	7440-41-7	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Barium	7440-39-3	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Cadmium	7440-43-9	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Chromium	7440-47-3	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Cobalt	7440-48-4	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Copper	7440-50-8	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Lead	7439-92-1	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Manganese	7439-96-5	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Nickel	7440-02-0	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Vanadium	7440-62-2	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Zinc	7440-66-6	Anonymous	Anonymous	Anonymous	Anonymo
G020F: Dissolved N	Metals by ICP-MS (QCLot: 6779	937)					
30807578-020 PZ09	EG020A-F: Arsenic	7440-38-2	0.100 mg/L	105	70	130	
	020F: Dissolved Metals by ICP-MS (QCLot: 677937) 0807578-020 PZ09	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
G020F: Dissolved M	Metals by ICP-MS (QCLot: 6783	388)					
B0807578-004	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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Sub-Matrix: WATER					Matrix Spike (MS) Rej	port	
				Spike	Spike Recovery (%)	Recovery	Limits (%)
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved	Metals by ICP-MS (QCLot: 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
G020T: Total Metal	Is 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
G035F: Dissolved	Mercury by FIMS (QCLot: 682288)						
EB0807509-001	Anonymous	EG035F: Mercury	7439-97-6	Anonymous	Anonymous	Anonymous	Anonymou
G035F: Dissolved	Mercury by FIMS (QCLot: 682289)						
EB0807578-003	PZ05	EG035F: Mercury	7439-97-6	0.01 mg/L	95.0	70	130
G035T: Total Reco	overable Mercury by FIMS (QCLot:	681681)					
EB0807559-001	Anonymous	EG035T: Mercury	7439-97-6	Anonymous	Anonymous	Anonymous	Anonymous
K040P: Fluoride by	y PC Titrator (QCLot: 680381)						
EB0807578-001	PZ04	EK040P: Fluoride	16984-48-8	4.9 mg/L	85.0	70	130
K057: Nitrite as N	(QCLot: 677867)						
EB0807578-001	PZ04	EK057: Nitrite as N		0.4 mg/L	105	70	130
K059: Nitrite plus I	Nitrate as N (NOx) (QCLot: 677865)						
EB0807570-001	Anonymous	EK059: Nitrite + Nitrate as N		Anonymous	Anonymous	Anonymous	Anonymou
EK059: Nitrite plus I	Nitrate as N (NOx) (QCLot: 677868)						
EB0807578-014	PZ06-S	EK059: Nitrite + Nitrate as N		0.4 mg/L	102	70	130
EK071: Reactiv <u>e Ph</u>	osphorus as P (Dissolved) (QCLot	: 677866)					
EB0807570-001	Anonymous	EK071F: Reactive Phosphorus - Filtered		Anonymous	Anonymous	Anonymous	Anonymou
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# 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	Address	: 32 Shand Street Stafford QLD Australia 4053
	BRISBANE QLD, AUSTRALIA 4001		
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
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Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	:		
C-O-C number	:	Date Samples Received	: 10-JUN-2008
Sampler	: AW/BS	Issue Date	: 17-JUN-2008
Order number	:		
		No. of samples received	: 24
Quote number	: EN/001/08	No. of samples analysed	: 24

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

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

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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 ; ✓ = Withir	n holding time
Method		Sample Date	Ex	traction / Preparation	paration		Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005: pH								
Clear Plastic Bottle - Natural								
QC01,	PZ06-D,	05-JUN-2008				10-JUN-2008	05-JUN-2008	×
PZ06-S,	PZ07-D,							
PZ07-S								
Clear Plastic Bottle - Natural								
QC04,	PZ08-D,	06-JUN-2008				10-JUN-2008	06-JUN-2008	x
PZ08-S,	PZ10,							
PZ09,	PZ11-D							
Clear Plastic Bottle - Natural								
QC07,	PZ03-D,	07-JUN-2008				10-JUN-2008	07-JUN-2008	x
PZ03-S,	PZ02							
Clear Plastic Bottle - Natural								
PZ04,	PZ01,	08-JUN-2008				10-JUN-2008	08-JUN-2008	x
PZ05,	QC10							
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural								
QC01,	PZ06-D,	05-JUN-2008				13-JUN-2008	03-JUL-2008	<ul> <li>✓</li> </ul>
PZ06-S,	PZ07-D,							
PZ07-S								
Clear Plastic Bottle - Natural								
QC04,	PZ08-D,	06-JUN-2008				13-JUN-2008	04-JUL-2008	<ul> <li>✓</li> </ul>
PZ08-S,	PZ10,							
PZ09,	PZ11-D							
Clear Plastic Bottle - Natural								
QC07,	PZ03-D,	07-JUN-2008				13-JUN-2008	05-JUL-2008	1
PZ03-S,	PZ02							
Clear Plastic Bottle - Natural	-							
PZ04,	PZ01,	08-JUN-2008				13-JUN-2008	06-JUL-2008	1
PZ05,	QC10							



Matrix: WATER					Evaluation	x = Holding time	breach ; ✓ = Withir	n holding time.
Method		Sample Date	Ex	traction / 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								
QC01,	PZ06-D,	05-JUN-2008				13-JUN-2008	19-JUN-2008	✓
PZ06-S,	PZ07-D,							
PZ07-S								
Clear Plastic Bottle - Natural								
QC04,	PZ08-D,	06-JUN-2008				13-JUN-2008	20-JUN-2008	<ul> <li>✓</li> </ul>
PZ08-S,	PZ10,							
PZ09,	PZ11-D							
Clear Plastic Bottle - Natural								
QC07,	PZ03-D,	07-JUN-2008				13-JUN-2008	21-JUN-2008	<ul> <li>✓</li> </ul>
PZ03-S,	PZ02							
Clear Plastic Bottle - Natural								
PZ04,	PZ01,	08-JUN-2008				13-JUN-2008	22-JUN-2008	✓
PZ05,	QC10							
ED040F: Dissolved Major Anions								
Clear Plastic Bottle - Natural								
QC01,	PZ06-D,	05-JUN-2008				11-JUN-2008	03-JUL-2008	✓
PZ06-S,	PZ07-D,							
PZ07-S								
Clear Plastic Bottle - Natural								
QC04,	PZ08-D,	06-JUN-2008				11-JUN-2008	04-JUL-2008	✓
PZ08-S,	PZ10,							
PZ09,	PZ11-D							
Clear Plastic Bottle - Natural								
QC07,	PZ03-D,	07-JUN-2008				11-JUN-2008	05-JUL-2008	✓
PZ03-S,	PZ02							
Clear Plastic Bottle - Natural								
PZ04,	PZ01,	08-JUN-2008				11-JUN-2008	06-JUL-2008	✓
PZ05,	QC10							



Matrix: WATER					Evaluation:	× = Holding time	breach ; ✓ = Withir	holding time.
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045P: Chloride by PC Titrator								
Clear Plastic Bottle - Natural								
QC01,	PZ06-D,	05-JUN-2008				13-JUN-2008	03-JUL-2008	✓
PZ06-S,	PZ07-D,							
PZ07-S								
Clear Plastic Bottle - Natural								
QC04,	PZ08-D,	06-JUN-2008				13-JUN-2008	04-JUL-2008	✓
PZ08-S,	PZ10,							
PZ09,	PZ11-D							
Clear Plastic Bottle - Natural								
QC07,	PZ03-D,	07-JUN-2008				13-JUN-2008	05-JUL-2008	✓
PZ03-S,	PZ02							
Clear Plastic Bottle - Natural								
PZ04,	PZ01,	08-JUN-2008				13-JUN-2008	06-JUL-2008	✓
PZ05,	QC10							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural								
QC01,	PZ06-D,	05-JUN-2008				11-JUN-2008	03-JUL-2008	✓
PZ06-S,	PZ07-D,							
PZ07-S								
Clear Plastic Bottle - Natural								
QC04,	PZ08-D,	06-JUN-2008				11-JUN-2008	04-JUL-2008	✓
PZ08-S,	PZ10,							
PZ09,	PZ11-D							
Clear Plastic Bottle - Natural								
QC07,	PZ03-D,	07-JUN-2008				11-JUN-2008	05-JUL-2008	✓
PZ03-S,	PZ02							
Clear Plastic Bottle - Natural								
PZ04,	PZ01,	08-JUN-2008				11-JUN-2008	06-JUL-2008	✓
PZ05,	QC10							



Matrix: WATER					Evaluation	: × = Holding time	breach ; ✓ = Within	n holding time.
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Filtered; Lab-acidified								
PZ07-D,	PZ07-S	05-JUN-2008				11-JUN-2008	02-DEC-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified								
QC01,	PZ06-D,	05-JUN-2008				13-JUN-2008	02-DEC-2008	✓
PZ06-S								
Clear Plastic Bottle - Filtered; Lab-acidified								
QC04,	PZ08-D,	06-JUN-2008				11-JUN-2008	03-DEC-2008	✓
PZ08-S,	PZ10,							
PZ09,	PZ11-D							
Clear Plastic Bottle - Filtered; Lab-acidified								
QC07,	PZ03-D,	07-JUN-2008				11-JUN-2008	04-DEC-2008	✓
PZ03-S								
Clear Plastic Bottle - Filtered; Lab-acidified								
QC08,	PZ02	07-JUN-2008				13-JUN-2008	04-DEC-2008	✓
Clear Plastic Bottle - Filtered; Lab-acidified								
PZ04,	PZ05,	08-JUN-2008				11-JUN-2008	05-DEC-2008	✓
QC10								
Clear Plastic Bottle - Filtered; Lab-acidified								
PZ01		08-JUN-2008				13-JUN-2008	05-DEC-2008	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Unfiltered; Lab-acidified								
QC02,	QC03	05-JUN-2008	11-JUN-2008	02-DEC-2008	✓	11-JUN-2008	02-DEC-2008	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified								
QC05,	QC06	06-JUN-2008	11-JUN-2008	03-DEC-2008	✓	11-JUN-2008	03-DEC-2008	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Filtered; Lab-acidified								
QC01,	PZ06-D,	05-JUN-2008				16-JUN-2008	03-JUL-2008	✓
PZ06-S,	PZ07-D,							
PZ07-S								
Clear Plastic Bottle - Filtered; Lab-acidified								
QC04,	PZ08-D,	06-JUN-2008				16-JUN-2008	04-JUL-2008	✓
PZ08-S,	PZ10,							
PZ09,	PZ11-D							
Clear Plastic Bottle - Filtered; Lab-acidified								
QC07,	QC08,	07-JUN-2008				16-JUN-2008	05-JUL-2008	✓
PZ03-D,	PZ03-S,							
PZ02								
Clear Plastic Bottle - Filtered; Lab-acidified								
PZ04,	PZ01,	08-JUN-2008				16-JUN-2008	06-JUL-2008	<ul> <li>✓</li> </ul>
PZ05,	QC10							

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Project	: 42626162



Matrix: WATER					Evaluation	<b>×</b> = Holding time	breach ; ✓ = Withir	holding time
Method		Sample Date	Ex	traction / Preparation		Analysis		
Container / Client Sample ID(s)			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	1
Clear Plastic Bottle - Unfiltered; Lab-acidified								
QC05,	QC06	06-JUN-2008				16-JUN-2008	04-JUL-2008	$\checkmark$
EK040P: Fluoride by PC Titrator								
Clear Plastic Bottle - Natural								
QC01,	PZ06-D,	05-JUN-2008				13-JUN-2008	03-JUL-2008	✓
PZ06-S,	PZ07-D,							
PZ07-S								
Clear Plastic Bottle - Natural								
QC04,	PZ08-D,	06-JUN-2008				13-JUN-2008	04-JUL-2008	✓
PZ08-S,	PZ10,							
PZ09,	PZ11-D							
Clear Plastic Bottle - Natural								
QC07,	PZ03-D,	07-JUN-2008				13-JUN-2008	05-JUL-2008	✓
PZ03-S,	PZ02							
Clear Plastic Bottle - Natural								
PZ04,	PZ01,	08-JUN-2008				13-JUN-2008	06-JUL-2008	✓
PZ05,	QC10							
EK057: Nitrite as N								
Clear Plastic Bottle - Natural								
QC01,	PZ06-D,	05-JUN-2008				11-JUN-2008	07-JUN-2008	<b>32</b>
PZ06-S,	PZ07-D,							
PZ07-S								
Clear Plastic Bottle - Natural								
QC04,	PZ08-D,	06-JUN-2008				11-JUN-2008	08-JUN-2008	x
PZ08-S,	PZ10,							
PZ09,	PZ11-D							
Clear Plastic Bottle - Natural								
QC07,	PZ03-D,	07-JUN-2008				11-JUN-2008	09-JUN-2008	x
PZ03-S,	PZ02							
Clear Plastic Bottle - Natural								
PZ04,	PZ01,	08-JUN-2008				11-JUN-2008	10-JUN-2008	×
PZ05,	QC10							



Matrix: WATER					Evaluation:	× = Holding time	breach ; ✓ = Within	holding time.
Method		Sample Date	Ex	traction / Preparation		Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059: Nitrite plus Nitrate as N (NOx)								
Clear Plastic Bottle - Natural								
QC01,	PZ06-D,	05-JUN-2008				11-JUN-2008	07-JUN-2008	×
PZ06-S,	PZ07-D,							
PZ07-S								
Clear Plastic Bottle - Natural								
QC04,	PZ08-D,	06-JUN-2008				11-JUN-2008	08-JUN-2008	×
PZ08-S,	PZ10,							
PZ09,	PZ11-D							
Clear Plastic Bottle - Natural								
QC07,	PZ03-D,	07-JUN-2008				11-JUN-2008	09-JUN-2008	*
PZ03-S,	PZ02							
Clear Plastic Bottle - Natural								
PZ04,	PZ01,	08-JUN-2008				11-JUN-2008	10-JUN-2008	×
PZ05,	QC10							
EK071: Reactive Phosphorus as P (Dissolved)								
Clear Plastic Bottle - Natural								
QC01,	PZ06-D,	05-JUN-2008				11-JUN-2008	07-JUN-2008	<b></b>
PZ06-S,	PZ07-D,							
PZ07-S								
Clear Plastic Bottle - Natural								
QC04,	PZ08-D,	06-JUN-2008				11-JUN-2008	08-JUN-2008	x
PZ08-S,	PZ10,							
PZ09,	PZ11-D							
Clear Plastic Bottle - Natural								
QC07,	PZ03-D,	07-JUN-2008				11-JUN-2008	09-JUN-2008	x
PZ03-S,	PZ02							
Clear Plastic Bottle - Natural								
PZ04,	PZ01,	08-JUN-2008				11-JUN-2008	10-JUN-2008	x
PZ05,	QC10							



# **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.

Quality Control Sample Type		С	ount		Rate (%)		Quality Control Specification			
Analytical Methods	Method	QC	Reaular	Actual	Expected	Evaluation				
aboratory Duplicates (DUP)										
Ikalinity 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			
luoride by PC Titrator	EK040P	2	19	10.5	10.0	1	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
lajor Anions - Filtered	ED040F	2	20	10.0	10.0	~	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
lajor Cations - Filtered	ED093F	2	20	10.0	10.0	~	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
litrite and Nitrate as N (NOx)	EK059	4	34	11.8	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
Jitrite as N	EK057	2	20	10.0	10.0	<ul> <li>✓</li> </ul>	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
рН	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			
otal Mercury by FIMS	EG035T	2	20	10.0	10.0	~	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
otal Metals by ICP-MS - Suite A	EG020A-T	3	25	12.0	10.0	~	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
aboratory Control Samples (LCS)										
Ikalinity by PC Titrator	ED037-P	1	19	5.3	5.0	1	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	1	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	1	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
luoride by PC Titrator	EK040P	1	19	5.3	5.0	~	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
litrite and Nitrate as N (NOx)	EK059	2	34	5.9	5.0	~	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
litrite as N	EK057	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
Н	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			
otal Mercury by FIMS	EG035T	1	20	5.0	5.0	1	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
otal Metals by ICP-MS - Suite A	EG020A-T	2	25	8.0	5.0	~	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
/lethod 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	<ul> <li>✓</li> </ul>	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	42	9.5	5.0	<ul> <li>✓</li> </ul>	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
luoride by PC Titrator	EK040P	1	19	5.3	5.0	✓ ✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
Najor Anions - Filtered	ED040F	1	20	5.0	5.0	✓ ✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			
Aajor Cations - Filtered	ED093F	1	20	5.0	5.0	<u> </u>	NEPM 1999 Schedule B(3) and ALS QCS3 requirement			

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Work Order	: EB0807578
Client	: URS AUSTRALIA PTY LTD (QLD)
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Matrix: WATER				Evaluation	n: × = Quality Co	ntrol frequency r	not within specification ; $\checkmark$ = Quality Control frequency within specificat
Quality Control Sample Type		С	ount		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC Reaular		Actual Expected		Evaluation	
Method Blanks (MB) - Continued							
Nitrite and Nitrate as N (NOx)	EK059	2	34	5.9	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N	EK057	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus - Filtered	EK071F	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	25	8.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Chloride by PC Titrator	ED045-P	1	19	5.3	5.0	✓	ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	2	40	5.0	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	37	8.1	5.0	1	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
Fotal 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	1	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
рН	EA005	WATER	APHA 21st ed. 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by both manual measurement and automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Major Anions - Filtered	ED040F	WATER	APHA 21st ed., 3120 Sulfur and/or Silcon content is determined by ICP/AES and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Chloride by PC Titrator	ED045-P	WATER	APHA 21st ed., 4500 CI - B. Automated Silver Nitrate titration.
Major Cations - Filtered	ED093F	WATER	APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Mercury by FIMS	EG035T	WATER	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 FC CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N	EK057	WATER	APHA 21st ed., 4500 NO3- I. Nitrite is determined by direct colourimetry by FIA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



Analytical Methods	Method	Matrix	Method Descriptions
Nitrate as N	EK058	WATER	APHA 21st ed., 4500 NO3I Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by FIA. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx)	EK059	WATER	APHA 21st ed., 4500 NO3- I. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by FIA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Reactive Phosphorus - Filtered	EK071F	WATER	APHA 21st ed., 4500 P-E Water samples are filtered through a 0.45um filter prior to analysis. Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is achieved by FIA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



## **Summary of Outliers**

## **Outliers : Quality Control Samples**

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

#### Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

#### Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	765975-002		Arsenic	7440-38-2	129 %	79.6-115%	Recovery greater than upper control
							limit
EG020F: Dissolved Metals by ICP-MS	765975-002		Lead	7439-92-1	125 %	85.4-117%	Recovery greater than upper control
							limit

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

#### Regular Sample Surrogates

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

#### **Outliers : Analysis Holding Time Compliance**

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

#### Matrix: WATER

Method		E	traction / Preparation			Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days	Date analysed	Due for analysis	Days
				overdue			overdue
EA005: pH							
Clear Plastic Bottle - Natural							
QC01,	PZ06-D,				10-JUN-2008	05-JUN-2008	5
PZ06-S,	PZ07-D,						
PZ07-S							
Clear Plastic Bottle - Natural							
QC04,	PZ08-D,				10-JUN-2008	06-JUN-2008	4
PZ08-S,	PZ10,						
PZ09,	PZ11-D						
Clear Plastic Bottle - Natural							
QC07,	PZ03-D,				10-JUN-2008	07-JUN-2008	3
PZ03-S,	PZ02						
Clear Plastic Bottle - Natural							
PZ04,	PZ01,				10-JUN-2008	08-JUN-2008	2
PZ05,	QC10						



#### Matrix: WATER

Method			Extraction / Preparation			Analysis	
Container / Client Sample ID(s)		Date extracte	d Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK057: Nitrite as N							
Clear Plastic Bottle - Natural							
QC01,	PZ06-D,				11-JUN-2008	07-JUN-2008	4
PZ06-S,	PZ07-D,						
PZ07-S	, ,						
Clear Plastic Bottle - Natural							
QC04,	PZ08-D,				11-JUN-2008	08-JUN-2008	3
PZ08-S,	PZ10,						
PZ09,	PZ11-D						
Clear Plastic Bottle - Natural							
QC07,	PZ03-D,				11-JUN-2008	09-JUN-2008	2
PZ03-S,	PZ02						_
Clear Plastic Bottle - Natural	. 202						
PZ04,	PZ01,				11-JUN-2008	10-JUN-2008	1
PZ05,	QC10						-
EK059: Nitrite plus Nitrate as N (NOx)							
Clear Plastic Bottle - Natural							
QC01,	PZ06-D,				11-JUN-2008	07-JUN-2008	4
PZ06-S.	PZ07-D,					01 0011 2000	
PZ07-S	1201-0,						
Clear Plastic Bottle - Natural							
QC04,	PZ08-D,				11-JUN-2008	08-JUN-2008	3
PZ08-S,	PZ10,					00 0011 2000	
PZ09,	PZ11-D						
Clear Plastic Bottle - Natural							
QC07,	PZ03-D,				11-JUN-2008	09-JUN-2008	2
PZ03-S,	PZ02				11 0011 2000	00 0011 2000	-
Clear Plastic Bottle - Natural	1 202						
PZ04,	PZ01,				11-JUN-2008	10-JUN-2008	1
PZ05,	QC10				11 0011 2000	10 0011 2000	
EK071: Reactive Phosphorus as P (Dissolved)							
Clear Plastic Bottle - Natural							
QC01,	PZ06-D,				11-JUN-2008	07-JUN-2008	4
PZ06-S,	PZ06-D, PZ07-D,				11-3010-2006	07-3019-2000	4
P206-S, PZ07-S	РZUI-D,						
Clear Plastic Bottle - Natural							
					11-JUN-2008	08-JUN-2008	3
QC04,	PZ08-D,				11-JUN-2008	00-JUN-2008	3
PZ08-S,	PZ10,						
PZ09,	PZ11-D						
Clear Plastic Bottle - Natural					44 1111 0000	00 11 10 0000	-
QC07,	PZ03-D,				11-JUN-2008	09-JUN-2008	2
PZ03-S,	PZ02						

Page	: 14 of 14
Work Order	: EB0807578
Client	: URS AUSTRALIA PTY LTD (QLD)
Project	: 42626162



#### Matrix: WATER

Method	E	xtraction / Preparation		Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days	Date analysed	Due for analysis	Days
				overdue			overdue
EK071: Reactive Phosphorus as	s P (Dissolved) - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural							
PZ04,	PZ01,				11-JUN-2008	10-JUN-2008	1
PZ05,	QC10						

## **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.

CLIEN	T: BMA						SAMF	LER:	Andr	ew Wi	lson /	Dale	Gould									
ADDR	ESS / OFFICE:						MOBI	LE:	0448	853 C	04 / 0	437 3	38 439	9							ALS)	
PROJE	ECT MANAGER (PM): Steph	en Denne	er				PHON	PHONE 3243 2146 / 3243 2128											Australian La	oratory Servi	ices Pty Ltd	
PROJE	ECT ID: 42626162						EMAII	REPC	RT TO		steph	nen_de	enner(	Qursc	orp.cc	(und	erscore	e betw	een s	tephen and den	1er)	
SITE: Ca	aval Ridge			P.O. NO.	:		EMAII		CE TO:	(if diffe	rent to	report)			·							
RESULT	IS REQUIRED (Date):			QUOTE	NO.:		ANAL	YSIS R	EQUIR	ED incl	uding	SUITES	(note	- suite c	odes m	nust be	listed to	attract	suite p	rices)	·	
COOLEF	BORATORY USE ONLY R SEAL (circle appropriate) Yes No N/A <u>E TEMPERATURE</u> D: Yes No		<u>ENTS / S</u> P	PECIAL HA	NDLING / STORAGE C	OR DIPOSAL:					Fe, Ga, Li (Dissolved)	Sr, Th, Ti, U (Dissolve	Fe, Ga, Li (Total)	Sr, Th, Ti, U (Total)						<u>Notes</u> : e.g. Highly e.g. "High PAHs ( Extra volume for	expected".	·
CHILLEL	SAMPLE INFORMATION (note		V=\Natar)				1	1			۲ <u>۵</u>	Se, S	ш	Se, S				Í				
ALS ID			DATE	Time	Type / Code	Total bottles	LTN 1	NT2	NT8	R3	AI, A,	Mo,	AI, A,	Mo,								
	Pz 10	Water	8/9	AM	P SP	3	$\nabla$	1.7		J	J									All gree	en plas	itics
	P211-D	The state of the s	8/9	P M		7		ĴĴ	J	J	V	Ī,							1	frozen	1	oc vî
	P209	and the state of the	3/9	PM		11 - 11 - 11 - 11 - 11 - 11 - 11 - 11	V	V,		V,		$\nabla$									cticable	3
	Pz 05	(124) - Alerek - Alee	9/9	PM					$\mathcal{I}$	V,	, d	4					1		I			
	P207-5		9/1	6W			J,	J	$\checkmark$	1	$\mathcal{I}_{I}$	$\sim$	2			Ľ,	2	ronm Bri	ental sban	Division .		
	Pz 07-D	- varianti - V	919	pp\			$\bigvee$	J		V,		1				t M	k	Wor				
	P208-5		9/9	P/^\			J	V	$\mathcal{I}_{\mathcal{I}}$	V,	ind .	V,					E	B08	812	2573 -		
	P208-D		9/9	ΡM			$\checkmark$	J.		V,		$\checkmark$				Mari						
	Pz 06-5		10/9	AM			J	J,	V		., J.											
	P206-D		10/9	AM				V,	J,	$\checkmark$		V.										
	fz 03-5		10/9	PM			J	4	V_		$\checkmark$					Т	elepho	ne:+	61-7-3	243 7222 -		
	P2 03 -D	$\sim$	10/9	6W			J	$\checkmark$	1	<i>.</i>	and the second s	1. A.				1						
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Of:	······································				Time:		Of:		*			-			Time:							

CLIEN	T: BMA					<u>.</u>	SAMP	LER:	Andr	ew Wi	ilson /	Dale (	Gould							
ADDR	ESS / OFFICE:						MOBIL	.E:	0448	853 0	04 / 0	437 3	38 439	9						
PROJE	ECT MANAGER (PM): Steph	ien Denne	r				PHON	E	3243	2146		3 2128								Australian Laboratory Services Pty Ltd
PROJE	ECT ID: 42626162				<u> </u>		EMAIL REPORT TO: <u>stephen_denner@urscorp.cc</u> (underscore between s									stephen and denner)				
SITE: Ca	aval Ridge			P.O. NO	.O. NO.:				EMAIL INVOICE TO: (if different to report) ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)											
RESULT	S REQUIRED (Date):			QUOTE	NO.:		ANAL	YSIS R	EQUIR	ED incl	luding	SUITES	(note -	suite c	odes mu	ist be l	isted to	attract	t suite	prices)
COOLEF Intact:	<u>BORATORY USE ONLY</u> R SEAL (circle appropriate) Yes No N/A	<u>сомм</u>	ENTS / SP	ECIAL HA	NDLING / STORAGE C	OR DIPOSAL:	-				Ga, Li (Dissolved)	, Ti, U (Dissolve	Ga, Li (Total)	, Ti, U (Total)						<u>Notes</u> : e.g. Highly contaminated samples e.g. "High PAHs expected". Extra volume for QC or trace LORs etc.
SAMPLE CHILLEI	<u>TEMPERATURE</u> D Yes No						1				B, Fe, G	, Sr, Th,	B, Fe, G	, Sr, Th,						
	SAMPLE INFORMATION (note			1	CONTAINER INFO	1	Ξ	2	œ		AI, A, B	o, Se,	Ŕ	o, Se,	·					
ALS ID	SAMPLE ID	MATRIX		Time	Type / Code	Total bottles	Ĕ	NT2	NT8	ŝ		Mo	, Å	Ň						
	Pz02	Water	10/9	PM1	<u> </u>	3		$ \vee\rangle$			V	× /							ļ	Green plastics froze
	F201		10/9	PM	<u>P,5P</u>	3	$\checkmark$	V			V	V								as soon as practicall
	P204		11/9	AM	E SP	3	$\sim$				$\langle $	No.					_			(except P204)
	QCOI	and the second second	8/9	PM	P P	ĺ							3.00							
	QC02	- ton - tonay	9/9	AM	ρ	1							3 Art							
	QC03	1	14/9	$\mathcal{PM}$	ρ	1							Ý	20						
	QC04	$\mathbb{N}$	10/9	M	P,SP	3	$\checkmark$		1		$\checkmark$	$\sim$								
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-	DH Butter 6-80																			
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Name:	Andrew Wilson				Date: 11/9/08		Name	9: 7	. (	Cres	agh	τ.			Date:	121	13/	158	/	Con' Note No:
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# **ALS Laboratory Group**

ANALYTICAL CHEMISTRY & TESTING SERVICES

# Environmental Division



# SAMPLE RECEIPT NOTIFICATION (SRN)

**Comprehensive Report** 

Work Order	: EB08	312573		
Client Contact Address	: MR ST : GPO E	USTRALIA PTY LTD (QLD) TEPHEN DENNER BOX 302 TANE QLD, AUSTRALIA 4001	Laboratory Contact Address	<ul> <li>Environmental Division Brisbane</li> <li>Tim Kilmister</li> <li>32 Shand Street Stafford QLD Australia 4053</li> </ul>
E-mail Telephone Facsimile	: +61 32	en_denner@urscorp.com 2432111 7 32432199	E-mail Telephone Facsimile	: Services.Brisbane@alsenviro.com : +61-7-3243 7222 : +61-7-3243 7218
Project Order number	: 42626	162	Page	: 1 of 3
C-O-C number Site	: : Caval	Ridge	Quote number	: ES2008URSQLD0041 (EN/001/08)
Sampler	: A. Wils	son, D. Gould	QC Level	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dates				
Date Samples Rece Client Requested Du		: 12-SEP-2008 : 23-SEP-2008	Issue Date Scheduled Reporti	: 17-SEP-2008 11:00 ng Date : 23-SEP-2008
Delivery Deta	ils			
Mode of Delivery		: Client Drop off	Temperature	: 9.6 C
No. of coolers/boxes Sercurity Seal	5	: 1 LARGE : Intact.	No. of samples rec No. of samples and	

## **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

process neccessar asks. Packages r he determination asks, that are includ When date(s) and nave been assumed Matrix: WATER	y for the executior may contain addition of moisture cont ed in the package. d/or time(s) are sh by the laboratory for pro	own bracketed, these occessing	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)
Laboratory sample ID	Client sampling date / time	Client sample ID	WATER Dissolve	NATE Fotal I	WATER - Dissolved	NATE Total I	WATER - Dissolved	NATE Fotal I	WATER - Ionic Bala	NATE Vlajor
EB0812573-001	08-SEP-2008 15:00	PZ10	✓		✓		✓		✓	√
EB0812573-002	08-SEP-2008 15:00	PZ11-D	✓		✓		1		1	1
EB0812573-003	08-SEP-2008 15:00	PZ09	✓		✓		1		√	✓
EB0812573-004	09-SEP-2008 15:00	PZ05	✓		✓		1		1	1
EB0812573-005	09-SEP-2008 15:00	PZ07-S	✓		✓		1		1	✓
EB0812573-006	09-SEP-2008 15:00	PZ07-D	1		1		1		1	1
EB0812573-007	09-SEP-2008 15:00	PZ08-S	✓		✓		1		1	✓
EB0812573-008	09-SEP-2008 15:00	PZ08-D	✓		✓		1		1	1
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	1		✓		1		1	✓
EB0812573-012	10-SEP-2008 15:00	PZ03-D	1		✓		✓		✓	✓
EB0812573-013	10-SEP-2008 15:00	PZ02	✓		✓		1		1	1
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		✓		✓		✓		
· · · · · · · · · · · · · · · · · · ·		QC04		1	✓	1	1		1	1

Matrix: <b>WATER</b> 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	1	1	✓
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	1	1	1



			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	✓	1	1
EB0812573-007	09-SEP-2008 15:00	PZ08-S	✓	✓	✓
EB0812573-008	09-SEP-2008 15:00	PZ08-D	1	✓	✓
EB0812573-009	10-SEP-2008 15:00	PZ06-S	✓	✓	✓
EB0812573-010	10-SEP-2008 15:00	PZ06-D	1	✓	✓
EB0812573-011	10-SEP-2008 15:00	PZ03-S	✓	✓	✓
EB0812573-012	10-SEP-2008 15:00	PZ03-D	1	✓	✓
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	✓	1	✓

## Requested Deliverables

### MR STEPHEN DENNER

<ul> <li>*AU Certificate of Analysis - NATA</li> </ul>	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		
<ul> <li>*AU Certificate of Analysis - NATA</li> </ul>	Email	brisbane@urscorp.com
- A4 - AU Sample Receipt Notification - Environmental	Email	brisbane@urscorp.com
<ul> <li>AU Interpretive QC Report (Anon QCI Not Rep)</li> </ul>	Email	brisbane@urscorp.com
<ul> <li>AU QC Report (Anon QC Not Rep) - NATA</li> </ul>	Email	brisbane@urscorp.com
<ul> <li>Default - Chain of Custody</li> </ul>	Email	brisbane@urscorp.com
- EDI Format - MRED	Email	brisbane@urscorp.com
THE ACCOUNTS BRISBANE		
- A4 - AU Tax Invoice	Email	brisbane_accounts@urscorp.com

# Environmental Division



# **CERTIFICATE OF ANALYSIS**

Work Order	: EB0812573	Page	: 1 of 10
Client	: URS AUSTRALIA PTY LTD (QLD)	Laboratory	: Environmental Division Brisbane
Contact	MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	:		
C-O-C number	:	Date Samples Received	: 12-SEP-2008
Sampler	: A. Wilson, D. Gould	Issue Date	: 23-SEP-2008
Site	: Caval Ridge		
	-	No. of samples received	: 19
Quote number	: EN/001/08	No. of samples analysed	: 19

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



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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 preformed, results are reported on a dry weight basis.

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

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

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

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

• LCS recovery for EG020T (Total Metals) & EG020F (Filtered Metals) fall outside Dynamic Control Limits. They are however within ALS Static Control Limits and hence deemed acceptable.



Sub-Matrix: WATER	Client sample ID Client sampling date / time		PZ10	PZ11-D	PZ09	PZ05	PZ07-S 09-SEP-2008 15:00	
			08-SEP-2008 15:00	08-SEP-2008 15:00	08-SEP-2008 15:00	09-SEP-2008 15:00		
Compound	CAS Number	LOR	Unit	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



Sub-Matrix: WATER		Cli	ent sample ID	PZ10	PZ11-D	PZ09	PZ05	PZ07-S
	Cl	ient sampli	ing date / time	08-SEP-2008 15:00	08-SEP-2008 15:00	08-SEP-2008 15:00	09-SEP-2008 15:00	09-SEP-2008 15:00
Compound	CAS Number	LOR	Unit	EB0812573-001	EB0812573-002	EB0812573-003	EB0812573-004	EB0812573-005
EG035F: Dissolved Mercury by FIM	S							
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK055G: Ammonia as N by Discrete	e 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 A	nalyser							
Nitrite as N		0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete A	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 An	alyser							
Nitrite + Nitrate as N		0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK061: Total Kjeldahl Nitrogen (TK	N)							
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



Sub-Matrix: WATER	Client sample ID		ample ID PZ07-D PZ08-S		PZ08-D	PZ06-S	PZ06-D		
	Cl	ient samplii	ng date / time	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	
Compound	CAS Number	LOR	Unit	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	



Sub-Matrix: WATER		Cli	ent sample ID	PZ07-D	PZ08-S	PZ08-D	PZ06-S	PZ06-D
	Cl	lient sampli	ing date / time	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
Compound	CAS Number	LOR	Unit	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 An	alyser							
Nitrite as N		0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Ar	nalyser							
^ 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 Ana	lyser							
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 I	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



Sub-Matrix: WATER		Clie	ent sample ID	PZ03-S	PZ03-D	PZ02	PZ01	PZ04
	Ci	lient samplii	ng date / time	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
Compound	CAS Number	LOR	Unit	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 Mana diam	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



Sub-Matrix: WATER		Cli	ent sample ID	PZ03-S	PZ03-D	PZ02	PZ01	PZ04
	Cl	ient sampli	ing date / time	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
Compound	CAS Number	LOR	Unit	EB0812573-011	EB0812573-012	EB0812573-013	EB0812573-014	EB0812573-015
EG035F: Dissolved Mercury by FIM	S							
Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
EK055G: Ammonia as N by Discrete	e 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 A	nalyser							
Nitrite as N		0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete A	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 An	alyser							
Nitrite + Nitrate as N		0.01	mg/L	0.39	<0.01	<0.01	<0.01	0.02
EK061: Total Kjeldahl Nitrogen (TK	N)							
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



Sub-Matrix: WATER		Clie	ent sample ID	QC01	QC02	QC03	QC04	
	CI	lient samplir	ng date / time	08-SEP-2008 15:00	09-SEP-2008 15:00	10-SEP-2008 15:00	10-SEP-2008 15:00	
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	Campbell Brothers Limited Company



Sub-Matrix: WATER		Clie	ent sample ID	QC01	QC02	QC03	QC04	
	Cl	ient sampliı	ng date / time	08-SEP-2008 15:00	09-SEP-2008 15:00	10-SEP-2008 15:00	10-SEP-2008 15:00	
Compound	CAS Number	LOR	Unit	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 Analy	/ser							
Ammonia as N	7664-41-7	0.01	mg/L				1.60	
EK057G: Nitrite as N by Discrete Analyse	r							
Nitrite as N		0.01	mg/L				<0.01	
EK058G: Nitrate as N by Discrete Analyse	ər							
^ 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 Discre	ete Analyser							
Total Phosphorus as P		0.01	mg/L				0.86	
EN055: Ionic Balance								
^ Total Anions		0.01	meq/L				240	
^ Total Cations		0.01	meq/L				222	
^ Ionic Balance		0.01	%				4.08	

# Environmental Division



# QUALITY CONTROL REPORT

Work Order	EB0812573	Page	: 1 of 12
Client	: URS AUSTRALIA PTY LTD (QLD)	Laboratory	: Environmental Division Brisbane
Contact	: MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Caval Ridge		
C-O-C number	·	Date Samples Received	: 12-SEP-2008
Sampler	: A. Wilson, D. Gould	Issue Date	: 23-SEP-2008
Order number	:		
		No. of samples received	: 19
Quote number	: EN/001/08	No. of samples analysed	: 19

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

This Quality Control Report contains the following information:

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

	NATA Accredited Laboratory 825			indicated below. Electronic signing ha	is been						
NATA	This document is issued in	carried out in compliance with procedures specified in 21 CFR Part 11.									
	accordance with NATA accreditation requirements.	Signatories	Position	Accreditation Category							
		Kim McCabe	Senior Inorganic Chemist	Inorganics							
WORLD RECOGNISED	Accredited for compliance with ISO/IEC 17025.	Stephen Hislop	Senior Inorganic Chemist	Inorganics							
Environmental Division Brisbane											

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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 preformed, results are reported on a dry weight basis.

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

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

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

 CAS Number = Chemistry Abstract Services number

 LOR = Limit of reporting

 RPD = Relative Percentage Difference

# = Indicates failed QC



### Laboratory Duplicate (DUP) Report

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

Sub-Matrix: WATER						Laboratory I	Duplicate (DUP) Repo	rt	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%
D037P: 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
ED040E: Dissolved	Major Anions (QC Lot:					_			-
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%
	by PC Titrator (QC Lot:				3				
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
	,		10001 00 0	•	ing/L	, alony mode	, anonymouo	, anonymouo	, alonymous
EB0812573-004	PZ05		16887-00-6	1	ma/l	148	146	1.4	0% - 20%
EB0812573-004	PZ03	ED045-P: Chloride	16887-00-6	1	mg/L mg/L	148	140	2.3	0% - 20%
	-	ED045-P: Chloride	10007-00-0	I	ilig/L	151	120	2.5	0 /0 - 20 /0
	Major Cations (QC Lot		7440 70 0			<b>A</b>	<b>A</b>		A
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

Page	: 4 of 12
Work Order	: EB0812573
Client	: URS AUSTRALIA PTY LTD (QLD)
Project	42626162



Sub-Matrix: WATER						Laboratory	Duplicate (DUP) Repor	t	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved I	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 I	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%
EG020E: Dissolved	Metals by ICP-MS (QC								
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

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



Sub-Matrix: WATER						Laboratory I	Duplicate (DUP) Repo	t	
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	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								
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 Motal	Is by ICP-MS (QC Lot:				5				
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 Motal	Is by ICP-MS (QC Lot:								
EB0812504-001	Anonymous	EG020B-T: Strontium	7440-24-6	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
01	, anonymous	EGUZUD-I. SUUNUUM	7440-24-0	0.001	ing/L	Anonymous	Anonymous	Anonymous	Anonymous

Page	: 6 of 12
Work Order	: EB0812573
Client	: URS AUSTRALIA PTY LTD (QLD)
Project	: 42626162



Sub-Matrix: WATER						Laboratory L	Duplicate (DUP) Repor	t	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020T: Total Metal	s 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 Metal	s 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 I	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
	as N by Discrete Analy	vser (QC Lot: 761696)			U U				
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
	-	yser (QC Lot: 761697)			5	,	,	- ,	,
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 EK055G: Ammonia as N	7664-41-7	0.01	mg/L	1.60	1.49	6.7	0% - 20%
	N by Discrete Analyse		1001111	0.01	iiig/E	1.00	1.10	0.1	070 2070
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
	-			0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
	N by Discrete Analyse			0.01		A.m. e. m. e	A	<b>A</b> in a muma ava	A
EB0812558-001 EB0812573-009	Anonymous	EK057G: Nitrite as N		0.01	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
	PZ06-S	EK057G: Nitrite as N		0.01	mg/L	<0.01	<0.01	0.0	No Limit
	by Discrete Analyser								
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%
	hl Nitrogen (TKN) (QC	C 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 Kjeldal	hl Nitrogen (TKN) (QC	C 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 Phos	phorus as P by Discr	ete 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%
K067G: Total Phos	phorus as P by Discr	ete Analyser (QC Lot: 759516)							
EB0812573-013	PZ02	EK067G: Total Phosphorus as P		0.01	mg/L	10.0	10.5	5.2	0% - 20%
					<u> </u>	1			

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Sub-Matrix: WATER			Laboratory D	Duplicate (DUP) Repor	t				
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)	Laboratory Control Spike (LCS) Report			
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 760714)								
ED037-P: Total Alkalinity as CaCO3		1	mg/L		500 mg/L	98.0	77.5	112
ED037P: Alkalinity by PC Titrator (QCLot: 762170)								
ED037-P: Total Alkalinity as CaCO3		1	mg/L		500 mg/L	97.8	77.5	112
ED040F: Dissolved Major Anions (QCLot: 759990)								
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1				
ED040F: Dissolved Major Anions (QCLot: 759992)								
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1				
ED045P: Chloride by PC Titrator (QCLot: 760715)								
ED045-P: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	101	88.4	110
ED045P: Chloride by PC Titrator (QCLot: 762171)					-			
ED045-P: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	100	88.4	110
ED093F: Dissolved Major Cations (QCLot: 759991)						1		
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				

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Sub-Matrix: WATER				Method Blank (MB)		Laboratory Control Spike (LCS) Report		
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QC	Lot: 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 (QC	Lot: 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 (QC	Lot: 759445)							
EG020D-F: Gallium	7440-55-3	0.001	mg/L	<0.001				
EG020T: Total Metals by ICP-MS (QCLot: 7	760171)		_					1
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: 7	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: 7	760173)		-					
EG020D-T: Gallium	7440-55-3	0.001	mg/L	<0.001				
EG035F: Dissolved Mercury by FIMS (QCL			5					
EG035F: Dissolved Mercury by FIMS (QCL EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.010 mg/L	106	85.3	117
		0.0001	ilig/L	-0.000 T	0.010 mg/L	100	00.0	117
EK055G: Ammonia as N by Discrete Analy		0.01		10.01	0.5 mm/l	04.4	70	400
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 Analy								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	82.4	70	130

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Sub-Matrix: WATER			Method Blank (MB)	Laboratory Control Spike (LCS) Report				
			Report	Spike	Spike Recovery (%)	Recovery	Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EK057G: Nitrite as N by Discrete Analyser (QCLot: 759920)	)							
EK057G: Nitrite as N		0.01	mg/L	<0.01	0.5 mg/L	101	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 759923)	)							
EK057G: Nitrite as N		0.01	mg/L	<0.01	0.5 mg/L	102	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 761134)								
EK059G: Nitrite + Nitrate as N		0.01	mg/L	<0.01	0.5 mg/L	104	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 759513)								
EK061G: Total Kjeldahl Nitrogen as N		0.1	mg/L	<0.1	10.0 mg/L	122	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 759515)								
EK061G: Total Kjeldahl Nitrogen as N		0.1	mg/L	<0.1	10.0 mg/L	79.4	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCL	ot: 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 (QCL	ot: 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) Rep	port			
				Spike	Spike Recovery (%)	Recovery	Limits (%)
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
D045P: Chloride by	y PC Titrator (QCLot: 760715)						
EB0812573-002	PZ11-D	ED045-P: Chloride	16887-00-6	400 mg/L	# Not Determined	70	130
D045P: Chloride by	y PC Titrator (QCLot: 762171)						
EB0812573-005	PZ07-S	ED045-P: Chloride	16887-00-6	40 mg/L	97.5	70	130
G020F: Dissolved I	Metals by ICP-MS (QCLot: 75944	3)					
EB0812517-009	Anonymous	EG020A-F: Aluminium	7429-90-5	Anonymous	Anonymous	Anonymous	Anonymou
		EG020A-F: Antimony	7440-36-0	Anonymous	Anonymous	Anonymous	Anonymou
		EG020A-F: Arsenic	7440-38-2	Anonymous	Anonymous	Anonymous	Anonymou
		EG020A-F: Beryllium	7440-41-7	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Barium	7440-39-3	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Cadmium	7440-43-9	Anonymous	Anonymous	Anonymous	Anonymou
		EG020A-F: Chromium	7440-47-3	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Cobalt	7440-48-4	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Copper	7440-50-8	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Lead	7439-92-1	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Manganese	7439-96-5	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Molybdenum	7439-98-7	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Nickel	7440-02-0	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Selenium	7782-49-2	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Vanadium	7440-62-2	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Zinc	7440-66-6	Anonymous	Anonymous	Anonymous	Anonymo
		EG020A-F: Boron	7440-42-8	Anonymous	Anonymous	Anonymous	Anonymo
G035F: Dissolved I	Mercury by FIMS (QCLot: 763478	3)					
EB0812573-001	PZ10	EG035F: Mercury	7439-97-6	0.01 mg/L	93.7	70	130
K055G: Ammonia a	as N by Discrete Analyser (QCLc	ot: 761696)					
EB0812521-006	Anonymous	EK055G: Ammonia as N	7664-41-7	Anonymous	Anonymous	Anonymous	Anonymou
K055G: Ammonia a	as N by Discrete Analyser (QCLc	ot: 761697)		- -	-	-	
EB0812573-007	PZ08-S	EK055G: Ammonia as N	7664-41-7	0.8 mg/L	84.1	70	130
K057G: Nitrite as I	N by Discrete Analyser (QCLot: )			, , , , , , , , , , , , , , , , , , ,			
B0812557-001	Anonymous	EK057G: Nitrite as N		Anonymous	Anonymous	Anonymous	Anonymo
	N by Discrete Analyser (QCLot: 3						
EB0812558-002	Anonymous			Anonymous	Anonymous	Anonymous	Anonyma
		EK057G: Nitrite as N		Anonymous	Anonymous	Anonymous	Anonymo
	by Discrete Analyser (QCLot: 76	51134)					1
EB0812573-002	PZ11-D	EK059G: Nitrite + Nitrate as N		0.4 mg/L	84.8	70	130

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Sub-Matrix: WATER					Matrix Spike (MS) Rep	port	
				Spike	Spike Recovery (%)	Recovery	Limits (%)
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK061: Total Kjeldal	nl Nitrogen (TKN) (QCLot: 7	759513)					
EB0812400-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N		Anonymous	Anonymous	Anonymous	Anonymous
EK061: Total Kjeldah	nl Nitrogen (TKN) (QCLot: 7	759515)					
EB0812573-014	PZ01	EK061G: Total Kjeldahl Nitrogen as N		5 mg/L	81.2	70	130
EK067G: Total Phos	phorus as P by Discrete An	alyser (QCLot: 759514)					
EB0812400-002	Anonymous	EK067G: Total Phosphorus as P		Anonymous	Anonymous	Anonymous	Anonymous
EK067G: Total Phos	phorus as P by Discrete An	alyser (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	Address	: 32 Shand Street Stafford QLD Australia 4053
	BRISBANE QLD, AUSTRALIA 4001		
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Caval Ridge		
C-O-C number		Date Samples Received	: 12-SEP-2008
Sampler	: A. Wilson, D. Gould	Issue Date	: 23-SEP-2008
Order number	:		
		No. of samples received	: 19
Quote number	: EN/001/08	No. of samples analysed	: 19

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

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

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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 ; ✓ = Withir	holding time
Method	Sample Date	Extraction / Preparation						
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								
PZ10,	PZ11-D,	08-SEP-2008				18-SEP-2008	22-SEP-2008	✓
PZ09								
Clear Plastic Bottle - Natural								
PZ05,	PZ07-S,	09-SEP-2008				19-SEP-2008	23-SEP-2008	✓
PZ07-D,	PZ08-S,							
PZ08-D								
Clear Plastic Bottle - Natural								
PZ06-S,	PZ06-D,	10-SEP-2008				19-SEP-2008	24-SEP-2008	<b>√</b>
PZ03-S,	PZ03-D,							-
PZ02,	PZ01,							
QC04	,							
Clear Plastic Bottle - Natural								
PZ04		11-SEP-2008				19-SEP-2008	25-SEP-2008	✓
ED040F: Dissolved Major Anions								
Clear Plastic Bottle - Natural								
PZ10,	PZ11-D,	08-SEP-2008				17-SEP-2008	06-OCT-2008	1
PZ09								
Clear Plastic Bottle - Natural								
PZ05,	PZ07-S,	09-SEP-2008				17-SEP-2008	07-OCT-2008	1
PZ07-D,	PZ08-S,							-
PZ08-D								
Clear Plastic Bottle - Natural								
PZ06-S,	PZ06-D,	10-SEP-2008				17-SEP-2008	08-OCT-2008	1
PZ03-S,	PZ03-D,							Ţ
PZ02,	PZ01,							
QC04	,							
Clear Plastic Bottle - Natural								
PZ04		11-SEP-2008				17-SEP-2008	09-OCT-2008	1
		11-3EF-2000				17-021-2000	00 001 2000	v



Matrix: WATER					Evaluation	× = Holding time	breach ; ✓ = Withir	n holding time
Method	Sample Date	Ex	traction / Preparation		Analysis			
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045P: Chloride by PC Titrator								
Clear Plastic Bottle - Natural								
PZ10,	PZ11-D,	08-SEP-2008				18-SEP-2008	06-OCT-2008	✓
PZ09								
Clear Plastic Bottle - Natural								
PZ05,	PZ07-S,	09-SEP-2008				19-SEP-2008	07-OCT-2008	✓
PZ07-D,	PZ08-S,							
PZ08-D								
Clear Plastic Bottle - Natural								
PZ06-S,	PZ06-D,	10-SEP-2008				19-SEP-2008	08-OCT-2008	1
PZ03-S,	PZ03-D,							-
PZ02,	PZ01,							
QC04								
Clear Plastic Bottle - Natural								
PZ04		11-SEP-2008				19-SEP-2008	09-OCT-2008	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural								
PZ10,	PZ11-D,	08-SEP-2008				17-SEP-2008	06-OCT-2008	✓
PZ09								
Clear Plastic Bottle - Natural								
PZ05,	PZ07-S,	09-SEP-2008				17-SEP-2008	07-OCT-2008	✓
PZ07-D,	PZ08-S,							
PZ08-D								
Clear Plastic Bottle - Natural								
PZ06-S,	PZ06-D,	10-SEP-2008				17-SEP-2008	08-OCT-2008	✓
PZ03-S,	PZ03-D,							
PZ02,	PZ01,							
QC04								
Clear Plastic Bottle - Natural								
PZ04		11-SEP-2008				17-SEP-2008	09-OCT-2008	1



Matrix: WATER					Evaluation	× = Holding time	breach ; ✓ = Withir	holding time.
Method		Sample Date	Ex	traction / Preparation				
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Filtered; Lab-acidified								
PZ10,	PZ11-D,	08-SEP-2008				17-SEP-2008	07-MAR-2009	✓
PZ09								
Clear Plastic Bottle - Filtered; Lab-acidified								
PZ05,	PZ07-S,	09-SEP-2008				17-SEP-2008	08-MAR-2009	✓
PZ07-D,	PZ08-S							
Clear Plastic Bottle - Filtered; Lab-acidified								
PZ03-S,	PZ03-D,	10-SEP-2008				17-SEP-2008	09-MAR-2009	✓
PZ02,	QC04							
Clear Plastic Bottle - Filtered; Lab-acidified								
PZ04		11-SEP-2008				17-SEP-2008	10-MAR-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered								
PZ08-D		09-SEP-2008				17-SEP-2008	08-MAR-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered								
PZ06-S,	PZ06-D,	10-SEP-2008				17-SEP-2008	09-MAR-2009	✓
PZ01								
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Unfiltered; Lab-acidified								
QC01		08-SEP-2008	18-SEP-2008	07-MAR-2009	✓	18-SEP-2008	07-MAR-2009	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified								
QC02		09-SEP-2008	18-SEP-2008	08-MAR-2009	✓	18-SEP-2008	08-MAR-2009	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified								
QC03		10-SEP-2008	18-SEP-2008	09-MAR-2009	✓	18-SEP-2008	09-MAR-2009	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Filtered; Lab-acidified								
PZ10,	PZ11-D,	08-SEP-2008				22-SEP-2008	06-OCT-2008	✓
PZ09								
Clear Plastic Bottle - Filtered; Lab-acidified								
PZ05,	PZ07-S,	09-SEP-2008				22-SEP-2008	07-OCT-2008	✓
PZ07-D,	PZ08-S							
Clear Plastic Bottle - Filtered; Lab-acidified								
PZ03-S,	PZ03-D,	10-SEP-2008				22-SEP-2008	08-OCT-2008	✓
PZ02,	QC04							
Clear Plastic Bottle - Filtered; Lab-acidified								
PZ04		11-SEP-2008				22-SEP-2008	09-OCT-2008	- ✓
Clear Plastic Bottle - Nitric Acid; Filtered								
PZ08-D		09-SEP-2008				22-SEP-2008	07-OCT-2008	✓
Clear Plastic Bottle - Nitric Acid; Filtered								
PZ06-S,	PZ06-D,	10-SEP-2008				22-SEP-2008	08-OCT-2008	✓
PZ01								

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Matrix: WATER					Evaluation:	× = Holding time	breach ; ✓ = Withir	n holding time
Method	Sample Date	Extraction / Preparation						
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete A	nalyser							
Clear Plastic Bottle - Sulphuric Acid								
PZ10,	PZ11-D,	08-SEP-2008				18-SEP-2008	06-OCT-2008	✓
PZ09								
Clear Plastic Bottle - Sulphuric Acid								
PZ05,	PZ07-S,	09-SEP-2008				18-SEP-2008	07-OCT-2008	✓
PZ07-D,	PZ08-S,							
PZ08-D								
Clear Plastic Bottle - Sulphuric Acid								
PZ06-S,	PZ06-D,	10-SEP-2008				18-SEP-2008	08-OCT-2008	✓
PZ03-S,	PZ03-D,							
PZ02,	PZ01,							
QC04								
Clear Plastic Bottle - Sulphuric Acid								
PZ04		11-SEP-2008				18-SEP-2008	09-OCT-2008	✓
EK057G: Nitrite as N by Discrete Anal	lyser							
Clear Plastic Bottle - Natural								
PZ10,	PZ11-D,	08-SEP-2008				17-SEP-2008	10-SEP-2008	x
PZ09								
Clear Plastic Bottle - Natural								
PZ05,	PZ07-S,	09-SEP-2008				17-SEP-2008	11-SEP-2008	×
PZ07-D,	PZ08-S,							
PZ08-D								
Clear Plastic Bottle - Natural								
PZ06-S,	PZ06-D,	10-SEP-2008				17-SEP-2008	12-SEP-2008	×
PZ03-S,	PZ03-D,							
PZ02,	PZ01,							
QC04								
Clear Plastic Bottle - Natural								
PZ04		11-SEP-2008				17-SEP-2008	13-SEP-2008	×

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Matrix: WATER					Evaluation	: × = Holding time	breach ; ✓ = Withir	n holding time
Method	Sample Date	Extraction / Preparation						
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: NOX as N by Discrete Analyser								
Clear Plastic Bottle - Sulphuric Acid								
PZ10,	PZ11-D,	08-SEP-2008				18-SEP-2008	06-OCT-2008	<ul> <li>✓</li> </ul>
PZ09								
Clear Plastic Bottle - Sulphuric Acid								
PZ05,	PZ07-S,	09-SEP-2008				18-SEP-2008	07-OCT-2008	✓
PZ07-D,	PZ08-S,							
PZ08-D								
Clear Plastic Bottle - Sulphuric Acid								
PZ06-S,	PZ06-D,	10-SEP-2008				18-SEP-2008	08-OCT-2008	✓
PZ03-S,	PZ03-D,							
PZ02,	PZ01,							
QC04								
Clear Plastic Bottle - Sulphuric Acid								
PZ04		11-SEP-2008				18-SEP-2008	09-OCT-2008	✓
EK061: Total Kjeldahl Nitrogen (TKN)								
Clear Plastic Bottle - Sulphuric Acid								
PZ10,	PZ11-D,	08-SEP-2008	17-SEP-2008	06-OCT-2008	✓	17-SEP-2008	06-OCT-2008	<ul> <li>✓</li> </ul>
PZ09								
Clear Plastic Bottle - Sulphuric Acid								
PZ05,	PZ07-S,	09-SEP-2008	17-SEP-2008	07-OCT-2008	✓	17-SEP-2008	07-OCT-2008	<ul> <li>✓</li> </ul>
PZ07-D,	PZ08-S,							
PZ08-D								
Clear Plastic Bottle - Sulphuric Acid								
PZ06-S,	PZ06-D,	10-SEP-2008	17-SEP-2008	08-OCT-2008	✓	17-SEP-2008	08-OCT-2008	✓
PZ03-S,	PZ03-D,							
PZ02,	PZ01,							
QC04								
Clear Plastic Bottle - Sulphuric Acid								
PZ04		11-SEP-2008	17-SEP-2008	09-OCT-2008	✓	17-SEP-2008	09-OCT-2008	1

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#### Matrix: WATER Evaluation: $\mathbf{x}$ = Holding time breach ; $\mathbf{v}$ = 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 EK067G: Total Phosphorus as P by Discrete Analyser Clear Plastic Bottle - Sulphuric Acid PZ10, PZ11-D, 08-SEP-2008 17-SEP-2008 06-OCT-2008 $\checkmark$ 17-SEP-2008 06-OCT-2008 $\checkmark$ PZ09 Clear Plastic Bottle - Sulphuric Acid PZ05, 07-OCT-2008 PZ07-S, 09-SEP-2008 17-SEP-2008 07-OCT-2008 17-SEP-2008 $\checkmark$ $\checkmark$ PZ07-D, PZ08-S, PZ08-D **Clear Plastic Bottle - Sulphuric Acid** 08-OCT-2008 08-OCT-2008 PZ06-S, PZ06-D, 10-SEP-2008 17-SEP-2008 17-SEP-2008 $\checkmark$ $\checkmark$ PZ03-S, PZ03-D, PZ02, PZ01, QC04 **Clear Plastic Bottle - Sulphuric Acid** PZ04 11-SEP-2008 17-SEP-2008 09-OCT-2008 17-SEP-2008 09-OCT-2008 ✓ $\checkmark$



# **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.

Quality Control Sample Type	ty Control Sample Type Count			Rate (%)		Quality Control Specification	
nalytical Methods	Method	QC	Reaular	Actual	Expected	Evaluation	
aboratory Duplicates (DUP)							
Ikalinity 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
lajor Anions - Filtered	ED040F	4	40	10.0	10.0	~	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Najor 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	<ul> <li>✓</li> </ul>	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	1	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
otal Metals by ICP-MS - Suite A	EG020A-T	2	13	15.4	10.0	~	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
otal Metals by ICP-MS - Suite B	EG020B-T	2	13	15.4	10.0	~	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
otal Metals by ICP-MS - Suite D	EG020D-T	2	12	16.7	10.0	1	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
otal Phosphorus as P By Discrete Analyser	EK067G	4	31	12.9	10.0	~	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
aboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	40	5.0	5.0	1	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	2	40	5.0	5.0	1	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	1	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
litrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	<ul> <li>✓</li> </ul>	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
litrite as N by Discrete Analyser	EK057G	2	40	5.0	5.0	~	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
otal Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	26	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
otal Metals by ICP-MS - Suite A	EG020A-T	1	13	7.7	5.0	✓ ✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
otal 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
/lethod Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	40	5.0	5.0	1	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	2	40	5.0	5.0	<u> </u>	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	20	5.0	5.0	<u> </u>	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

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Matrix: WATER				Evaluation	n: × = Quality Cor	ntrol frequency n	ot within specification ; $\checkmark$ = Quality Control frequency within specification.
Quality Control Sample Type		Count Rate (%)		Quality Control Specification			
Analytical Methods	Method	QC	Reaular	Actual	Expected Evaluation		
Method Blanks (MB) - Continued							
Dissolved Metals by ICP-MS - Suite D	EG020D-F	1	18	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	2	40	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	38	5.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	40	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	26	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite B	EG020B-T	1	13	7.7	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite D	EG020D-T	1	12	8.3	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	31	6.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	40	5.0	5.0	1	ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	2	40	5.0	5.0	✓	ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	1	20	5.0	5.0	✓	ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	18	5.6	5.0	✓	ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.0	5.0	✓	ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	2	40	5.0	5.0	✓	ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	26	7.7	5.0	✓	ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	13	7.7	5.0	✓	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	31	6.5	5.0	✓	ALS QCS3 requirement



# **Brief Method Summaries**

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by both manual measurement and automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Major Anions - Filtered	ED040F	WATER	APHA 21st ed., 3120 Sulfur and/or Silcon content is determined by ICP/AES and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Chloride by PC Titrator	ED045-P	WATER	APHA 21st ed., 4500 CI - B. Automated Silver Nitrate titration.
Major Cations - Filtered	ED093F	WATER	APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite B	EG020B-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite D	EG020D-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite D	EG020D-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500 NH3+-G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500 NO3- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500 NO3F. Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500 NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg-D25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500 N org / NO3. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500 P-B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT and ICPAES	EN055	WATER	APHA 21st Ed. 1030F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Digestion for Total Recoverable Metals	EN25	WATER	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



# **Summary of Outliers**

### **Outliers : Quality Control Samples**

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

#### Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

#### Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment				
Laboratory Control Spike (LCS) Recoveries	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		MS recovery not determined,				
					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		E	traction / Preparation			Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days	Date analysed	Due for analysis	Days
				overdue			overdue
EK057G: Nitrite as N by Discrete Analy	/ser						
Clear Plastic Bottle - Natural							
PZ10,	PZ11-D,				17-SEP-2008	10-SEP-2008	7
PZ09							
Clear Plastic Bottle - Natural							
PZ05,	PZ07-S,				17-SEP-2008	11-SEP-2008	6
PZ07-D,	PZ08-S,						
PZ08-D							
Clear Plastic Bottle - Natural							
PZ06-S,	PZ06-D,				17-SEP-2008	12-SEP-2008	5
PZ03-S,	PZ03-D,						
PZ02,	PZ01,						
QC04							
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.

, UR	SQU pe	r previous	ERO	175	73	•		17	13	(	E_	)	Andr	ew, W	Y Joor	Purscorp.com
HAIN OF CUSTODY DO	v	•										, 				
CLIENT: BMA				SAMPL	ER:	Andre	ew Wi	son / S	Shane	Steve	ens 🔪					ALS
ADDRESS / OFFICE:				MOBIL	E:	0448	853 0	04 / 04	427 75	53 236			/			
PROJECT MANAGER (PM): Stephen De	enner		×	PHON		3243			2209							Australian Laboratory Services Pty Ltd
PROJECT ID: 42626162				EMAIL	REPO	RT TO:		<u>steph</u>	<u>en de</u>	enner@	<u>Durscor</u>	<u>o.cc</u> (ur	dersc	ore betv	veen s	tephen and denner)
SITE: Caval Ridge	P.O. NO.:					CE TO:	<u> </u>				-					
RESULTS REQUIRED (Date):	QUOTE N	10.:		ANAL	SIS RI	EQUIRE	ED incl	uding S		(note -	suite cod	es must	be listed	to attrac	t suite p	prices)
FOR LABORATORY USE ONLY     CC       COOLER SEAL (circle appropriate)	OMMENTS / SPECIAL HAN	IDLING / STORAGE OR	DIPOSAL:					3, Fe, Ga, Li (Dissolve	Sr, Th, Ti, U (Dissolve	B, Fe, Ga, Li (Total)	Sr, Th, Ti, U (Total)					<u>Notes</u> : e.g. Highly contaminated samples e.g. "High PAHs expected". Extra volume for QC or trace LORs etc.
SAMPLE INFORMATION (note: S = S	oil, W=Water)	CONTAINER INFO			~			ŝb, Ē	Se,	Sb, E	Še					
	TRIX DATE Time	Type / Code	Total bottles	NT1	NT2	NT8	M3	Ĭ,	ο Μ	AI, ŝ	Mo,					
1 P206-5 Wate	er 27/2 PM	P, 5P.N	3	~	V.	<u> </u>	$\checkmark$	$\checkmark$	$\checkmark$							Purple bottles Erozen
2 P206-D	27/2 PM	PSPN	3	$\checkmark$	$\checkmark$	$\mathcal{J}$	$\overline{\checkmark}$	$\checkmark$	$\checkmark$				1			as soon as
3 P208-5	28/2 AM	PSP N	3	$\checkmark$	$\overline{\checkmark}$	$\nabla$	$\overline{\checkmark}$	$\overline{\checkmark}$	$\checkmark$							practicable
4 P208-D	23/2 AM	PSPN	3	./	Ż	J	1 V	Ť	$\overline{\mathbf{v}}$				$ \leq $			
		PSPN	3	Ť.	$\overline{\checkmark}$		$\overline{\mathbf{x}}$	~/	$\overline{\mathbf{x}}$			·				Environmental Division
	28/2 AM		3	Ť.		-7		7	Ž							Brisbane
	28/2 AM	PSP N	<u> </u>	$\vdash$	$\frac{1}{2}$		$\mathbf{H}$	$\rightarrow$	$\rightarrow$		> ni	. L				Work Order
7 Pz 05	23/2 PM	P'SPN			-	$\downarrow \checkmark$	-	$\overline{\nabla}$	$\rightarrow$		Fimp		8			EB0903756
3 P209	2/3 PM	PSPN	3	$\langle  \rangle$	$\underline{\vee}_{\ell}$	$\vee$	ert	$\mathbf{\mathbf{x}}$	$\rightarrow$	NO	Nid	t ON	<del>- 4 . ' -</del>		y per	/ +
9 P211-D	2/3 PM	P SP N	3	$\checkmark$	$\checkmark$		$ert \checkmark$	$\vee$	$\mathbf{\nabla}_{\mathbf{x}}$	h-	draw	White	(0)	<u> </u>		
10 Pz0	3/3 AM	P,SP, P	S	$\bigvee$		$\bigvee$	$\bigvee$	$\checkmark$	$\checkmark$		9-8	-09 fa	) q	jo jo		
11 Pz 03-5	3/3 PM	PSPN	3	$\bigvee$	V	$\mathcal{I}_{\mathcal{I}}$	$\bigvee$	$\bigvee$			đ		(Jm	AM		Telephone: +61-7-3243 7222
17 P203-D	3/3 PM	P.SP.N	3	$\overline{\mathbf{v}}$	$\overline{\checkmark}$	$\checkmark$	V	$\checkmark$	$\checkmark$				()			
	LINQUISHED BY:			- <u>/</u>			<b>v</b>	•	REC		<u>) BY</u>	<b>i</b>	· ·			METHOD OF SHIPMENT
Name: Andrew Wilson		Date: 4/3/01	9	Name	.C.!	Br	jav	$\mathcal{F}$			D	ate:Ŝ	3	PC		Con' Note No:
of: VRS		Time: 11:30		Of: 🖌			5				Т	me: 灯	383	)		
Name:		Date:		Name	):						D	ate:				Transport Co:
Of:		Time:	· · · · · · ·	Of:								me:				1
Water Container Codes: P = Unpreserved Pl V = VOA Vial HCl Preserved; VS = VOA Vial Sulph Z = Zinc Acetate Preserved Bottle; E = EDTA Pres	nuric Preserved; SG = Sul	furic Preserved Amber (	Glass; H = H	ICI pres	erved F	Plastic;	HS = H	Ci pres								

СНА	N OF CUSTODY			NTAT																
CLIENT:	<						SAMP	1 FR <sup>.</sup>	Andr	ew Wi	lson /	Shane	e Stev	ens						
	SS / OFFICE:						MOBIL				04/0									(ALS)
	T MANAGER (PM): Steph	en Denne	er				PHONE 3243 2146 / 3243 2209										Australian Laboratory Services Pty Ltd			
	T ID: 42626162						EMAIL	REPO	RT TO	:	steph	ien de	enner(	@ursc	orp.cc	(unde	rscor	e betv	veen s	tephen and denner)
SITE: Cava	al Ridge			P.O. NO.:	; .		EMAIL		CE TO:	(if diffe	erent to	report)								
RESULTS	REQUIRED (Date):			QUOTE N	NO.:		ANAL	YSIS R	EQUIR	ED incl	uding \$	SUITES	(note -	suite c	odes m	ust be l	isted to	attrac	t suite p	prices)
FOR LABO	RATORY USE ONLY	COMM	IENTS / SPI	ECIAL HAI	NDLING / STORAGE O	R DIPOSAL:					lved	olved	-							Notes: e.g. Highly contaminated samples
COOLER S	EAL (circle appropriate)										Ga, Li (Dissolve	Ti, U (Dissolve	Li (Total)	(Total)						e.g. "High PAHs expected".
intact:	Yes No N/A						1				Li (T	'n	Li (J							Extra volume for QC or trace LORs etc.
SAMPLE T	EMPERATURE						1					т, т	Ga	Ъ, П						-
CHILLED:	Yes No						]				В, Fe	ۍ'۱ ۲	B, Fe,	່ິ						
	SAMPLE INFORMATION (note	e: S = Soil, V	N=Water)		CONTAINER INFO	RMATION	]_		6		Al, Sb, E	Ś	Sb, E	Se,						
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles	NT1	NT2	NT8	ŝ	/ <del>द</del>	/ <sup>§</sup> /	AI,	Š						
13	PZOZ	Water	3/3	PΜ	P, SPN	3	$ $ $\checkmark$		$\left  \mathcal{I}_{\prime} \right $			1,								Purple bottles Frozen
14	P204		3/3	PM	PSPN	3	$\overline{\checkmark}$	$\mathcal{N}$			V	Γ,								as soon as
15	QCOL		2/3	PM	PSPN	3		$\checkmark$	$\bigvee$		$\checkmark$	$\checkmark$								practicable
15	QC02		2/3	PM	Ň	1							$\overline{}$	$\bigvee$						
13	QC03		2/3	PA	N	1							$\bigvee$	$\bigvee$						
18	Q C 0 4		3/3	PM	P.SP.N	3	$\checkmark$	$\bigvee$	$\checkmark$	./	$\checkmark$	$\checkmark$				. ~	TO M	r		
19	Q C 0 5		3/3	pM	Ň								$\bigvee$				1 <del>660</del>	-	Me	als on
20	QC06		3/3	PM	N	l							$\int$	$\overline{\mathbf{V}}$		ρ	27		raw	Wilson 9-3-09@ 9461
																V	Bi F	Hea	nei	Filtered
		-1		<u> </u>																
		RELING	UISHED BY	<u>(:</u>										<u>) BY</u>						METHOD OF SHIPMENT
Name:	Andrew Wilson	1			Date: 4/3/09		Name	÷/∠			-	$ \simeq$			Date:		÷.,			Con' Note No:
Of:	URS				Time: 11 : 30		Of:								Time:					
Name:					Date:		Name: Date:								Transport Co:					
Of:	· · · · · · · · · · · · · · · · · · ·				Time:		Of:								Time:					
V = VOA V	ntainer Codes: P = Unprese ial HCl Preserved; VS = VOA Via cetate Preserved Bottle; E = EDT	al Sulphuric	Preserved;	SG = Sul	furic Preserved Amber	Glass; H = H	ICI pres	erved F	Plastic;	HS = ⊦	ICI pres									mber Glass Unpreserved; F = Formaldehyde Preserved Glass;

c

# ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES

# Environmental Division



# SAMPLE RECEIPT NOTIFICATION (SRN)

**Comprehensive Report** 

Work Order	: EB0	903756		
Client Contact Address	: MR S : GPO	AUSTRALIA PTY LTD (QLD) TEPHEN DENNER BOX 302 BANE QLD, AUSTRALIA 4001	Laboratory Contact Address	<ul> <li>Environmental Division Brisbane</li> <li>Tim Kilmister</li> <li>32 Shand Street Stafford QLD Australia 4053</li> </ul>
E-mail Telephone Facsimile	: +61 3	en_denner@urscorp.com 2432111 7 32432199	E-mail Telephone Facsimile	: Services.Brisbane@alsenviro.com : +61-7-3243 7222 : +61-7-3243 7218
Project Order number	: 42626	162	Page	: 1 of 3
C-O-C number	:		Quote number	: ES2008URSQLD0041 (EN/001/08)
Site	: Caval	Ridge		
Sampler	: A.Wils	son, S.Stevens	QC Level	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dates				
Date Samples Rec	eived	: 05-MAR-2009	Issue Date	: 09-MAR-2009 10:22
Client Requested E	ue Date	: 17-MAR-2009	Scheduled Reporti	ng Date : 17-MAR-2009
Delivery Deta	ails			
Mode of Delivery		: Carrier	Temperature	: 8.0,9.8,24.2,14.8C - Ice present
No. of coolers/boxe	s	: 4 MEDIUM	No. of samples rec	eived : 20
Sercurity Seal		: Intact.	No. of samples and	alysed : 20

### **General Comments**

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- Samples received in appropriately pretreated and preserved containers.
- Breaches in recommended extraction / analysis holding times may occur.
- The recommended holding time for Nitrite, Nitrate +/or reactive phosphorus analysis is 48 hours from the time of sampling.
- Sample labelled PZ09 1lt Green Container was received in esky without a lid and sample was spilt throughout the esky.

We were unable to salvage this sample. As per our conversation 09/03 due to this analysis of NT2 and TN, NH3 and TP (from NT8) were unable to be performed. We were however able to perform analysis of Nox from the (NT8)

- As per conversion 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

process neccessar asks. Packages r he determination asks, that are includ	y for the executior may contain addition of moisture con led in the package. d/or time(s) are sh imed by the labo sampling time is		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	<u> </u>	<u>s F</u>	≤ □	<u>s</u> F	≤ □	<u>s</u> f	SZO	<u>≤ ⊴</u>
EB0903756-002	27-FEB-2009 15:00	PZ06-D	✓		✓		✓			✓
EB0903756-003	28-FEB-2009 15:00	PZ08-S	✓		✓		✓			1
EB0903756-004	28-FEB-2009 15:00	PZ08-D	1		✓		1			1
EB0903756-005	28-FEB-2009 15:00	PZ07-S	✓		✓		1			1
EB0903756-006	28-FEB-2009 15:00	PZ07-D	✓		✓		1			✓
EB0903756-007	28-FEB-2009 15:00	PZ05	✓		✓		1			✓
EB0903756-008	02-MAR-2009 15:00	PZ09	✓		✓		✓		✓	
EB0903756-009	02-MAR-2009 15:00	PZ11-D	✓		✓		✓			1
EB0903756-010	03-MAR-2009 15:00	PZ01	✓		✓		1			1
EB0903756-011	03-MAR-2009 15:00	PZ03-S	✓		✓		✓			1
EB0903756-012	03-MAR-2009 15:00	PZ03-D	✓		✓		1			✓
EB0903756-013	03-MAR-2009 15:00	PZ02	✓		✓		1			1
EB0903756-014	03-MAR-2009 15:00	PZ04	✓		✓		✓			✓
EB0903756-015	02-MAR-2009 15:00	QC01	✓		1		1			1
EB0903756-016	02-MAR-2009 15:00	QC02		✓		✓		✓		
EB0903756-017	02-MAR-2009 15:00	QC03		✓		1		✓		
EB0903756-018	03-MAR-2009 15:00	QC04	✓		✓		✓			✓
EB0903756-019	03-MAR-2009 15:00	QC05	✓		✓		1			
EB0903756-020	03-MAR-2009 15:00	QC06	✓		1		✓			

Matrix: <b>WATER</b> 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	1	✓	1	✓
EB0903756-002	27-FEB-2009 15:00	PZ06-D	✓	✓	✓	✓
EB0903756-003	28-FEB-2009 15:00	PZ08-S	1	1	1	✓
EB0903756-004	28-FEB-2009 15:00	PZ08-D	✓	✓	✓	✓
	1	1				



			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	
EB0903756-005	28-FEB-2009 15:00	PZ07-S	1	✓	✓	1
EB0903756-006	28-FEB-2009 15:00	PZ07-D	1	✓	1	✓
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	✓	<ul> <li>✓</li> </ul>	✓	✓
EB0903756-010	03-MAR-2009 15:00	PZ01	✓	✓	✓	✓
EB0903756-011	03-MAR-2009 15:00	PZ03-S	✓	1	✓	✓
EB0903756-012	03-MAR-2009 15:00	PZ03-D	✓	✓	✓	✓
EB0903756-013	03-MAR-2009 15:00	PZ02	✓	1	1	✓
EB0903756-014	03-MAR-2009 15:00	PZ04	✓	✓	✓	1
EB0903756-015	02-MAR-2009 15:00	QC01	✓	1	1	✓
EB0903756-018	03-MAR-2009 15:00	QC04	✓	✓	1	1

# Requested Deliverables

### MR STEPHEN DENNER

<ul> <li>*AU Certificate of Analysis - NATA (COA)</li> </ul>	Email	stephen_denner@urscorp.com
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	stephen_denner@urscorp.com
<ul> <li>AU Interpretive QC Report (Anon QCI Not Rep) ( QCI_NoAnon )</li> </ul>	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
<ul> <li>AU Interpretive QC Report (Anon QCI Not Rep) ( QCI_NoAnon</li> </ul>	Email	brisbane@urscorp.com
, AU QC Report (Anon QC Not Rep) - NATA ( QC NoAnon )	Email	brisbane@urscorp.com
- Default - Chain of Custody ( COC )	Email	brisbane@urscorp.com
- EDI Format - MRED (MRED)	Email	brisbane@urscorp.com
THE ACCOUNTS BRISBANE		
- A4 - AU Tax Invoice ( INV )	Email	brisbane_accounts@urscorp.com

# Environmental Division



# **CERTIFICATE OF ANALYSIS**

Work Order	EB0903756	Page	: 1 of 10
Client	: URS AUSTRALIA PTY LTD (QLD)	Laboratory	: Environmental Division Brisbane
Contact	MR STEPHEN DENNER	Contact	: Tim Kilmister
Address	: GPO BOX 302 BRISBANE QLD, AUSTRALIA 4001	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	:		
C-O-C number	:	Date Samples Received	: 05-MAR-2009
Sampler	: A.Wilson, S.Stevens	Issue Date	: 17-MAR-2009
Site	: Caval Ridge		
	-	No. of samples received	: 20
Quote number	: EN/001/08	No. of samples analysed	: 20

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



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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 insuffient sample for analysis.

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

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

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

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



Sub-Matrix: WATER		Clie	ent sample ID	PZ06-S	PZ06-D	PZ08-S	PZ08-D	PZ07-S
	CI	lient samplii	ng date / time	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
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



Sub-Matrix: WATER		Cli	ent sample ID	PZ06-S	PZ06-D	PZ08-S	PZ08-D	PZ07-S
	Cl	ient sampli	ng date / time	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 Analy	yser							
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 Discre	ete 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



Sub-Matrix: WATER		Clie	ent sample ID	PZ07-D	PZ05	PZ09	PZ11-D	PZ01
	Cl	lient samplii	ng date / time	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
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



Sub-Matrix: WATER		Clie	ent sample ID	PZ07-D	PZ05	PZ09	PZ11-D	PZ01
	Cl	ient sampli	ng date / time	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 Analy	/ser							
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 Discre	ete 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



Sub-Matrix: WATER		Clie	ent sample ID	PZ03-S	PZ03-D	PZ02	PZ04	QC01
	Cl	ient sampliı	ng date / time	03-MAR-2009 15:00	03-MAR-2009 15:00	03-MAR-2009 15:00	03-MAR-2009 15:00	02-MAR-2009 15:00
Compound	CAS Number	LOR	Unit	EB0903756-011	EB0903756-012	EB0903756-013	EB0903756-014	EB0903756-015
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



Sub-Matrix: WATER		Cli	ent sample ID	PZ03-S	PZ03-D	PZ02	PZ04	QC01
	Cl	ient sampli	ng date / time	03-MAR-2009 15:00	03-MAR-2009 15:00	03-MAR-2009 15:00	03-MAR-2009 15:00	02-MAR-2009 15:00
Compound	CAS Number	LOR	Unit	EB0903756-011	EB0903756-012	EB0903756-013	EB0903756-014	EB0903756-015
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK055G: Ammonia as N by Discrete Analy	yser							
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 Discre	ete 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



Sub-Matrix: WATER		Clie	ent sample ID	QC02	QC03	QC04	QC05	QC06
	CI	lient samplir	ng 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		



Sub-Matrix: WATER		Clie	ent sample ID	QC02	QC03	QC04	QC05	QC06
	Cli	ent samplii	ng 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
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 Analy	vser							
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 Discre	ete Analvser							
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	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	BRISBANE QLD, AUSTRALIA 4001 : stephen denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 32432111	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Caval Ridge		
C-O-C number		Date Samples Received	: 05-MAR-2009
Sampler	: A.Wilson, S.Stevens	Issue Date	: 17-MAR-2009
Order number	:		
		No. of samples received	: 20
Quote number	: EN/001/08	No. of samples analysed	: 20

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

This Quality Control Report contains the following information:

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

ΝΑΤΑ	NATA Accredited Laboratory 825		Signatories This document has been electronically signed by the authorized signatories indicated below. Electronic signatried out in compliance with procedures specified in 21 CFR Part 11.								
NAIA	accordance with NATA	Signatories	Position	Accreditation Category	n Category						
	accreditation requirements.	Kim McCabe	Senior Inorganic Chemist	Inorganics							
WORLD RECOGNISED	Accredited for compliance with										
ACCREDITATION	ISO/IEC 17025.										
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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 insuffient sample for analysis.

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

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

# = Indicates failed QC



### Laboratory Duplicate (DUP) Report

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

ub-Matrix: WATER						Laboratory I	Duplicate (DUP) Repor	t	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%
D037P: Alkalinity I	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%
D040F: Dissolved	Major Anions (QC Lot:	913201)							
B0903756-001	PZ06-S	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	37	37	0.0	0% - 20%
B0903780-003	Anonymous	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
D040F: Dissolved	Major Anions (QC Lot:	913780)							
B0903675-003	Anonymous	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
B0903756-007	PZ05	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	406	402	1.0	0% - 20%
D045P: Chloride b	y PC Titrator (QC Lot: S	917421)							
B0903756-013	PZ02	ED045-P: Chloride	16887-00-6	1	mg/L	352	354	0.6	0% - 20%
D093F: Dissolved	Major Cations (QC Lot				, , , , , , , , , , , , , , , , , , ,				
B0903756-001	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
D093F: Dissolved	Major Cations (QC Lot	: 913779)							
B0903675-003	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
B0903756-007	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%
G020F: Dissolved	Metals by ICP-MS (QC	Lot: 913180)							
B0903600-001	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

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



Sub-Matrix: WATER						Laboratory	Duplicate (DUP) Repor	t	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved I	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
FG020E: Dissolved	Metals by ICP-MS (QC								,
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	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
EB0903600-010	Anonymous	EG020B-F: Strontium	7440-24-6	0.001	mg/L	Anonymous	Anonymous	Anonymous	Anonymous
	Anonymous	EGUZUB-F. SUUIIUUII	7440-24-0	0.001	iiig/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) Repor	t	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
G020F: 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
G020F: 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
G020F: Dissolved	Metals by ICP-MS (QC	L of: 913183)							
B0903756-004	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: Coholit	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
			7439-93-2	0.001	mg/L	0.620	0.662	6.7	0% - 20%
		EG020A-F: Lithium	7439-96-5	0.001	mg/L	0.126	0.129	2.2	0% - 20%
		EG020A-F: Manganese	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Molybdenum	7439-98-7 7440-02-0	0.001	•	0.015	0.016	0.0	0% - 50%
		EG020A-F: Nickel			mg/L				
		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%
B0903756-013	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

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



Sub-Matrix: WATER			[			Laboratory	Duplicate (DUP) Repor	t	
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 I	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 I	Metals by ICP-MS (QC I								
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 Metal	s by ICP-MS (QC Lot: 9								
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
	5	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
FG020T: Total Metal	s by ICP-MS (QC Lot: 9				_				-
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 Meta	Is 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 Meta	Is 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 L	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 L	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 Analys	ser (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 Analys	ser (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 Kjelda	hl 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 Kjelda	hl 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 Phos	sphorus as P by Discret	te 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 Pho	sphorus as P by Discret	te 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)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
ED037P: Alkalinity by PC Titrator (QCLot: 917420)									
ED037-P: Total Alkalinity as CaCO3		1	mg/L		500 mg/L	104	80	114	
ED040F: Dissolved Major Anions (QCLot: 913201)									
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1					
ED040F: Dissolved Major Anions (QCLot: 913780)									
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1					
ED045P: Chloride by PC Titrator (QCLot: 917421)									
ED045-P: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	98.6	90	110	
ED093F: Dissolved Major Cations (QCLot: 913202)			0		5				
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	

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Client	: URS AUSTRALIA PTY LTD (QLD)
Project	: 42626162



Sub-Matrix: WATER			Method Blank (MB) Report			Laboratory Control Spike (LCS) Report		
	Í				Spike	Spike Recovery (%)		/ Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	Higi
EG020F: Dissolved Metals by ICP-MS (QCLo	ot: 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	12
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.50 mg/L	112	76	12
EG020F: Dissolved Metals by ICP-MS(QCLo	ot: 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
G020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001				
EG020F: Dissolved Metals by ICP-MS (QCLo	ot: 913182)							
EG020D-F: Gallium	7440-55-3	0.001	mg/L	<0.001				
EG020F: Dissolved Metals by ICP-MS (QCLo	of: 913183)							
G020A-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	12
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	96.6	75	12
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.100 mg/L	124	82	13
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	12
G020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	95.9	84	12
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.100 mg/L	102	81	11
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	100	81	12
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	100	83	12:
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	12
EG020A-F: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.100 mg/L	100	83	11
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	120
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(QCLo	ot: 913184)							
EG020B-F: Strontium	7440-24-6	0.001	mg/L	<0.001	0.500 mg/L	100	83	11
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	12
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001				
EG020F: Dissolved Metals by ICP-MS(QCLo	ot: 913185)							
EG020D-F: Gallium	7440-55-3	0.001	mg/L	<0.001				

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Client	: URS AUSTRALIA PTY LTD (QLD)
Project	: 42626162



Sub-Matrix: WATER			Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	Recovery	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS(QCLot: 913755)- coi	ntinued							
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)		_		_			1
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: 9137	(12)							1
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
		0.1	ing/E	-0.1	10.0 mg/L	11.1	10	110
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 916545)		0.1	mg/L	<0.1	10.0 mg/L	81.0	70	115
EK061G: Total Kjeldahl Nitrogen as N		0.1	iiig/L	<b>NU. 1</b>	10.0 Hig/L	01.0	10	115
EK067G: Total Phosphorus as P by Discrete Analyser	(QCLot: 912947)	0.01		10.01	4.0	00.5	70	400
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.

ub-Matrix: WATER	o-Matrix: WATER				Matrix Spike (MS) Report			
			-	Spike	Spike Recovery (%)	Recovery	Limits (%)	
aboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High	
D045P: Chloride by	PC Titrator (QCLot: 917421)							
- EB0903756-014	PZ04	ED045-P: Chloride	16887-00-6	40 mg/L	# Not Determined	70	130	
G020F: Dissolved I	Metals by ICP-MS (QCLot: 9131	180)		_				
B0903600-002	Anonymous	EG020A-F: Aluminium	7429-90-5	Anonymous	Anonymous	Anonymous	Anonymo	
		EG020A-F: Antimony	7440-36-0	Anonymous	Anonymous	Anonymous	Anonymo	
		EG020A-F: Arsenic	7440-38-2	Anonymous	Anonymous	Anonymous	Anonymo	
		EG020A-F: Beryllium	7440-41-7	Anonymous	Anonymous	Anonymous	Anonymo	
		EG020A-F: Barium	7440-39-3	Anonymous	Anonymous	Anonymous	Anonymo	
		EG020A-F: Cadmium	7440-43-9	Anonymous	Anonymous	Anonymous	Anonymo	
		EG020A-F: Chromium	7440-47-3	Anonymous	Anonymous	Anonymous	Anonym	
		EG020A-F: Cobalt	7440-48-4	Anonymous	Anonymous	Anonymous	Anonym	
		EG020A-F: Copper	7440-50-8	Anonymous	Anonymous	Anonymous	Anonym	
		EG020A-F: Lead	7439-92-1	Anonymous	Anonymous	Anonymous	Anonym	
		EG020A-F: Manganese	7439-96-5	Anonymous	Anonymous	Anonymous	Anonym	
	EG020A-F: Molybdenum	7439-98-7	Anonymous	Anonymous	Anonymous	Anonym		
	EG020A-F: Nickel	7440-02-0	Anonymous	Anonymous	Anonymous	Anonym		
		EG020A-F: Selenium	7782-49-2	Anonymous	Anonymous	Anonymous	Anonym	
		EG020A-F: Vanadium	7440-62-2	Anonymous	Anonymous	Anonymous	Anonym	
		EG020A-F: Zinc	7440-66-6	Anonymous	Anonymous	Anonymous	Anonym	
		EG020A-F: Boron	7440-42-8	Anonymous	Anonymous	Anonymous	Anonym	
G020F: Dissolved I	Metals by ICP-MS (QCLot: 9131	183)						
B0903756-005	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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Sub-Matrix: WATER					Matrix Spike (MS) Report						
				Spike	Spike Recovery (%)	Recovery	Limits (%)				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High				
EG020F: Dissolved	Metals by ICP-MS (QCLot: 913183)	- continued									
EB0903756-005	PZ07-S	EG020A-F: Zinc	7440-66-6	0.2 mg/L	107	70	130				
		EG020A-F: Boron	7440-42-8	0.5 mg/L	102	70	130				
EG035F: Dissolved	Mercury by FIMS (QCLot: 917849)										
EB0903711-002	Anonymous	EG035F: Mercury	7439-97-6	Anonymous	Anonymous	Anonymous	Anonymous				
EG035F: Dissolved	Mercury by FIMS (QCLot: 917850)										
EB0903756-003	PZ08-S	EG035F: Mercury	7439-97-6	0.010 mg/L	78.8	70	130				
EK055G: Ammonia	as N by Discrete Analyser (QCLot:	913255)									
EB0903749-010	Anonymous	EK055G: Ammonia as N	7664-41-7	Anonymous	Anonymous	Anonymous	Anonymous				
EK055G: Ammonia	as N by Discrete Analyser (QCLot:	913256)									
EB0903756-018	QC04	EK055G: Ammonia as N	7664-41-7	0.8 mg/L	77.5	70	130				
EK059G: NOX as N	by Discrete Analyser (QCLot: 9137	712)									
EB0903721-002	Anonymous	EK059G: Nitrite + Nitrate as N		Anonymous	Anonymous	Anonymous	Anonymous				
EK061: Total Kjelda	hl Nitrogen (TKN) (QCLot: 912946)										
EB0903753-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N		Anonymous	Anonymous	Anonymous	Anonymous				
EK061: Total Kjelda	hl Nitrogen (TKN) (QCLot: 916545)										
EB0903849-009	Anonymous	EK061G: Total Kjeldahl Nitrogen as N		Anonymous	Anonymous	Anonymous	Anonymous				
EK067G: Total Phos	sphorus as P by Discrete Analyser	(QCLot: 912947)									
EB0903753-002	Anonymous	EK067G: Total Phosphorus as P		Anonymous	Anonymous	Anonymous	Anonymous				
EK067G: Total Phos	sphorus as P by Discrete Analyser	(QCLot: 912948)									
EB0903756-018	QC04	EK067G: Total Phosphorus as P		1.0 mg/L	98.7	70	130				
	· · · · · · · · · · · · · · · · · · ·					1	2				

## 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	Address	: 32 Shand Street Stafford QLD Australia 4053
	BRISBANE QLD, AUSTRALIA 4001		
E-mail	: stephen_denner@urscorp.com	E-mail	: Services.Brisbane@alsenviro.com
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Facsimile	: +61 07 32432199	Facsimile	: +61-7-3243 7218
Project	: 42626162	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Caval Ridge		
C-O-C number		Date Samples Received	: 05-MAR-2009
Sampler	: A.Wilson, S.Stevens	Issue Date	: 17-MAR-2009
Order number	:		
		No. of samples received	: 20
Quote number	: EN/001/08	No. of samples analysed	: 20

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

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

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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		Sample Date	E	traction / 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-S,	03-MAR-2009				13-MAR-2009	17-MAR-2009	✓
PZ03-D,	PZ02,							
PZ04,	QC04							
Clear Plastic Bottle - Natural								
PZ06-S,	PZ06-D	27-FEB-2009				13-MAR-2009	13-MAR-2009	✓
Clear Plastic Bottle - Natural								
PZ08-S,	PZ08-D,	28-FEB-2009				13-MAR-2009	14-MAR-2009	✓
PZ07-S,	PZ07-D,							
PZ05								
ED040F: Dissolved Major Anions								
Clear Plastic Bottle - Natural								
PZ11-D,	QC01	02-MAR-2009				10-MAR-2009	30-MAR-2009	✓
Clear Plastic Bottle - Natural								
PZ01,	PZ03-S,	03-MAR-2009				10-MAR-2009	31-MAR-2009	✓
PZ03-D,	PZ02,							
PZ04,	QC04							
Clear Plastic Bottle - Natural								
PZ06-S,	PZ06-D	27-FEB-2009				09-MAR-2009	27-MAR-2009	✓
Clear Plastic Bottle - Natural								
PZ08-S,	PZ08-D,	28-FEB-2009				10-MAR-2009	28-MAR-2009	✓
PZ07-S,	PZ07-D,							
PZ05								



Matrix: WATER					Evaluation	× = Holding time	breach ; ✓ = Withir	n holding time.
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045P: Chloride by PC Titrator								
Clear Plastic Bottle - Natural								
PZ11-D,	QC01	02-MAR-2009				13-MAR-2009	30-MAR-2009	✓
Clear Plastic Bottle - Natural								
PZ01,	PZ03-S,	03-MAR-2009				13-MAR-2009	31-MAR-2009	✓
PZ03-D,	PZ02,							
PZ04,	QC04							
Clear Plastic Bottle - Natural								
PZ06-S,	PZ06-D	27-FEB-2009				13-MAR-2009	27-MAR-2009	✓
Clear Plastic Bottle - Natural								
PZ08-S,	PZ08-D,	28-FEB-2009				13-MAR-2009	28-MAR-2009	1
PZ07-S,	PZ07-D,							
PZ05								
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural								
PZ11-D,	QC01	02-MAR-2009				10-MAR-2009	30-MAR-2009	1
Clear Plastic Bottle - Natural		•						
PZ01,	PZ03-S,	03-MAR-2009				10-MAR-2009	31-MAR-2009	1
PZ03-D,	PZ02,						0110000	•
PZ04,	QC04							
Clear Plastic Bottle - Natural	4007							
PZ06-S,	PZ06-D	27-FEB-2009				09-MAR-2009	27-MAR-2009	1
Clear Plastic Bottle - Natural	1200 B						21 100 0 1 2000	
PZ08-S,	PZ08-D,	28-FEB-2009				10-MAR-2009	28-MAR-2009	1
PZ07-S,	PZ07-D,	201 20-2000				10-111-110-2003	20 10/ 11 2000	•
PZ05	1207-0;							
Clear Plastic Bottle - Nitric Acid; Filtered								
PZ09		02-MAR-2009				10-MAR-2009	30-MAR-2009	1
		02 m/at 2000				10 110 110 2000	00 111 11 2000	<b>V</b>
EG020F: Dissolved Metals by ICP-MS			1					
Clear Plastic Bottle - Nitric Acid; Filtered		02-MAR-2009				09-MAR-2009	29-AUG-2009	
PZ09,	PZ11-D,	02-WAR-2009				09-IVIAR-2009	29-AUG-2009	✓
QC01								
Clear Plastic Bottle - Nitric Acid; Filtered	D702 C	00 MAR 0000					30-AUG-2009	
PZ01,	PZ03-S,	03-MAR-2009				09-MAR-2009	30-AUG-2009	✓
PZ03-D,	PZ02,							
PZ04,	QC04							
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							07 4110 0000	,
PZ08-S,	PZ08-D,	28-FEB-2009				09-MAR-2009	27-AUG-2009	✓
PZ07-S,	PZ07-D,							
PZ05								



Matrix: WATER					Evaluation	: × = Holding time	breach ; ✓ = Withir	n holding time
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered								
QC02,	QC03	02-MAR-2009	10-MAR-2009	29-AUG-2009	✓	10-MAR-2009	29-AUG-2009	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered								
QC05,	QC06	03-MAR-2009	10-MAR-2009	30-AUG-2009	✓	10-MAR-2009	30-AUG-2009	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered								
PZ09,	PZ11-D,	02-MAR-2009				13-MAR-2009	30-MAR-2009	✓
QC01								
Clear Plastic Bottle - Nitric Acid; Filtered								
PZ01,	PZ03-S,	03-MAR-2009				13-MAR-2009	31-MAR-2009	✓
PZ03-D,	PZ02,							
PZ04,	QC04							
Clear Plastic Bottle - Nitric Acid; Filtered								
PZ06-S,	PZ06-D	27-FEB-2009				13-MAR-2009	27-MAR-2009	✓
Clear Plastic Bottle - Nitric Acid; Filtered								
PZ08-S,	PZ08-D,	28-FEB-2009				13-MAR-2009	28-MAR-2009	✓
PZ07-S,	PZ07-D,							
PZ05								
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulphuric Acid								
PZ09,	PZ11-D,	02-MAR-2009				09-MAR-2009	30-MAR-2009	✓
QC01								
Clear Plastic Bottle - Sulphuric Acid								
PZ01,	PZ03-S,	03-MAR-2009				09-MAR-2009	31-MAR-2009	✓
PZ03-D,	PZ02,							
PZ04,	QC04							
Clear Plastic Bottle - Sulphuric Acid								
PZ06-S,	PZ06-D	27-FEB-2009				09-MAR-2009	27-MAR-2009	✓
Clear Plastic Bottle - Sulphuric Acid								
PZ08-S,	PZ08-D,	28-FEB-2009				09-MAR-2009	28-MAR-2009	✓
PZ07-S,	PZ07-D,							
PZ05								



#### Matrix: WATER Evaluation: $\mathbf{x}$ = Holding time breach ; $\mathbf{v}$ = Within holding time. Method Sample Date Extraction / Preparation Analvsis Container / Client Sample ID(s) Date extracted Due for extraction Evaluation Date analysed Due for analysis Evaluation EK059G: NOX as N by Discrete Analyser Clear Plastic Bottle - Sulphuric Acid PZ09, PZ11-D, 02-MAR-2009 10-MAR-2009 30-MAR-2009 ----- $\checkmark$ --------QC01 **Clear Plastic Bottle - Sulphuric Acid** PZ09 30-MAR-2009 02-MAR-2009 --------11-MAR-2009 $\checkmark$ ----Clear Plastic Bottle - Sulphuric Acid PZ01, PZ03-S, 03-MAR-2009 ----10-MAR-2009 31-MAR-2009 ✓ ----\_\_\_\_ PZ03-D, PZ02, PZ04, QC04 **Clear Plastic Bottle - Sulphuric Acid** PZ06-S, PZ06-D 27-FEB-2009 -----10-MAR-2009 27-MAR-2009 $\checkmark$ --------Clear Plastic Bottle - Sulphuric Acid PZ08-S. PZ08-D. 28-FEB-2009 10-MAR-2009 28-MAR-2009 1 \_\_\_\_ \_\_\_\_ ----PZ07-S. PZ07-D. PZ05 EK061: Total Kjeldahl Nitrogen (TKN) Clear Plastic Bottle - Sulphuric Acid 30-MAR-2009 PZ11-D. QC01 02-MAR-2009 10-MAR-2009 $\checkmark$ 10-MAR-2009 30-MAR-2009 $\checkmark$ **Clear Plastic Bottle - Sulphuric Acid** 02-MAR-2009 12-MAR-2009 30-MAR-2009 12-MAR-2009 30-MAR-2009 $\checkmark$ PZ09 $\checkmark$ **Clear Plastic Bottle - Sulphuric Acid** PZ01, PZ03-S, 03-MAR-2009 10-MAR-2009 31-MAR-2009 1 10-MAR-2009 31-MAR-2009 $\checkmark$ PZ03-D, PZ02, PZ04, QC04 **Clear Plastic Bottle - Sulphuric Acid** PZ06-S. PZ06-D 27-FEB-2009 10-MAR-2009 27-MAR-2009 $\checkmark$ 10-MAR-2009 27-MAR-2009 1 **Clear Plastic Bottle - Sulphuric Acid** PZ08-S, PZ08-D, 28-FEB-2009 10-MAR-2009 28-MAR-2009 $\checkmark$ 10-MAR-2009 28-MAR-2009 $\checkmark$ PZ07-S, PZ07-D, PZ05

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#### Matrix: WATER Evaluation: $\mathbf{x}$ = Holding time breach ; $\mathbf{v}$ = 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 EK067G: Total Phosphorus as P by Discrete Analyser Clear Plastic Bottle - Sulphuric Acid PZ09, PZ11-D, 02-MAR-2009 10-MAR-2009 30-MAR-2009 $\checkmark$ 10-MAR-2009 30-MAR-2009 $\checkmark$ QC01 Clear Plastic Bottle - Sulphuric Acid PZ01, PZ03-S, 31-MAR-2009 10-MAR-2009 31-MAR-2009 03-MAR-2009 10-MAR-2009 $\checkmark$ $\checkmark$ PZ03-D, PZ02, PZ04, QC04 Clear Plastic Bottle - Sulphuric Acid 27-FEB-2009 27-MAR-2009 27-MAR-2009 PZ06-S, PZ06-D 10-MAR-2009 10-MAR-2009 $\checkmark$ $\checkmark$ **Clear Plastic Bottle - Sulphuric Acid** PZ08-S, PZ08-D, 28-FEB-2009 10-MAR-2009 28-MAR-2009 $\checkmark$ 10-MAR-2009 28-MAR-2009 $\checkmark$ PZ07-S, PZ07-D, PZ05



## **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.

Quality Control Sample Type		С	ount		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Reaular	Actual	Expected	Evaluation	
_aboratory 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	1	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
/lajor 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	1	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	<ul> <li>✓</li> </ul>	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	1	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Fotal Metals by ICP-MS - Suite A	EG020A-T	2	20	10.0	10.0	~	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
otal Metals by ICP-MS - Suite B	EG020B-T	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
otal Metals by ICP-MS - Suite D	EG020D-T	2	20	10.0	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
otal Phosphorus as P By Discrete Analyser	EK067G	4	39	10.3	10.0	<ul> <li>✓</li> </ul>	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
_aboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	6	16.7	5.0	1	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Ammonia as N by Discrete analyser	EK055G	2	29	6.9	5.0	<u> </u>	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride by PC Titrator	ED045-P	1	6	16.7	5.0	<u> </u>	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Mercury by FIMS	EG035F	2	39	5.1	5.0	<u> </u>	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	6.1	5.0	1	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	33	6.1	5.0	1	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	<u> </u>	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
/ethod Blanks (MB)						-	
Ammonia as N by Discrete analyser	EK055G	2	29	6.9	5.0	1	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

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Matrix: WATER				Evaluation	n: × = Quality Cor	ntrol frequency r	ot within specification ; $\checkmark$ = Quality Control frequency within specification
Quality Control Sample Type		Сс	ount		Rate (%)		Quality Control Specification
Analytical Methods	Method	QC	Reaular	Actual	Expected	Evaluation	
Method Blanks (MB) - Continued							
Dissolved Metals by ICP-MS - Suite D	EG020D-F	2	33	6.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Anions - Filtered	ED040F	2	36	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Major Cations - Filtered	ED093F	2	40	5.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	39	5.1	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Nitrite as N by Discrete Analyser	EK057G	1	5	20.0	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	51	5.9	5.0	1	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	1	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite D	EG020D-T	1	20	5.0	5.0	1	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	1	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	1	ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.0	5.0	~	ALS QCS3 requirement
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	5.1	5.0	✓	ALS QCS3 requirement



## **Brief Method Summaries**

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by both manual measurement and automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Major Anions - Filtered	ED040F	WATER	APHA 21st ed., 3120 Sulfur and/or Silcon content is determined by ICP/AES and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Chloride by PC Titrator	ED045-P	WATER	APHA 21st ed., 4500 CI - B. Automated Silver Nitrate titration.
Major Cations - Filtered	ED093F	WATER	APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite B	EG020B-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite D	EG020D-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite D	EG020D-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.



Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ammonia as N by Discrete analyser	EK055G	WATER	APHA 21st ed., 4500 NH3+-G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite as N by Discrete Analyser	EK057G	WATER	APHA 21st ed., 4500 NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrate as N by Discrete Analyser	EK058G	WATER	APHA 21st ed., 4500 NO3F. Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	APHA 21st ed., 4500 NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	APHA 21st ed., 4500-Norg-D25mL water samples are digested using a traditional Kjeldahl digestion followed by determination by Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	APHA 21st ed., 4500 N org / NO3. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	APHA 21st ed., 4500 P-B&F This procedure involves sulphuric acid digestion of a 100mL sample to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using Discrete Analyser. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Ionic Balance by PCT and ICPAES	EN055	WATER	APHA 21st Ed. 1030F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	APHA 21st ed., 4500 Norg - D; APHA 21st ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)
Digestion for Total Recoverable Metals	EN25	WATER	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)



## Summary of Outliers

## **Outliers : Quality Control Samples**

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

#### Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

#### Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED045P: Chloride by PC Titrator	EB0903756-014	PZ04	Chloride	16887-00-6	Not		MS recovery not determined,
					Determined		background level greater than or
							equal to 4x spike level.

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

#### Regular Sample Surrogates

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

#### **Outliers : Analysis Holding Time Compliance**

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

• No Analysis Holding Time Outliers exist.

## **Outliers : Frequency of Quality Control Samples**

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

• No Quality Control Sample Frequency Outliers exist.

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